FINAL ENVIRONMENTAL ASSESSMENT

Environmental Assessment to Comply with FAA Design Standards, Meet Runway Length Requirements, Improve All-Weather Reliability, and Terminal Improvements

Pullman-Moscow Regional Airport

APPENDIX VOLUME II

November 2014

Mead&Hunt

In Partnership with:

JUB Engineers, Inc.
TO Engineers, Inc.
Epic Land Solutions, Inc.
GeoEngineers, Inc.
Transect Archaeology

Appendix A
Phase II Airport Master Plan Appendices

FINAL ENVIRONMENTAL ASSESSMENT

Appendix A – Glossary of Terms

ABOVE GROUND LEVEL (AGL): An elevation datum given in feet above ground level.

ACOUSTICAL: (Miriam-Webster Dictionary Online) Relating to the deadening or absorbing of sound.

ADVISORY CIRCULAR (AC): (FAA Library) Advisory Circulars (ACs) provide guidance such as methods, procedures, and practices for complying with regulations and grant requirements. ACs may also contain explanations of regulations, other guidance material, best practices, or information useful to the aviation community. They do not create or change a regulatory requirement.

AERONAUTICAL ACTIVITIES: (FAA AC 150/5190-6) Any activity that involves, makes possible, or is required for the operation of aircraft, or that contributes to or is required for the safety of such operations. Activities within this definition, commonly conducted on airports, include, but are not limited to, the following: general and corporate aviation, air taxi and charter operations, scheduled and nonscheduled air carrier operations, pilot training, aircraft rental and sightseeing, aerial photography, crop dusting, aerial advertising and surveying, aircraft sales and services, aircraft storage, sale of aviation petroleum products, repair and maintenance of aircraft, sale of aircraft parts, parachute or ultralight activities, and any other activities that, because of their direct relationship to the operation of aircraft, can appropriately be regarded as aeronautical activities. Activities, such as model aircraft and model rocket operations, are not aeronautical activities.

AERONAUTICAL INFORMATION MANUAL (AIM): A primary FAA publication whose purpose is to instruct airmen about operating in the National Airspace System of the U.S. It provides basic flight information, ATC Procedures and general instructional information concerning health, medical facts, factors affecting flight safety, accident and hazard reporting, and types of aeronautical charts and their use.

AERONAUTICAL STUDY: (FAA AC 70/7460-2K general definition) A study performed pursuant to FAR Part 77 "Objects Affecting Navigable Airspace" concerning the effect of proposed construction or alternation on the use of air navigation facilities or navigable airspace by aircraft. The conclusion of each study is normally a determination as to whether the specific proposal studied would be a hazard to air navigation and/or a determination for marking and/or lighting.

AIR CARRIERS: The commercial system of air transportation, consisting of the certificated air carriers, air taxis (including commuters), supplemental air carriers, commercial operators of large aircraft, and air travel clubs. (FAA Census)

AIR CARRIER, CERTIFICATED ROUTE: An air carrier holding a Certificate of Public Convenience and Necessity, issued by the U.S. Department of Transportation under Part 121 of the Federal Aviation Regulations (FAR), to conduct scheduled services over specified routes and a limited amount of nonscheduled operations.

AIR CARRIER, COMMUTER: An air taxi operator who, under FAR Part 135, (1) performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week, and places between which such flights are performed; or (2) transports mail by air pursuant to a contract with the U.S. Postal Service.

AIR ROUTE TRAFFIC CONTROL CENTER (ARTCC): A facility established to provide air traffic control service to aircraft operating on IFR flight plans within controlled airspace, principally during the en route phase of flight. When equipment capabilities and controller workload permit, certain advisory/assistance services may be provided to VFR aircraft. (AIM)

AIR TAXI: A classification of air carriers which directly engage in the air transportation of persons, property, mail, or in any combination of such transportation and which do not directly or indirectly utilize large aircraft (over 30 seats or a maximum payload capacity of more than 7,500 pounds) and do not hold a Certificate of Public Convenience and Necessity or economic authority issued by the Department of Transportation. (Also see commuter air carrier and demand air taxi.) (FAA Census)

AIR TRAFFIC CONTROL (ATC): (FAA FAR Sec. 1.1) A service operated by appropriate authority to promote the safe, orderly, and expeditious flow of air traffic.

AIR TRAFFIC: (FAA FAR Sec. 1.1) Aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.

AIR/FIRE ATTACK BASE: An established on-airport base of operations for the purposes of aerial suppression of large-scale fires by specially-modified aircraft. Typically, such aircraft are operated by the U.S. Forest Service.

AIRCRAFT: Any contrivance designed for navigation of or flight in the air.

AIRCRAFT APPROACH CATEGORY: A grouping of aircraft (Categories A–E) based on 1.3 times their stall speed in their landing configuration at their maximum certificated landing weight. (Airport Design)

AIRCRAFT OPERATION: The airborne movement of aircraft in controlled or non-controlled airport terminal areas and about given en route fixes or at other points where counts can be made. There are two types of operations — local and itinerant. (FAA Stats)

AIRCRAFT PARKING LINE LIMIT (APL): A line established by the airport authorities beyond which no part of a parked aircraft should protrude. (Airport Design)

AIRFIELD CAPACITY: The maximum number of aircraft operations (landings or takeoffs) that can take place on an airfield in a designated time period under specific conditions.

AIRPLANE DESIGN GROUP: A grouping of airplanes (Groups I–VI) based on wingspan. (Airport Design)

AIRPORT: (FAA FAR Sec. 152.3) Any areas of land or water that is used, or intended for use, for the landing and takeoff of aircraft. Any appurtenant areas that are used, or intended for use, for airport buildings, other airport facilities, or rights-of-way; and all airport buildings and facilities located on the areas specified in this definition.

AIRPORT ELEVATION: (FAA AC 150/5190-4A) The highest point on an airport's usable landing area measured in feet from sea level.

AIRPORT ENVIRONS: The land use and people in the areas surrounding an airport which can be directly affected by the operation of the airport.

AIRPORT HAZARD: (FAA FAR Sec. 152.3) Any structure or object of natural growth located on or in the vicinity of a public airport, or any use of land near a public airport that- obstruct the airspace required for the flight of aircraft landing or talking off at the airport; or is otherwise hazardous to aircraft landing or taking off at the airport.

AIRPORT IMPROVEMENT PROGRAM (AIP): (FAA Order 5050.4B) Chapter 471 of Title 49 USC establishes the general requirements and conditions for federally financing the Airport Improvement Program (AIP) that ARP administers on FAA’s behalf. AIP funding is used to develop a nationwide public-use airport system to meet the country’s current and projected civil aviation needs. The airports comprising that system make up the National Plan of Integrated Airport Systems (NPIAS). The AIP also provides funding for noise compatibility programs (NCPs) and implementing FAA-reviewed and approved recommendations comprising an NCP. FAA Order 5100.38, Airport Improvement Program Handbook, provides details on administering the AIP.

AIRPORT LAYOUT PLAN (ALP): (FAA FAR Sec. 152.3) The plan of an airport showing the layout of existing and proposed airport facilities.

AIRPORT MASTER PLAN: (FAA AC 150/5050-4) An airport master plan is a presentation of the phased development of a specific airport. It presents the research and logic from which the plan evolved and displays the plan in a graphic and written report. Master plans are applied to the modernization and expansion of existing airports and to site selection and planning for new airports, regardless of their size or functional role. It is desirable that airport master plans be developed within the framework of metropolitan or regional plans or state airport system plans.

AIRPORT MASTER RECORD: An FAA form (form 5010) that provides FAA with statistical information about an airport or heliport for its national airports database.

AIRPORT NOISE ABATEMENT POLICY: (FAA AC 2050-1) Policy adopted jointly by the Secretary of Transportation and the FAA, on November 18, 1976. delineating the responsibilities of FAA, air carriers, airport operators and local communities in achieving reductions in airport noise.

AIRPORT NOISE AND CAPACITY ACT OF 1990: (FAA Web site) This act required the establishment of a National Noise Policy and a requirement to eliminate Stage 2 aircraft weighing 75,000 pounds or greater operating in the contiguous United States by the year 2000.

AIRPORT OPERATIONS: (FAA Web site) The total number of movements in landings (arrivals) plus take-offs (departures) from an airport.

AIRPORT OVERLAY ZONE: A zone intended to place additional land use conditions on land impacted by the airport while retaining the existing underlying zone.

AIRPORT OWNER: (FAA Web site) Any person or authority having the operational control of an airport as defined in the ASNA Act.

AIRPORT REFERENCE CODE (ARC). (FAA Web site) The ARC is an FAA coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.

AIRPORT REFERENCE POINT (ARP): (FAA AC 150/5300-13) The latitude and longitude of the approximate center of the airport.

AIRPORT SPONSOR: (FAA AC 150/5190-6) The airport sponsor is the entity that is legally, financially, and otherwise able to assume and carry out the certifications, representations, warranties, assurances, covenants and other obligations require of sponsors, which are contained in the AIP grant agreement and property conveyances..

AIRPORT TRAFFIC CONTROL TOWER (ATCT): A terminal facility that uses air/ground communications, visual signaling, and other devices to provide ATC services to aircraft operating in the vicinity of an airport or on the movement area. (AIM)

AIRSIDE: (FAA Web site) That portion of the airport facility where aircraft movements take place, airline operations areas, and areas that directly serve the aircraft, such as taxiway, runway, maintenance and fueling areas.

AIRSPACE (FAA Web site) The space lying above the earth or above a certain area of land or water that is necessary to conduce aviation operations.

- Class A—Generally, that airspace from 18,000 feet MSL up to and including 60,000 feet MSL (Flight Level 600), including the airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous states and Alaska. Unless otherwise authorized, all persons must operate their aircraft under IFR.
- Class B—Generally, that airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports in terms of airport operations or passenger enplanements. The configuration of each Class B airspace area is individually tailored and consists of a surface area and two or more layers (some Class B airspaces areas resemble upside-down wedding cakes), and is designed to contain all published instrument procedures once an aircraft enters the airspace. An ATC clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace. The cloud clearance requirement for VFR operations is "clear of clouds".
- Class C—Generally, that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the configuration of each Class C airspace area is individually tailored, the airspace usually consists of a surface area with a 5 nm radius, and an outer area with a 10 nm radius that extends from 1,200 feet to 4,000 feet above the air¬port elevation. Each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while within the airspace. VFR aircraft are only separated from IFR aircraft within the airspace.
- Class D—Generally, that airspace from the surface to 2,500 feet above the airport elevation (chartered in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be Class D or Class E airspace. Unless otherwise authorized, each person must establish two-way radio communications with the ATC facility providing air traffic services prior to entering the airspace and thereafter maintain those communications while in the airspace. No separation services are provided to VFR aircraft.
- Class E—Generally, if the airspace is not Class A, Class B, Class C, or Class D, and it is controlled airspace, it is Class E airspace. Class E airspace extends upward from either the surface or a designated altitude to the overlying or adjacent controlled airspace. When designated as a surface area, the airspace will be configured to contain all instrument procedures. Also in this class are Federal airways, airspace beginning at either 700 or 1,200 feet AGL used to transition to/from the terminal or en route environment, en route domestic, and offshore airspace areas designated below 18,000 feet MSL. Unless designated at a lower altitude, Class E airspace begins at 14,500 MSL over the United States, including that airspace overlying the waters within 12 nautical miles of the coast of the 48 contiguous States and Alaska. Class E airspace does not include the airspace 18,000 feet MSL or above.

AIRSPACE DETERMINATION: A letter issued by the FAA as the end product of the “airspace study” required by FAR Part 157, Notice of Landing Area Proposal. Except for unusual cases, an airspace determination expresses “no objection” to use of airspace needed to operate to and from a heliport site. Therefore, it is not technically an “approval.” The airspace determination generally carries an 18-month expiration date from the date of issue but can be extended for an additional 12 months upon written request.

AIRSPACE STUDY: A study, required under FAR Part 157, conducted by FAA staff, to determine a proposed landing area’s (heliport’s) impact on safe and efficient use of the airspace needed to operate to and from the site.

AIRWAY/FEDERAL AIRWAY: A Class E airspace area established in the form of a corridor, the centerline of which is defined by radio navigational aids. (AIM)

ALERT AREA: A special use airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft. (AIM)

AMBIENT NOISE: (FAA Web site) The total amount of noise in a given place and time, which is usually a composite of sounds from varying sources at varying distances.

APPROACH AND RUNWAY PROTECTION ZONE MAP: The approach and Runway Protection Zone Map is compiled from the criteria in FAR Part 77, "Objects Affecting Navigable Airspace". It shows the area affected by the Airport Overlay Zoning Ordinance, and includes the layout of runways, airport boundaries, elevations, and area topography. Applicable height limitation areas are shown in detail.

APPROACH LIGHT SYSTEM (ALS): An airport lighting system which provides visual guidance to landing aircraft by radiating light beams in a directional pattern by which the pilot aligns the aircraft with the extended runway centerline during a final approach to landing. Among the specific types of systems are:

APPROACH SLOPES. (FAR Part 77) The ratios of horizontal to vertical distance indicating the degree of inclination of the Approach Surface. The various ratios include:

- 20:1. For all utility and visual runways extended from the primary surface a distance of 5,000 feet.
- 34:1. For all non-precision instrument runways extended from the primary surface for a distance of 10,000 feet.
- 50:1/40:1. For all precision instrument runways extending from the primary surface for a distance of 10,000 feet at an approach slope of 50.1 and an additional 40,000 feet beyond this at a 40:1 Approach Slope.

APPROACH SPEED: The recommended speed contained in aircraft manuals used by pilots when making an approach to landing. This speed will vary for different segments of an approach as well as for aircraft weight and configuration. (AIM)

APPROACH SURFACE. (FAA AC 150/5190-4A) A surface longitudinally centered on the extended runway centerline, extending outward and upward from the end of the primary surface and at the same slope as the approach zone height limitation slope set forth in this Ordinance. In plan the perimeter of the approach surface coincides with the perimeter of the approach zone.

APPROACH/DEPARTURE PATH: The flight path, normally centered within an approach/departure surface, intended for helicopters to follow when landing at or taking off from a heliport.

APPROACH/DEPARTURE SURFACE: (See Exhibit 1.) An imaginary surface, as defined in FAR Part 77, that begins at the end of the primary surface (FATO) and extends out and up along the approach/departure path. For heliports, it extends for a horizontal distance of 4,000 feet with a slope of eight feet horizontal to one foot vertical (ten-to-one for U.S. military heliports). The width of the approach/departure surface varies from the FATO's width at its inner edge to 500 feet at its outer edge. No object should penetrate an approach/departure surface's elevation within its lateral boundaries.

APRON/RAMP: A defined area on an airport or heliport intended to accommodate aircraft for purposes of loading passengers or cargo, refueling, parking, or maintenance.
AQUEOUS FILM FORMING FOAM (AFFF): A type of foam fire-fighting agent.

AREA NAVIGATION: (FAA FAR Sec 1.1)A method of navigation that permits aircraft operations on any desired flight path.

ASNA Act: (FAA Web site) The Aviation Safety and Noise Abatement Act of 1979, as amended (49 USC 2101 et seq.).

ASSOCIATION OF AIR MEDICAL SERVICES (AAMS): The industry trade organization composed primarily of companies dedicated to the aerial transportation of injured or ill medical patients as well as human organs.

ATTAINMENT AREA: (PLANNING AND URBAN DESIGN STANDARDS) A geographic area whose air has been determined through monitoring and modeling to have criteria pollutant levels below the primary standard.

AUTOMATED FLIGHT SERVICE STATION: An FAA facility providing pilots with a number of aviation-related services including weather briefing and filing of flight plans.

AUTOMATED SURFACE OBSERVATION SYSTEM (ASOS): The primary surface weather observing system in the U.S., supporting aviation operations and weather forecasting. Automated sensors record wind direction and speed, visibility, cloud ceiling, precipitation, etc. Data sent automatically to the National Weather Service. At many locations, a computer-generated voice broadcasts the minute-by-minute weather reports to pilots on a discrete radio frequency.

AUTOMATED WEATHER OBSERVING SYSTEM (AWOS): Airport electronic equipment which automatically measures meteorological parameters, reduces and analyzes the data via computer, and broadcasts weather information which can be received on aircraft radios in some applications, via telephone.

AUTOMATIC DIRECTION FINDER (ADF): An aircraft radio navigation system which senses and indicates the direction to a L/MF non-directional radio beacon (NDB) ground transmitter. (AIM)

AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS): The continuous broadcast of recorded non-control information in selected terminal areas. (AIM)
AUTOROTATION: The act of rotor rotation without engine power but solely by the aerodynamic forces induced by the rotor’s motion along its flight path.

AVERAGE DAY-NIGHT SOUND LEVEL (DNL): (FAA AC 5020-1) The 24-hour average sounds level, in decibels, for the period from midnight to midnight, obtained after the addition of ten decibels to sound levels for the periods between midnight and 7 a.m. and between 10 p.m. and midnight, local time, as averaged over a spans of one year. It is the FAA standard metric for determining the cumulative exposure of individuals to noise.

AVIGATION EASEMENT: (FAA Web site) A grant of a property interest in land over which a right of unobstructed flight in the airspace is established.

BACK COURSE APPROACH: A non-precision instrument approach utilizing the rearward projection of the ILS localizer beam.

BALANCED FIELD LENGTH: The runway length at which the distance required for a given aircraft to abort a takeoff and stop on the runway (accelerate-stop distance) equals the distance required to continue the takeoff and reach a height of 35 feet above the runway end (accelerate-go distance).

BASED AIRCRAFT: (FAA Web site) An aircraft permanently stationed at an airport by agreement between the aircraft owner and the airport management.

BEACON: See Heliport Beacon

BUILDING CODES: (The Practice of Local Government Planning) Codes, either local or state, that control the functional and structural aspects of buildings and/or structures. Local ordinances typically require proposed buildings to comply with zoning requirements before building permits can be issued under the building codes.

BUILDING RESTRICTION LINE (BRL): A line which identifies suitable building area locations on airports.

CEILING: Height above the earth's surface to the lowest layer of clouds or obscuring phenomena that is reported as "broken", "overcast", or "obscuration" and is not classified as "thin" or "partial". (AIM)

CERTIFICATED FLIGHT INSTRUCTOR (CFI): A pilot holding a Commercial Pilot Certificate who, after passing two written tests and a practical flight exam, is FAA-rated to give flight instruction. The flight instructor rating is specific as to type of instruction authorized, e.g., single-engine airplane, multi-engine airplane, instrument flying (CFII), helicopter; etc.

CERTIFICATED ROUTE AIR CARRIER: An air carrier holding a Certificate of Public Convenience and Necessity issued by the Department of Transportation authorizing the performance of scheduled service over specified routes, and a limited amount of nonscheduled service. (FAA Census)

CIRCLING APPROACH/CIRCLE TO LAND MANEUVER: A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight in landing from an instrument approach is not possible or is not desirable. (AIM)

CIVIL AIRCRAFT: (FAA FAR Sec. 1.1) Any aircraft other than a public aircraft.

CODE OF FEDERAL REGULATIONS (CFR): (FAA AIM Glossary) The FAA publishes the Code of Federal Regulations (CFRs) to make readily available to the aviation community the regulatory requirements placed upon them. These regulations are sold as individual parts by the Superintendent of Documents.

COMMERCIAL OPERATOR: A person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier. (FAR 1)

COMMERCIAL PILOT: Holder of an FAA Commercial Pilot Certificate, requiring a minimum of 250 flight hours (and other sub-requirements), a Commercial written test and Commercial flight test. The pilot certificate to fly for compensation or hire, often in a wide variety of commercial general aviation operations including sight-seeing, aerial application, glider towing and flight instruction. It does not necessarily imply flying for a scheduled airline. (See ATP. FYI: More than 40% of general aviation pilots are licensed as Commercial or ATP pilots, whether they fly for a living or not.)

COMMERCIAL SERVICE AIRPORT: (FAA Web site) A public airport that has at least 2,500 passengers boarding each year and is receiving scheduled passenger aircraft service.

COMMUNITY NOISE EQUIVALENT LEVEL (CNEL): The noise rating adopted by the State of California for measurement of airport noise. It represents the average daytime noise level during a 24 hour day, measured in decibels and adjusted to an equivalent level to account for the lower tolerance of people to noise during evening and nighttime periods.

COMMUTER AIR CARRIER: An air taxi operator which performs at least five round trips per week between two or more points and publishes flight schedules which specify the times, days of the week and places between which such flights are performed. (FAA Census)

COMPASS LOCATOR: A low power, low or medium frequency (L/MF) radio beacon installed at the site of the outer or middle marker of an instrument landing system (ILS). (AIM)

COMPASS ROSE: A circle, graduated in degrees, printed on some charts or marked on the ground at an airport. It is used as a reference to either true or magnetic direction. (AIM)

COMPATIBILITY: The degree to which land uses or types of development can coexist or integrate.

COMPREHENSIVE PLAN: (FAA Web site) Similar to a master plan, the comprehensive plan is a governmental entity's official statement of its plans and policies for long-term development. The plan includes maps, graphics and written proposals, which indicate the general location for streets, parks, schools, public buildings, airports and other physical development of the jurisdiction.

CONDITIONAL USE PERMIT: See Use Permit

CONDITIONAL ZONING: (FAA Web site) The imposition or exaction of conditions or promises upon the grant of zoning by the zoning authority.

CONTROLLED AIRSPACE: A generic term that covers the different classifications of airspace (Class A, Class B, Class C, Class D and Class E airspace) and defines dimensions within which air traffic control service is provided to IFR flights and to VFR flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

CYCLIC: One of the primary controls on a helicopter – controls forward and lateral motion.

DECIBEL (dB): (FAA Web site) Sound is measured by its pressure or energy in terms of decibels. The decibel scale is logarithmic; when the scale increases by ten, the perceived sound is two times as loud.

DEMAND AIR TAXI: Use of an aircraft operating under Federal Aviation Regulations, Part 135, passenger and cargo operations, including charter and excluding commuter air carrier. (FAA Census)

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM: A Federal program developed to ensure firms owned and controlled by minorities may take part in contracts supported with Federal funds.

DISPLACED THRESHOLD: A threshold that is located at a point on the runway other than the designated beginning of the runway. (AIM)

DISTANCE MEASURING EQUIPMENT (DME): Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid. (AIM)

EASEMENT: (FAA AC 5020-1)The legal right of one party to use a portion of the total rights in real estate owned by another party. This may include the right of passage over, on, or below property; certain air rights above the property, including view rights; and the rights to any specified from of development or activity, as well as any other legal rights in the property that may be specified in the easement document.

ELEVATED HELIPORT: A heliport elevated above the surrounding terrain or above the surrounding roof.

ELEVATION: The elevation, expressed as the distance above mean sea level, of the highest point of the FATO or FARA.

EMERGENCY EVACUATION FACILITY: A clear area on the roof of a tall building that is designed to accommodate helicopters engaged in firefighting and/or emergency evacuation operations related to building safety but is not intended to function as a heliport for other reasons.

ENPLANEMENT: (FAA Web site) A passenger boarding of a commercial flight.

ENVIRONMENTAL ASSESSMENT (EA): (FAA AC 150/5020-1) Environmental assessments are prepared for many types of airport development projects and/or airport operational changes under the requirements of the National Environmental Policy Act (NEPA), Regulations of the Council on Environmental Quality (CEQ), Department of Transportation Order 5610.1C (Procedures for Considering Environmental Impacts), FAA Order 1050.1C (Policies and Procedures for Considering Environmental Impacts), and FAA Order 5050.4 (Airport Environmental Handbook). Many EA's contain analyses of airport noise, compatible land use, social impacts, and induced socioeconomic impacts. An Airport Noise Compatibility Program may supplement, but is not intended to replace an EA in meeting required environmental analyses. Similarly, an EA may contain information that, provided it is current, can be valuable inputs to developing airport noise exposure maps and airport noise compatibility programs. To the extent the information in EA is appropriate; such use of existing sources is encouraged.

ENVIRONMENTAL IMPACT STATEMENT (EIS): (FAA Web site) A document that provides full and fair discussion of the significant environmental impacts that would occur as a result of a proposed project and informs decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts.

EUCLIDEAN ZONING: (FAA Web site) A traditional legislative method or device for controlling land use by establishing districts with boundaries and providing for specific uniform regulations as to type of permitted land use, height, bulk and lot coverage of structure, setback and similar building restrictions. (Reference from 1929 US Supreme Court landmark decision upholding zoning as a means of land use

EXCLUSIVE RIGHT: (FAA AC 150/5190-6) A power, privilege, or other right excluding or debarring another from enjoying or exercising a like power, privilege, or right. An exclusive right may be conferred either by express agreement, by imposition of unreasonable standards or requirements, or by any other means. Such a right conferred on one or more parties but excluding others from enjoying or exercising a similar right or rights would be an exclusive right.

FAA Form 5010: See Airport Master Record.

FAA Form 7460: See Notice of Proposed Construction or Alteration.

FAA Form 7480: See Notice of Landing Area Proposal.

FAR Part 150: (FAA FAR Sec. 150.1) Regulation pertaining to airport noise compatibility planning.

FAR Part 161: (FAA FAR Sec. 161.1) Regulation pertaining to notice and approval of airport noise and access restrictions.

FAR Part 36: (FAA FAR Sec. 36.1) Regulation establishing noise standards for the civil aviation fleet.

FAR Part 77: (FAA FAR Sec. 77.1)Objects Affecting Navigable Airspace - Part 77 (a) establishes standards for determining obstructions in navigable airspace; (b) defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; (c) provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; (d) provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and (e) provides for establishing antenna farm areas.

FAR Part 91: (FAA FAR Sec. 91.1) Regulation pertaining to air traffic and general operating rules, including operating noise limits.

FAR Part 157, NOTICE OF LANDING AREA PROPOSAL: The part of the FARs that specifies that a project proponent submit an application for a new heliport to FAA to initiate an “airspace study.” The study, conducted by FAA staff, results in an airspace determination.

FEDERAL AVIATION ADMINISTRATION (FAA): The United States government agency that is responsible for insuring the safe and efficient use of the nation's airspace.

FEDERAL AVIATION REGULATIONS (FAR): Regulations established and administered by the FAA that govern civil aviation and aviation-related activities.

FEDERAL GRANT ASSURANCE: (FAA AC 150/5190-6) A Federal grant assurance is a provision with a Federal grant agreement to which the recipient of Federal airport development assistance has agreed to comply in consideration of the assistance provided.

FINAL APPROACH AND TAKEOFF AREA (FATO): (See Exhibit 1.) A defined area over which the final phase of an approach to a hover, or a landing, is completed and from which the takeoff is initiated. Also called the primary surface. (Note: This area was also called the “takeoff and landing area” in older FAA publications.)

FINAL APPROACH REFERENCE AREA (FARA): A 150-foot wide by at least 150-foot long obstacle-free area located at the end of a precision instrument approach with its center aligned on the final approach course.

FINDING OF NO SIGNIFICANT IMPACT (FONSI): An administrative determination by the FAA that a proposed action by the airport sponsor will have no significant impact (on the environment). Specific guidelines for the preparation of a FONSI report (see EA) are included in FAA Orders 1050.1D and 5050.4A.

FIXED BASE OPERATOR (FBO): A business operating at an airport that provides aircraft services to the general public, including but not limited to sale of fuel and oil; aircraft sales, rental, maintenance, and repair; parking and tie-down or storage of aircraft; flight training; air taxi/charter operations; and specialty services, such as instrument and avionics maintenance, painting, overhaul, aerial application, aerial photography, aerial hoists, or pipeline patrol.

FLIGHT PLAN: Filed by radio, telephone, computer, or in person with Flight Service Stations, a record of aircraft number; type and equipment, estimated time of departure and time en route, route and altitude to be flown, amount of fuel and number of persons aboard, home base and contact phone number; and other information.

- VFR Flight Plan – Voluntary filing for cross-country flights under Visual Flight Rules. For search and rescue use only; it has no air traffic control role.
- IFR Flight Plan – Mandatory filing (at least one-half hour) before a flight under Instrument Flight Rules. Based on flight plan information, ATC can issue (immediately before departure) an IFR clearance to enter clouds or low visibility conditions for instrument rather than visual flight.

FLIGHT SERVICE STATION (FSS): FAA facilities which provide pilot briefings on weather, airports, altitudes, routes, and other flight planning information.

FLIGHT STANDARDS DISTRICT OFFICE (FSDO): A local FAA office providing services to and oversight of the aviation community. Normally, the FSDO's aviation safety inspector is the only FAA staff member who will make a site visit during the airspace determination process. The aviation safety inspector normally sends his/her comments to FAA's regional Flight Standards office.

FRACTIONAL OWNERSHIP: A company or individual buys, or leases, a fractional interest in one aircraft just as they might acquire a partial interest in one condo unit. They can use their own aircraft or another similar or identical aircraft a certain number of hours or days per year. The economics of each situation differs depending on the number of people who will use the aircraft, the value of their time to the company, and the dollars saved in airline tickets, hotels, etc.

FUEL/WATER SEPARATOR: A tank that separates fuel and/or oil that could leak out of a helicopter from storm water. A fuel/water separator directs rainwater into the local storm water system while storing fuel and/or oil for later removal.

FUSELAGE: The main structure, or central section, of an aircraft, which normally contains the crew, passengers, cargo, etc.

GENERAL AVIATION (GA): (FAA Web site) Refers to all civil aircraft and operations that are not classified as air carrier, commuter or regional. The types of aircraft used in general aviation activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons and dirigibles.

GENERAL AVIATION AIRPORT: Any airport that is not an air carrier airport, or a military facility.

GENERAL AVIATION HELIPORT: A public use heliport intended to accommodate individuals, corporations and helicopter air taxi operators. Scheduled passenger services may be available.

GENERIC VISUAL GLIDE SLOPE INDICATOR (GVGI): A generic term for the group of airport visual landing aids which includes Visual Approach Slope Indicators (VASI), Precision Approach Path Indicators (PAPI), and Pulsed Light Approach Slope Indicators (PLASI). When FAA funding pays for this equipment, whichever type receives the lowest bid price will be installed unless the airport owner wishes to pay the difference for a more expensive unit.

GLIDE SLOPE: An electronic signal radiated by a component of an ILS to provide descent path guidance to approaching aircraft.

GLOBAL POSITIONING SYSTEM (GPS): A relatively new navigational system which utilizes a network of satellites to determine a positional fix almost anywhere on or above the earth. Developed and operated by the U.S. Department of Defense, GPS has been made available to the civilian sector for surface, marine, and aerial navigational use. For aviation purposes, the current form of GPS guidance provides en route aerial navigation and selected types of non-precision instrument approaches. Eventual application of GPS as the principal system of navigational guidance throughout the world is anticipated.

GPS APPROACH: An instrument approach procedure to a heliport or runway in which pilots rely upon information provided by GPS satellites for navigation.

GRANT ASSURANCE: (FAA AC 150/5100-16A) The Grant Assurances, including Assurances 1, are required to be submitted as part of the application by sponsors requesting funds under the provisions of the Airport and Airway Improvement Act of 1982 and the Aviation Safety and Noise Abatement Act of 1979. Upon acceptance of the grant offer by the sponsor, the Grant Assurances, including Assurance 1, are incorporated in and become a part of the grant agreement.

GROWTH POLICY: (Planning and Urban Design Standards) A local or regional governmental policy intended to influence the rate, amount, type, location and/or quality of future development within the jurisdiction.

HANGAR: A building intended to be used for storage, maintenance, etc. of aircraft (note correct spelling – not “hanger”).

HAZARD TO AVIATION: Any object having a substantial adverse effect upon the safe and efficient use of the navigable airspace by aircraft or upon the operation of an air navigation facility. (Note: an obstruction is assumed to be a hazard unless determined not to be a hazard by an FAA study.)

HELICOPTER: A type of rotorcraft normally supported in the air by airfoils (rotors) mechanically rotated about an approximately vertical axis.

HELIDECK: A TLOF elevated above surrounding roof or terrain.

HELIPAD: A small, designated area, usually with a prepared surface, on a heliport, airport, landing/takeoff area, apron/ramp, or movement area used for takeoff, landing, or parking of helicopters. (AIM)

HELIPORT: An area of land, water or structure used or intended to be used for the landing and takeoff of helicopters with appurtenant buildings and facilities.

HELIPORT BEACON: A beacon light intended to help pilots find the general vicinity of a heliport. Heliport beacons sometimes consist of only one color but more often have three colors, typically green-white-yellow, to differentiate them from two-color airport beacons. Beacons can have either a rotating or three-globe sequentially flashing format.

HELIPORT REFERENCE POINT: The geographic position of a heliport expressed as its latitude and longitude coordinates at:

- The center of the FARA when the heliport has a precision instrument approach procedure.
- The center of the FATO, or the centroid of multiple FATOs, for heliports having visual and/or non-precision instrument approach procedures.

HELISTOP: A minimal heliport for boarding and discharging passengers and/or cargo. For hospitals, this equates to patients and/or organs. A helistop does not normally include refueling, maintenance or helicopter storage facilities although, at some sites, one helicopter may be stored on the landing pad. The heliport/helistop relationship has been described as similar to a bus terminal/bus stop relationship with respect to the extent of services provided or expected.

HIRL: High Intensity Runway Lights.

HOLD HARMLESS AGREEMENT: An agreement which holds airport sponsors or jurisdictions harmless for alleged damages resulting from airport operations. Such agreements are recorded in deeds or permits as a condition of approval of a regulatory land use decision.

HOSPITAL HELIPORT (HELISTOP): A heliport (helistop) limited to serving helicopters engaged in air ambulance or other hospital-related functions.

HOUSING CODES: (FAA Web site) The codes that usually apply to both existing and future living units. The codes include minimum standards of occupancy, and usually govern spatial, ventilation, wiring, plumbing, structural and heating requirements.

IMAGINARY SURFACES: (FAA FAR Part 77.25) Those areas established in relation to the airport and to each runway consistent with FAR Part 77 in which any object extending above these imaginary surfaces, by definition, is an obstruction.

- Transitional surface extends outward and upward at right angles to the runway centerline and extend at a slop of seven feet horizontally for each on foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to the point at which they intercept the horizontal surface at a height of 150 feet above the established airport elevation.
- Horizontal surface is a horizontal plane located 150 feet above the established airport elevation and encompasses an area from the transitional surface to the conical surface. The perimeter is constructed by generating arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs.
- Conical surface extends upward and outward from the periphery of the horizontal surface at a slope of 20 feet horizontally for every one foot vertically (20:1) for a horizontal distance of 4,000 feet.
- Approach surface is longitudinally centered on the extended runway centerline and extends outward and upward from the end of the runway primary surface. The approach slope of a runway is a ratio of

20:1, 34:1, or 50:1, depending on the approach type. The length of the approach surface varies from 5,000 to 50,000 feet and also depends upon the approach type.

INCOMPATIBLE LAND USE: (FAA FAR Sec. 150.7) The use of land which is normally incompatible with the aircraft and airport operations (such as, but not limited to, homes, schools, nursing homes, hospitals, and libraries).

INFRASTRUCTURE: (FAA Web site) A community's built elements that establish the community's foundation for maintaining existing populations, activities, future growth and development. Infrastructure elements include airports, roads, highways, bridges, water and sewer systems, waste disposal facilities, utilities, telecommunications systems, schools, and governmental and community facilities.

INNER MARKER: Innermost marker beacon on an ILS.

INSTRUMENT APPROACH PROCEDURE: (FAA Pilot/Controller Glossary) A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually. It is prescribed and approved for a specific airport by competent authority.

INSTRUMENT FLIGHT RULES (IFR): (FAA Pilot/Controller Glossary) Rules governing the procedure for conducting instrument flight. In addition, it is a term used by pilots and controllers to indicate a type of flight plan.

INSTRUMENT LANDING SYSTEM (ILS): (FAA Pilot/Controller Glossary) A precision instrument approach system which normally consists of the following electronic components and visuals aids: localizer, glideslope, outer marker, middle marker, and approach lights.

INSTRUMENT OPERATION: An aircraft operation in accordance with an IFR flight plan or an operation where IFR separation between aircraft is provided by a terminal control facility. (FAA ATA)

INSTRUMENT RUNWAY: A runway equipped with electronic and visual navigation aids for which a precision or non-precision approach procedure having straight-in landing minimums has been approved. (AIM)

INTEGRATED NOISE MODEL (INM). FAA's computer model used by the civilian aviation community for evaluating aircraft noise impacts near airports. The INM uses a standard database of aircraft characteristics and applies them to an airport's average operational day to produce noise contours.

ITINERANT OPERATION: (FAA AC 150/5325-4B) Takeoff or landing operations of airplanes going from one airport to another airport that involves a trip of at least 20 miles. Local operations are excluded.

KNOT: (nautical mile per hour) Most common measure of aircraft speed. 100 knots equals 115 statue miles per hour. (For mph, multiply knots by 1.15.)

LAND BANKING: The purchase of property by a government (state or local) to be held for future use and development either by the government or for resale for the development of compatible uses.

LAND USE COMPATIBILITY: (FAA Web site) The coexistence of land uses surrounding the airport with airport-related activities.

LAND USE CONTROLS: (FAA Web site) Measures established by state or local government that are designed to carry out land use planning. The controls include: zoning, subdivision regulations, planned acquisition, easements, covenants or conditions in building codes and capital improvement programs, such as the establishment of sewer, water, utilities or their service facilities.

LAND USE MANAGEMENT MEASURES: (FAA Web site) Land use management techniques that consist of both remedial and preventive measures. Remedial, or corrective, measures typically include sound insulation or land acquisition. Preventive measures typically involve land use controls that amend or update the local zoning ordinance, comprehensive plan, subdivision regulations, and building code.

LANDING AREA: (FAA Pilot/Controller Glossary) Any locality, either of land or water, including airports/heliports and intermediate landing fields, which is used, or intended to be used, for the landing and takeoff of aircraft whether or not facilities are provided for the shelter, servicing, or for receiving or discharging passengers or cargo.

LANDSIDE: (FAA Web site) That part of an airport used for activities other than the movement of aircraft, such as vehicular access roads and parking.

LARGE AIRCRAFT: An aircraft of more than 12,500 pounds maximum certificated takeoff weight. (FAR 1)

LATITUDE: A geographic coordinate expressing a point’s location as degrees, minutes and seconds north or south of the equator (0º). Used with longitude to define a specific location on the earth’s surface. Coordinates for a heliport normally define the center of the TLOF or, in the case of multiple TLOF’s the centroid.

LDIN: Lead in Light System.

LIGHTING AND MARKING OF HAZARDS TO AIR NAVIGATION: Installation of appropriate lighting fixtures, painted markings or other devices to such objects or structures that constitute hazards to air navigation

LIMITED AVIGATION EASEMENT: (FAA AC 150/5100-17) Action and resulting legal document which grants the purchaser the right of flight at any altitude above acquired surfaces. It also often prevents the erection or growth of all objects above the acquired surfaces. The right of entry to remove, mark, or light any structures or growth above acquired surfaces is also granted.

LOCAL OPERATION: (FAA Web site) Any operation performed by an aircraft that (a) operates in the local traffic pattern or within sight of the tower or airport, or (b) is known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the control tower or airport, or (c) executes a simulated instrument approach or low pass at the airport.

LOCALIZER (LOC): The component of an ILS which provides course guidance to the runway. (AIM)

LONGITUDE: A geographic coordinate expressing a point's location as degrees, minutes and seconds east or west of the Prime Meridian (0º), which passes through Greenwich, England. Used with latitude to define a specific location on the earth's surface. Coordinates for a heliport normally define the center of the TLOF or, in the case of multiple TLOF's the centroid.

LORAN: An electronic ground-based navigational system established primarily for marine use but used extensively for VFR and limited IFR air navigation.

MAGNETIC BEARING: True bearing corrected for magnetic declination to account for geographical difference between the true and magnetic north poles. Magnetic bearing is normally used to indicate flight path alignment.

MAGNETIC DECLINATION: The correction to a true bearing to account for the geographic difference between the true and magnetic poles. The declination value varies, depending on location on the earth's surface.

MALSR: Medium-intensity Approach Light System with Runway Alignment Indicator Lights.

MARKER BEACON (MB): The component of an ILS which informs pilots, both aurally and visually, that they are at a significant point on the approach course.

MAXIMUM GROSS TAKEOFF WEIGHT (MGTOW): The maximum weight with which an aircraft is permitted to takeoff. MGTOW includes the aircraft's empty weight plus the weight of fuel, oil, crew, passengers, baggage, cargo and removable equipment.

MEAN SEA LEVEL (MSL): Official elevations of runways and heliports are reported in feet above mean sea level (the midpoint between the highest and lowest sea levels)

MEDIATION: (FAA Web site) The use of a mediator or co-mediators to facilitate open discussion between disputants and assist them to negotiate a mutually agreeable resolution. Mediation is a method of alternative dispute resolution that provides an initial forum to informally settle disputes prior to regulatory intervention on the part of the FAA.

MEDIUM-INTENSITY APPROACH LIGHTING SYSTEM (MALS): The MALS is a configuration of steady-burning lights arranged symmetrically about and along the extended runway centerline. MALS may also be installed with sequenced flashers — in this case, the system is referred to as MALSF.

MILITARY OPERATIONS AREA (MOA): A type of special use airspace of defined vertical and lateral dimensions established outside of Class A airspace to separate/segregate certain military activities from IFR traffic and to identify for VFR traffic where these activities are conducted. (AIM)

MINIMUM DESCENT ALTITUDE (MDA): The lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach or during circle-to-land maneuvering in execution of a standard instrument approach procedure where no electronic glide slope is provided. (FAR 1)

MIRL: Medium Intensity Runway Lights.

MISSED APPROACH: A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. (AIM)

MITIGATION MEASURE: (FAA Web site) An action taken to alleviate adverse impacts.

MITIGATION: (FAA Web site) The avoidance, minimization, reduction, elimination or compensation for adverse environmental effects of a proposed action.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (NEPA): (FAA AC 150/5020.1) FAA compliance with the NEPA is controlled by FAA Order 1050.1C, Policies and Procedures for Considering Environmental Impacts. The FAA has determined that approval or disapproval of airport noise compatibility programs are “categorical exclusions” to the requirements for environmental assessment under Order 1050.1C. The ASNA Act requires an airport noise compatibility program to be either approved or disapproved within 180 days of receipt or it will be automatically approved. Development of a noise exposure map or noise compatibility program does not replace an environment assessment but can be used in the preparation of such an assessment. Environmental assessment leading to a finding of no significant impact or to any environmental impact statement must still be conducted, where required by applicable procedures, prior to taking any Federal implementing action such as grant approvals or covered air traffic actions. Although the 180 day time constraint does no permit the normal federal Environmental Impact Assessment process, consideration of the potential impacts remain an integral part of the planning process. Airport operators should fully consider environmental as well as noise and land use consequences in developing an airport noise compatibility program.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS (NPIAS): (FAA NPIAS Report) The Secretary of Transportation transmitted the 2007-2011 National Plan of Integrated Airport Systems (NPIAS) to Congress on September 29, 2006. The AIP-eligible development needs identified in this report were compiled as of December 2005 with selected updates through July 2006.

NAUTICAL MILE: (FAA Web site) A measure of distance equal to one minute of arc on the earth's surface, which is approximately 6,076 feet.

NAVIGABLE AIRSPACE: The airspace above minimum altitude for safe flight, and includes the airspace needed to ensure safety in take-off and landing of aircraft.

NAVIGATIONAL AID/NAVAID: Any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight. (AIM)

NOISE: (Planning and Urban Design Standards) Unwanted sound.

NOISE ABATEMENT PROCEDURES: (FAA Web site) Changes in runway usage, flight approach and departure routes and procedures, and vehicle movement, such as ground maneuvers or other air traffic procedures that shift aviation impacts away from noise sensitive areas.

NOISE COMPATIBILITY PROGRAM (NCP): (FAA AC 150/5020.1) The purpose of such a program is to seek optimal accommodation of both airport operations and community activities within acceptable safety, economic and environmental parameters. That may be accomplished by reducing existing non-compatible land uses in the vicinity of the airport and preventing the introduction of new non-compatible land uses in the future. To that end, the airport proprietor and other responsible officials should consider a wide range of feasible alternatives of noise control actions and land use patterns.

NOISE CONTOURS: Lines drawn on a map that connect points of equal noise exposure (Ldn) values. They are usually drawn in 5-dzB intervals, such as Ldn 75 dB values, Ldn 70 dB values, Ldn 65 dB values, and so forth.

NOISE EXPOSURE CONTOURS: (FAA Web site) Lines drawn around a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise.

NOISE EXPOSURE MAP (NEM). (FAA AC 150/5020.1) A scaled, geographic, depiction of an airport, its noise contours, and surrounding area developed in accordance with Section A150.101 of Appendix A of FAR Part 150, including the accompanying documentation setting forth the required descriptions of projected aircraft operations at the airport during 1985 and if submitted after 1982, during the fifth calendar year beginning after submission of the map, together with the ways, if any those operations for each of those years will affect the map.

NOISE IMPACT: A condition that exists when the noise levels that occur in an area exceed a level identified as appropriate for the activities in that area.

NOISE SENSITIVE AREA: (FAA AC 91-36D) Defined as an area where noise interferes with normal activities associated with the area’s use. Examples of noise-sensitive areas include residential, educational, health, and religious structures and sites, and parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historical sites where a quiet setting is a generally recognized feature or attribute..

NON-AERONAUTICAL ACTIVITIES: The following are examples of non-aeronautical activities: ground transportation (taxis, car rentals, limousines); restaurants; barber shops; auto parking lots. See Aeronautical Activities.

NON-ATTAINMENT AREA: (FAA Web site) Areas that exceeded the national ambient air quality standards for any of six pollutants (ozone or smog, carbon monoxide, lead, particulate matter, PM-10 or nitrogen dioxide).

NON-CONFORMING USE: (FAA Web site) Any pre-existing structure, tree, or use of land that is inconsistent with the provisions of the local land use or airport master plans.

NONDIRECTIONAL BEACON (NDB): A 4 MF or UHF radio beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction finding equipment can determine his bearing to or from the radio beacon and "home" on or track to or from the station. (AIM)

NONPRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which no electronic glide slope is provided. (FAR 1)

NONPRECISION INSTRUMENT RUNWAY: A runway with an instrument approach procedure utilizing air navigation facilities, with only horizontal guidance, or area-type navigation equipment for which a straight-in non-precision instrument approach procedure has been approved or planned, and no precision approach facility or procedure is planned. (Airport Design)

NONTOWERED AIRPORT: An airport without a control tower – the majority of America's 13,000 airports. Only 680 airports have control towers. Non-towered airports are far from being "uncontrolled." Pilots follow traffic pattern procedures and self-announce positions and intentions using the Common Traffic Advisory Frequency (CTAF), usually called the UNICOM frequency.

NOTICE TO AIRMEN (NOTAM): A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System) the timely knowledge of which is essential to personnel concerned with flight operations.

NOTICE OF LANDING AREA PROPOSAL: FAA Form 7480, submitted along with other documentation, to initiate an airspace study by FAA staff per FAR Part 157. The study results in an airspace determination.

NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION: FAA Form 7460, submitted along with other documentation, to initiate a study by FAA staff per FAR Part 77. The study results in an obstruction evaluation.

OBJECT (FAA AC 150/5300-13): Includes, but is not limited to above ground structures, NAVAIDSs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.

OBJECT FREE AREA (OFA): A surface surrounding runways, taxiways, and taxilanes which should be clear of parked airplanes and objects except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (Airport Design)

OBLIGATED AIRPORT: (FAA PPM 5190.10) A public use airport that is developed or improved with federal assistance under the various Federal grant programs, surplus property transfers, and other federal government deeds of conveyance.

OBSTACLE: An existing object, object of natural growth, or terrain at a fixed geographical location, or which may be expected at a fixed location within a prescribed area, with reference to which vertical clearance is or must be provided during flight operation. (AIM)

OBSTACLE FREE ZONE (OFZ): (FAA 150/5300-13) The OFZ is the airspace below 150 feet (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for the frangible visual NAVAID's that need to be located in the OFZ because of their function, in order to provide clearance protection for the aircraft landing or taking off from the runway, and for missed approaches.

OBSTRUCTION: (FAA AC 150/5190-4A) Any object, including a parked helicopter, exceeding the obstruction standards specified by FAR Part 77, Subpart C, Obstruction Standards

OBSTRUCTION EVALUATION: A study performed by FAA staff to determine if an object (building, tower, etc.) proposed near an airport or heliport would constitute an obstruction under the criteria specified in FAR Part 77 and, if so, if it would constitute a hazard to aviation.

OBSTRUCTION LIGHT: A red light designed to mark a potential airspace obstruction for pilots operating in the airspace near a heliport or airport.

ODALS—Omnidirectional Approach Light System, a combination of LDIN and REILS.

OFF AIRPORT PROPERTY: (FAA Web site) Property that is beyond the boundary of land owned by the airport sponsor.

ON AIRPORT PROPERTY: (FAA Web site) Property that is within the boundary of land owned by the airport sponsor.

OPERATION: Either the landing or the takeoff of an aircraft.

OUTER MARKER: A marker beacon at or near the glide slope intercept position of an ILS approach. (AIM)

OVERLAY ZONE: (FAA Web site) A mapped zone that imposes a set of requirements in addition to those of the underlying zoning district.

PART 150 STUDY: (FAA Web site) Part 150 is the abbreviated name for the airport noise compatibility planning process outlined in Part 150 of the Federal Aviation Regulation (FAR) that allows airport owners to voluntarily submit noise exposure maps and noise compatibility programs to the FAA for review and approval. See "Noise Compatibility Plan."

PART 77: (FAA FAR Sec. 77.31) 14 CFR Part 77, Objects Affecting Navigable Airspace, establishes standards for determining obstructions in navigable airspace; defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and provides for establishing antenna farm areas.

PASSENGER FACILITY CHARGE (PFC) PROGRAM: (FAA Website) Program allows the collection of fees up to a set dollar amount, approved by the FAA for every enplaned passenger at commercial airports controlled by public agencies. Airports use these fees to fund FAA-approved projects that enhance safety, security, or capacity; reduce noise; or increase air carrier competition.

PERFORMANCE STANDARDS: (FAA Web site and Planning and Urban Design Standards) Minimum acceptable levels of performance, imposed by zoning that must be met by each land use. These standards set limits on externalities such as noise, odor, smoke, dust, noxious gases, vibration, heat and glare. They may be used to control physical, traffic, and fiscal impacts of development.

PILOT-CONTROLLED LIGHTING (PCL): A system allowing pilots to control heliport lighting via the aircraft radio through a receiver/controller on the ground. Any of a number of frequencies can be used for the receiver/controller, the most common of which is 123.05 MHz.

PRECISION APPROACH PATH INDICATOR (PAPI): An airport visual landing aid similar to a VASI, but which has light units installed in a single row rather than two rows.

PRECISION APPROACH PROCEDURE: A standard instrument approach procedure in which an electronic glide slope is provided, such as an ILS or PAR. (FAR 1)

PRECISION INSTRUMENT RUNWAY: (FAA AC 150/5190-4A) A runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS) or a Precision Approach Radar (PAR). It also means a runway for which a precision approach system is planned and is so indicated on an approved airport layout plan or any other planning document.

PREVAILING WIND: Represents the general direction and speed of local winds under normal conditions. Ideally, a heliport should be laid out so that approach and departure paths will be into the prevailing winds.

PRIMARY RUNWAY: (FAA AC 150/5325-4B General Definition) The runway used for the majority of airport operations. Large, high-activity airports may operate two or more parallel primary runways.

PRIMARY SURFACE: (FAA AC 150/5190-4A) A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway; for military runways or when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway. The width of the primary surface is set forth in FAR Part 77. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline.

PRIVATE PILOT: The Private Pilot Certificate allows flying passengers for personal transportation and business. Requires the pilot to be at least 17 years old, have a minimum of 40 hours of flight experience and training (35 hours under Part 141), and pass at least a Third Class Medical exam, a written exam and flight test. May not “fly for hire or compensation” but may share expenses equally with passengers.

PRIVATE USE HELIPORT: A heliport intended for the exclusive use of its owner and persons authorized by its owner.

PUBLIC AIRCRAFT: An aircraft used exclusively in the service of any government or of any political subdivision thereof, including the government of any state, territory, or possession of the United States, or the District of Columbia, but not including any government-owned aircraft engaged in carrying persons or property for commercial purposes.

PUBLIC USE AIRPORT: (FAA AC 150/5190-6) Means either a publicly owned airport or a privately owned airport open for public use.

PUBLIC USE HELIPORT: A heliport available for use by the public without prior approval by the owner or operator.

RECREATIONAL PILOT: A pilot certificate requiring less training than a Private Certificate. Privileges limited accordingly to flight within 50 nautical miles of base, carrying no more than one passenger; using non-tower airports and flying during daylight hours only unless restrictions are removed through further training. May not share expenses. Few new pilots currently choose the recreational certificate.

RELIEVER AIRPORT: (FAA FAR Sec. 152.3) A general aviation airport designated by the Administrator as having the primary function of relieving congestion at an air carrier airport by diverting from that airport general aviation traffic.

RELOCATED THRESHOLD: The portion of pavement behind a relocated threshold that is not available for takeoff and landing. It may be available for taxiing and aircraft. (Airport Design)

RESTRICTED AREA: Designated airspace within which the flight of aircraft, while not wholly prohibited, is subject to restriction. (FAR 1)

ROTOR: A rotating system of airfoils that either support in the air (main rotor) or stabilize (tail rotor) a rotorcraft.

ROTORCRAFT: A power-driven aircraft, heavier than air, which is supported in flight by one or more rotors.

ROTORWASH: The local air circulation (wind) caused by a helicopter’s spinning rotors.

RUNWAY CLEAR ZONE: A term previously used to describe the runway protection zone.

RUNWAY EDGE LIGHTS: Lights used to define the lateral limits of a runway. Specific types include:

RUNWAY END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide a pilot with a rapid and positive visual identification of the approach end of a particular runway. (AIM)

RUNWAY PROTECTION ZONE (RPZ) (FAA AC 150/5300-13): A trapezoidal shaped area at the end of a runway, the function of which is to enhance the protection of people and property on the ground through airport owner control of the land. The RPZ usually begins at the end of each primary surface and is centered upon the extended runway centerline. (Airport Design)

RUNWAY SAFETY AREA (RSA) (FAA AC 150/5300-13): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overrun, or excursion from the runway. (Airport Design)

RUNWAY THRESHOLD: The beginning of that portion of a runway usable for landing or takeoff.

SAFETY AREA: A defined area, surrounding the FATO that is to be maintained free of objects above TLOF elevation. It is intended to reduce the risk of damage to helicopters accidentally diverging from the FATO, for example while performing turning maneuvers over it. The minimum width for a safety area is, for hospital and other PPR heliports, 1/3 the main rotor diameter or 10 feet, whichever is larger; for public use general aviation heliports, 1/3 the main rotor diameter or 20 feet, whichever is larger; and for public use transport heliports, 30 feet.

SAFETY NET: A device for fall protection surrounding an elevated TLOF. A safety net is intended to prevent falls as well as to warn people who might accidentally step off the TLOF. FAA recommends a five-foot wide safety net. However, for projects in California, safety nets should be six feet wide, to satisfy Cal-OSHA criteria.

SMALL AIRCRAFT: An aircraft of 12,500 pounds or less maximum certificated takeoff weight. (FAR 1)

SOUND ATTENUATION: (FAA FAR Part 150) Acoustical phenomenon whereby a reduction of sound energy is experienced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, constructed features (e.g., sound insulation) and natural features.

SOUND EXPOSURE LEVEL (SEL). (FAA FAR Sec. 150.7) The level, in decibels, of the time integral of squared A-weighted sounds pressure during a specified period or event, with reference to the square of the standard reference sound pressure of 20 micropascals and a duration of one second.

SPECIAL USE AIRSPACE: Airspace of defined horizontal and vertical dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. (AIM)

SPECIAL USE PERMIT: See Use Permit.

SSALR—Simplified Short Approach Light System with Runway Alignment Indicator Lights. (AIM)

STAGE 2 AIRCRAFT. (FAA Web site) Aircraft that meet the noise levels prescribed by FAR Part 36 and are less stringent than noise levels established for the quieter designation Stage 3 aircraft. The Airport Noise and Capacity Act requires the phase-out of all Stage 2 aircraft by December 31, 1999, with case-by-case exceptions through the year 2003.

STAGE 3 AIRCRAFT. (FAA Web site) Aircraft that meet the most stringent noise levels set forth in FAR Part 36.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned instrument flight rules (IFR) air traffic control departure procedure printed for pilot use in graphic and/or textual form. SID's provide transition from the terminal to the appropriate en route structure. (AIM)

STANDARD TERMINAL ARRIVAL ROUTE (STAR): A preplanned instrument flight rule (IFR) air traffic control arrival route published for pilot use in graphic and/or textual form. STARs provide transition from the en route structure to an outer fix or an instrument approach fix/arrival waypoint in the terminal area. (AIM)

STATUTE MILE: (FAA Web site) A measure of distance equal to 5,280 feet.

STOPWAY: An area beyond the takeoff runway, no less wide than the runway and centered upon the extended centerline of the runway, able to support the airplane during an aborted takeoff, without causing structural damage to the airplane, and designated by the airport authorities for use in decelerating the airplane during an aborted takeoff. (FAR 1)

STRAIGHT- IN INSTRUMENT APPROACH — IFR: An instrument approach wherein final approach is begun without first having executed a procedure turn; it is not necessarily completed with a straight in landing or made to straight in landing weather minimums. (AIM)

STRUCTURE: Any object constructed or installed by humans, including, but without limitation, buildings, towers, smokestacks, and overhead transmission lines, including the poles or other structures supporting the same.

TAILROTOR: The smaller rotor in the rear of a conventionally designed helicopter that provides directional stability. Heliports should be designed to minimize the potential for tail rotor strikes of people or objects. Therefore, access points to the heliport should be well away from where a tail rotor would normally be expected during or just after a normal approach of just before a normal departure.

TAXI: The movement of an airplane under it’s own power on the surface of an airport. Also, it describes the surface movement of helicopters equipped with wheels.

TAXILANE: The portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, storage facilities, etc. (Airport Design)

TAXIWAY: A defined path, from one part of an airport to another, selected or prepared for the taxiing of aircraft. (Airport Design)

TAXIWAY SAFETY AREA (TSA): (FAA AC 150/5300-13) A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TERMINAL AREA: (FAA Web site) A general term used to describe airspace in which airport traffic control or approach control service is provided.

TERMINAL INSTRUMENT PROCEDURES (TERPS): Procedures for instrument approach and departure of aircraft to and from civil and military airports. There are four types of terminal instrument procedures: precision approach, non-precision approach, circling, and departure.

TERMINAL RADAR SERVICE AREA (TRSA): Airspace surrounding designated airports wherein ATC provides radar vectoring, sequencing, and separation on a full-time basis for all IFR and participating VFR aircraft. (AIM)

THRESHOLD: The beginning of that portion of the runway usable for landing. (AIM)

TILTROTOR: A type of powered-lift aircraft with characteristics of both rotary wing and fixed wing aircraft. Tiltrotors have proprotors at each wingtip. The proprotors can be positioned to allow the aircraft to takeoff or land vertically, similar to a helicopter or horizontally, similar to a fixed-wing aircraft. Once airborne, proprotors can be tilted forward for horizontal flight.

TOUCH AND GO: An operation by an aircraft that lands and departs on a runway without stopping or exiting the runway. A touch and go is defined as two operations. (AIM)

TRAFFIC PATTERN: The traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport. The components of a typical traffic pattern are upwind leg, crosswind leg, downwind leg, base leg, and final approach. (AIM)

TRANSFER OF DEVELOPMENT RIGHTS (TDR):. (FAA Web site) This involves separate ownership and use of the various "rights" associated with a parcel of real estate. Under this concept, some of the property's development rights are transferred to a remote location where they may be used to intensify allowable development.

TRANSIENT AIRCRAFT: Aircraft not based at the airport.

TRANSITIONAL SURFACE: (FAA AC 150/5190-4A) These surfaces extend outward at 90 degree angles to the runway centerline and the runway centerline extended at a slope of seven (7) feet horizontally for each foot vertically from the aides of the primary and approach surfaces to where they intersect the horizontal and conical surfaces. Transitional surfaces for those portions of the precision approach surfaces, which project through and beyond the limits of the conical Surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at 90 degree angles to the extended runway centerline.

TRANSMISSOMETER: An apparatus used to determine visibility by measuring the transmission of light through the atmosphere. (AIM)

TRANSPORT HELIPORT: A public use heliport intended to accommodate air carrier operators providing scheduled or unscheduled service with large helicopters.

TRUE BEARING: Bearing expressed with respect to true north, often used to indicate flight path alignment.

TURBOJET AIRCRAFT: (FAA AC 20-147 General Definition) Aircraft operated by jet engines incorporating a turbine-driven air compressor to take in and compress the air for the combustion of fuel, the gases of combustion (or the heated air) are used both to rotate the turbine and to create a thrust-producing jet.

TURBOPROP AIRCRAFT: (FAA Web site) Aircraft in which the main propulsive force is supplied by a gas turbine driven conventional propeller. Additional propulsive force may be supplied from the discharged turbine exhaust gas.

ULTRALIGHT VEHICLE: An aeronautical vehicle operated for sport or recreational purposes which does not require FAA registration, an airworthiness certificate, nor pilot certification. They are primarily singe-occupant vehicles, although some two-place vehicles are authorized for training purposes. Operation of an ultralight vehicle in certain airspace requires authorization from ATC.

UNCONTROLLED AIRSPACE: Now known as Class G airspace. Class G airspace is that portion of the airspace that has not been designated as Class A, Class B, Class C, Class D, and Class E airspace.

UNICOM (Aeronautical Advisory Station): A nongovernment air/ground radio communication facility which may provide airport information at certain airports. (AIM)

UTILITY RUNWAY: A utility runway constructed for and intended to be used by propeller driven aircraft of 12,500 pounds gross weight or less.

VARIANCE: (FAA Web site) An authorization for the construction or maintenance of a building or structure, or for the establishment or maintenance of a use of land that is prohibited by a zoning ordinance. A lawful exception from specific zoning ordinance standards and regulations predicated on the practical difficulties and/or unnecessary hardships on the petitioner being required to comply with those regulations and standards from which an exemption or exception is sought.

VERTIPORT: A facility designed to accommodate powered-lift aircraft such as tiltrotors. A vertiport would normally have a short runway to facilitate rolling takeoffs in a quieter and more fuel-efficient mode than true vertical takeoffs.

VERY HIGH FREQUENCY OMNIDIRECTIONAL RANGE (VOR): The standard navigational aid used throughout the airway system to provide bearing information to aircraft. When combined with Distance Measuring Equipment (DME) or Tactical Air Navigation (TACAN) the facility, called VOR-DME or VORTAC, provides distance as well as bearing information.

VERY LIGHT JET (VLJ): A VLJ is an extremely small jet aircraft approved for single-pilot operation. With a maximum take-off weight under 10,000 lbs., they are lighter than business jets and seat between three and five passengers plus one crew member. A number of designs are currently in development and will feature advanced avionics with glass cockpit technology. VLJs are intended to have lower operating costs than conventional jets, and will be able to operate from runways as short as 3,000 feet. The two jets shown above were certified in 2006. These new jets will be used by pilot/owners, air taxi charter, and corporate operations.

VICTOR AIRWAY: A control area or portion thereof established in the form of a corridor, the centerline of which is defined by VOR's.

VISIBILITY: The ability, as determined by atmospheric conditions and expressed in units of distance, to see and identify prominent unlighted objects by day and prominent lighted objects by night. Visibility is reported as statute miles, hundreds of feet or meters.

1. Flight Visibility. The average forward horizontal distance, from the cockpit of an aircraft in flight, at which prominent unlighted objects may be seen and identified by day and prominent lighted objects may be seen and identified by night.
2. Ground Visibility. Prevailing horizontal visibility near the earth's surface as reported by the United States National Weather Service or an accredited observer.

VISUAL APPROACH SLOPE INDICATOR (VASI): An airport landing aid which provides a pilot with visual descent (approach slope) guidance while on approach to landing. Also see PAPI.

VISUAL APPROACH: (FAA Web site) An approach to an airport conducted with visual reference to the terrain.

VISUAL FLIGHT RULES (VFR): (FAA FAR Sec. 170.3) Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, "VFR" is used by pilots and controllers to indicate the type of flight plan.

VISUAL GLIDE SLOPE INDICATOR (VGSI): A generic term for the group of airport visual landing aids which includes Visual Approach Slope Indicators (VASI), Precision Approach Path Indicators (PAPI), and Pulsed Light Approach Slope Indicators (PLASI). When FAA funding pays for this equipment, whichever type receives the lowest bid price will be installed unless the airport owner wishes to pay the difference for a more expensive unit.

VISUAL RUNWAY: (FAA AC 150/5300-13) A runway without an existing or planned straight-in instrument approach procedure.

WARNING AREA: A type of special use airspace which may contain hazards to nonparticipating aircraft in international airspace. (AIM)

WEIGHT LIMITATION MARKING: For elevated TLOFs, a marking indicating the maximum weight, in thousands of pounds, that the TLOF is capable of supporting. For example, a “12” indicates a 12,000-pound maximum aircraft weight.

WEIGHTED SOUND LEVEL (also referred to as DBA) (FAA AC 20-133): A single event sound level which has been filtered or weighted to discriminate against the low and high frequency extremes to approximate the auditory sensitivity of the human ear.

WETLAND MITIGATION BANKING: (FAA AC 150/5200-33A) Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning.

WETLAND: Land on which water covers the soil or is present either at or near the surface of the soil or within the root zone, all year or for varying periods of time during the year, including during the growing season. (FAA AC 150/5200-33A) Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species

WINDCONE: A device designed to visually indicate wind speed and direction to pilots using a heliport. Heliports intended for nighttime use should have a lighted wind-cone. The common way of lighting wind-cones is with four downward directed flood lights mounted above the wind-cone although some are internally lighted. Either method is acceptable. A lighted wind-cone also normally includes a red obstruction light mounted on its mast.

WIND SHEAR: Large changes in either wind speed or direction at different altitudes which can cause sudden gain or loss of airspeed. Wind shear is especially hazardous when aircraft airspeeds are low on take-off or landing.

WINDSOCK: (See Wind-cone.)

YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (YDNL): (FAA FAR Sec. 150.7) The 365-day average, in decibels, day-night average sound level. The symbol for YDNL is also Ldn.

ZONING: (FAA AC 150/5020-1) An exercise of the police powers of the State, as delegated to local governments, designating the uses permitted on each parcel of land within the zoning jurisdiction

ZONING ORDINANCE: (FAA AC 150/5190-4A general definition) Primarily a legal document that allows a local government effective and legal regulation of uses of property while protecting and promoting the public interest

Frequently Used Terms and Acronyms:

AAAE:	American Association of Airport Executives
AAE:	Accredited Airport Executive
AALS:	Advanced Approach and Landing System
AAMS:	Association of Air Medical Services
AC:	Advisory Circular (FAA publications) – Informational policy and guidance material
ACI:	Airport Council International
ADO:	Airports District Office (FAA)
AFFF:	Aqueous Film Forming Foam
AFSS:	Automated Flight Service Station (FAA)
ALUC:	Airport Land Use Commission (California)
AGL:	Elevation Above Ground Level
AHS:	American Helicopter Society
AIM:	Aeronautical Information Manual – Instructions and procedures for operation aircraft in the U.S. National Airspace System
AIP:	Airport Improvement Program – Federal program administering financial grants-in-aid for airport development projects.
ALP:	Airport Layout Plan – Drawings illustrating existing and proposed property, facilities and structures.
AMS:	Air medical service
AOPA:	Aircraft Owners and Pilots Association
ARFF:	Airport Rescue and Fire Fighting
ARTCC:	Air Route Traffic Control Center
ASOS:	Automated Surface Observation System
ATC:	Air Traffic Control – Separation services involving aircraft utilizing a control tower.
ATIS:	Automated Terminal Information System – Provides continuous broadcast of an airport's current weather.
AVGAS:	Aviation gasoline
AWOS:	Automated Weather Observing System – Primary surface weather observing system in the U.S.
CIP:	Capital Improvement Program
CUP:	Conditional Use Permit
DME:	Distance measuring equipment – Aircraft navigation equipment
DNL:	Day-Night Average Sound – Decibel measurement determining noise.
EHLF:	Emergency helicopter landing facility
EMS:	Emergency medical service
ENG:	Electronic news gathering
FAA:	Federal Aviation Administration
FAR:	Federal Aviation Regulation
FARA:	Final approach reference area
FATO:	Final approach and takeoff area
FBO:	Fixed Base Operator
FONSI:	Finding of No Significant Impact – Determination by the FAA that a proposed action has no significant impact on the environment.

FSDO:	Flight Standards District Office (FAA)
GA:	General Aviation – Civil aviation except air carrier or air taxi.
GPS:	Global Positioning System
HAI:	Helicopter Association International
HRP:	Heliport reference point
ICAO:	International Council of Aviation Officials
IFR:	Instrument flight rules
ILS:	Instrument landing system
IMC:	Instrument Meteorological Conditions
MALSR:	Medium Intensity Approach Light System with Runway Alignment Indicator Lights
MGTOW:	Maximum gross takeoff weight
MHz	Megahertz
MSL:	Elevation above Mean Sea Level
MUP:	Major use permit
NAVAID:	Navigational Aid
NFPA	National Fire Protection Association
NOTAM:	Notice to Airmen – Notice containing airport/airspace information.
NOTAR:	“No tailrotor” technology
NTSB:	National Transportation Safety Board
OE:	Obstruction evaluation
PART 139:	Federal regulations for airports serving air carrier aircraft.
PCL:	Pilot-controlled lighting
PVT:	Private Use
PUC:	Public Utilities Code
SWPPP:	Storm Water Pollution Prevention Plan
TLA:	Three-letter acronym
TLOF:	Touchdown and liftoff area
TSA:	Transportation Security Administration
UHF:	Ultra high frequency
VASI	Visual approach slope indicator
VHF:	Very high frequency
VFR:	Visual flight rules
VMC:	Visual Meteorological Conditions
VOR:	Very high frequency omni-range
Z/ZULU:	Greenwich Mean Time

Sources:

FAR 1: Federal Aviation Regulations Part 1, Definitions and Abbreviations. (1993)

AIM: Airman's Information Manual, Pilot/Controller Glossary. (1993)

Airport Design: Federal Aviation Administration. Airport Design. Advisory Circular 150/5300-13, Change 11. (2007)

FAA ATA: Federal Aviation Administration. Air Traffic Activity. (1986)

FAA Census: Federal Aviation Administration. Census of U.S. Civil Aircraft. (1986)

FAA Stats: Federal Aviation Administration. Statistical Handbook of Aviation. (1984)

NTSB: National Transportation Safety Board. U.S. NTSB 830-3. (1989)

Pullman-Moscow Regional Airport

3200 Airport Complex North • Pullman, WA 99163
(509) 338-3223 • Fax (509) 334-5217

Robb Parish
Airport Manager

July 27, 2006

Ms. Mary Vargas
Seattle Airports District Office, SEA-633
Federal Aviation Administration
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Mary:

This letter presents the most recent actions taken to mitigate non-standard conditions at the Pullman-Moscow Regional Airport in order to facilitate changing the Airport Reference Code from design category BII to CIII aircraft. These actions are based on recommendations from FAA and the airports primary air carrier, Horizon Air. Following are the specific elements that have been completed:

- The south-side runway safety area has been graded to 250 feet;
- The runway 5 threshold has been displaced 290 feet and distances declared to provide for 600 foot approach safety areas and 1,000 foot departure safety areas for both runways;
- The Transponder Landing System has been removed and all associated obstacles inside the safety area eliminated;
- Intermediate hold-short lines have been painted on the general aviation ramps 65 feet north of the taxiway centerline providing 265 feet of clearance from the runway centerline;
- A Pilot education brochure has been developed and distributed to based-pilots. This brochure is also displayed in the FBO office for transient pilots;
- Proper communication procedures are taught by the FBO and by Horizon Air. In addition, the pilot information brochure instructs pilots on communication protocol ;
- PPR documents have been revised to include required CTAF procedures for design group III and approach category C unscheduled aircraft as well as disclosing non-standard conditions;
- Non-standard conditions and taxiway restrictions will be published in the next available edition of the Airport/Facility Directory;
- The airport web site has an ALERT link to an operational notice with specific taxiing instructions;
- Taxiing instructions are posted in the FBO office;

- The airport has coordinated this process with Horizon Air and they have developed special PUW operational procedures for flight crews;
- The airport is requesting a modification to standards be issued by FAA for those design conditions that cannot be corrected by the above actions;
- The airport master plan update contract has been awarded and the scope of work is directed toward planning for bringing the airport into compliance with CIII design standards.

The Pullman-Moscow Regional Airport and its primary air carrier, Horizon Air, believe these actions will ensure an acceptable level of safety for CIII aircraft while the airport completes its upgrades from BII to CIII design standards. If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Robb Parish
Airport Manager

Attachments: CIII Mitigation Actions
Airport Use Request Form
Airport Facility Directory Disclosures
Pilot Information Brochure
Photographs
Web Site Home Page and Alert Page
Taxiing instructions poster
Horizon Air Operational Procedures

CIII Mitigation Actions

Runway Safety Areas and Declared Distances

The south side runway safety area has been expanded to 250 feet. In order to lengthen the runway end safety areas, thresholds have been relocated as required by Advisory Circular 5300/13 for CIII aircraft. The runway 5 PAPI has also been lowered and runway markings and runway lights and modified as necessary. The Microwave Landing System (MLS) remains in place and has been successfully retained by a wall outside the safety area. The Transponder Landing System (TLS) equipment has been removed and is no longer a factor inside the safety area. Declared distances have been recalculated and have been published in the airport facility directory. Intermediate hold-short lines have been painted on the general aviation ramps to provide a visual indicator to aircraft preparing to taxi. This line is 65 feet north of the taxiway centerline providing an effective 265 foot runway safety area on the north side of the runway when the taxiway is clear of aircraft.

Pilot Education and Awareness

Because the parallel taxiway is within the 250 foot runway safety area, a pilot education program has been implemented to make based and transient pilots aware of limitations on taxiing aircraft during ARC CIII aircraft operations. An information brochure has been developed and distributed (see attached). In addition, the airport manager will participate in general aviation safety programs sponsored by the FBO and FAA. The airport is also working with Horizon Air flight operations to ensure that their flight crews are fully familiar with operating procedures at the Pullman-Moscow Regional Airport.

Communication Procedures on the Common Traffic Advisory Frequency (CTAF)

The Pullman-Moscow Regional Airport has well established communications procedures that are used by both general aviation and air carrier pilots. Because PUW is a busy uncontrolled airport, the FBO, Horizon Air, and the based corporate flight departments have previously implemented strict communications protocols that ensure safe operations at the airport. The FBO has a Part 141 flight school that teaches proper communications techniques and Horizon Air has established a remote observer program that includes a formal communication protocol for both air crews and ground crews. Communications procedures already in place at PUW include announcing aircraft type and location and altitude relative to the airport, operating intentions with regard to arrival and departure (including direction of arrival or departure), position in the traffic pattern, and taxiing movements. This communication regimen has evolved over time and has become a formal part of airport operations. In order to emphasize the importance of communication procedures these communication protocols are included in the pilot education and awareness materials. We also include communications requirements in the PPR forms (copy attached) that we send to unscheduled carriers with large aircraft. Finally, we have worked with Horizon Air flight operations to ensure that the established communications protocols are consistently used for every operation into PUW.

Airport/Facility Directory

Non-standard conditions, taxiing procedures, and communications requirements will be published in the airport/facility directory. A copy of the language is attached.

Special Operating Instructions

The airport has published and posted taxiing instructions on the web site (www.pullman-wa.gov/airport) and in the FBO office. This information is shown on pages 11, 12 and 13 of this plan.

Modification To Standards

FAA will approve a modification to airport design standards allowing the airport to service ARC CIII aircraft. The airport agrees that this modification to standards is contingent on progress toward permanently resolving all design issues and further, that the modification to standards will be subject to periodic review and approval.

PULLMAN-MOSCOW REGIONAL AIRPORT
AIRPORT USE REQUEST

COMPANY MAKING REQUEST (OPERATOR)____

ARRIVAL DATE:_____________________ TIME: in _______________out_______________

DEPARTURE DATE:__________________ TIME: in________________out_______________

AIRCRAFT TO BE UTILIZED__________AIRCRAFT GROSS LANDING WEIGHT: ______

CONTACT PERSON___________________PHONE # __________________________________

FAX #______________________________________

OPERATOR AGREES TO:

1. **GIVE NOTICE OF ARRIVAL, DEPARTURE, & LAYOVER TIMES AND ANY CHANGES**
   Operator will provide airport with arrival, departure, & any layovers at least 2 days prior to anticipated arrival date and will give at least 3 hours notice of any time change from those noted and 12 hours notice of any cancellations or date changes.

2. **CARRY INSURANCE**
   Operator shall carry and maintain liability insurance covering property damage, death, bodily injury and fire liability with a limit of at least $2,000,000.00. Additionally, operator must carry a combined single limit, bodily injury and property damage coverage for aircraft in motion claims, whether on airport property or in flight in amounts/limits meeting FAA requirements.

3. **ARRANGE GROUND HANDLING**
   Operator is responsible for, and has arranged appropriate ground handling equipment and personnel while at airport.

4. **PAY LANDING AND FACILITY USE FEES (AS NECESSARY)**
   Operator acknowledges and agrees to pay to airport a landing fee of 90 cents per 1,000 lbs maximum gross landing weight per landing at airport. Furthermore, operator agrees to pay fees for use of various airport facilities if utilized or needed. As indicated below, please note needed/requested services. Note: for flights between 0100 and 0500 a $75.00/hr ARFF callout fee will apply. Furthermore, if during actual operation services or facilities are needed or utilized a fee will be assessed whether requested or not.

5. **COLLECT PFC**
   Operator acknowledges that they are responsible for collecting and submitting to airport appropriate passenger facility charges ($4.50 per passenger) if applicable.

6. **ACKNOWLEDGE OWN RISK**
   Operator acknowledges that they are utilizing the airport at their own risk and have appropriately planned the flight considering airport non-standard design conditions as published in the Airport/Facility Directory, runway length, airport elevation, terrain surrounding airport, weather, and aircraft & crew capabilities. Furthermore, operator acknowledges that they are responsible for any damage to the airport, its facilities and structures caused as a result of their aircraft and/or operation on the airport.

7. COMPLY WITH AIRPORT OPERATING AND COMMUNICATIONS PROCEDURES

NOTE: due to the proximity of the parallel taxiway to the runway, the following procedures for large (78 foot wingspan or greater) or category C (approach speed 120 knots or greater) aircraft are in effect for PUW:

Arrival:

Announce on CTAF (122.8) that you are a large and/or category C aircraft inbound. Include an estimated time to landing. This is to allow any aircraft on the parallel taxiway time to exit or proceed to the run-up area near either end.

Departure:

1. Prior to taxiing onto the parallel taxiway:
- Announce on CTAF that you are a large and/or category C aircraft intending to takeoff. Include an estimated time to takeoff.
- Attempt to determine whether there are any large and/or category C aircraft inbound or preparing for takeoff.
- If there are other large and/or category C aircraft operations,
  - Delay taxi until the aircraft has cleared the runway or,
  - Determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.

2. Immediately prior to takeoff:
- Check for aircraft on the parallel taxiway.
- If an aircraft is on the parallel taxiway,
  - Delay takeoff until the aircraft has exited the taxiway or,
  - The aircraft has proceeded to the run-up area at either end.
- If an aircraft is on the parallel taxiway but is not exiting or proceeding to the run-up area at a reasonable speed,
  - Takeoff is authorized if the Captain has determined the other aircraft does not present a hazard.

8. HOLD AIRPORT HARMLESS

Operator will indemnify and hold the Pullman-Moscow airport, airport board, cities of Moscow and Pullman, port of Whitman county, Latah county, University of Idaho, and Washington State University, their agents, governing bodies, employees, and officers harmless against liability, costs and expense arising out of any and all claims or for loss or damage to property and for injuries to or deaths of any and all persons arising out of any and all claims of any negligent act or omission on the part of operator or the operators negligent use or occupancy of all portions of the airport, except a loss, liability or expense caused by the negligence or willful misconduct of the airport, its agents or employees.

I hereby understand, agree, accept, and will comply to the above stated terms, conditions, & fees as noted.

ACCEPTED: ______________________________________ ___________________

Signature of authorized agent of Operator Date:

The following services/facilities are requested and it is understood that the noted fees will be assessed (please initial after each service/facility needed/requested).

TERMINAL GATE ($ 50.00)____________ TICKET COUNTER ($100.00)__________________

RAMP PARKING (FREE)_______

TERMINAL PARKING (FREE)_________ DESIGNATED RAMP OBSERVER (15.00/HR)____

FIRE SERVICES (FREE)_

Airport/Facility Directory
Corrections and Proposed Remarks

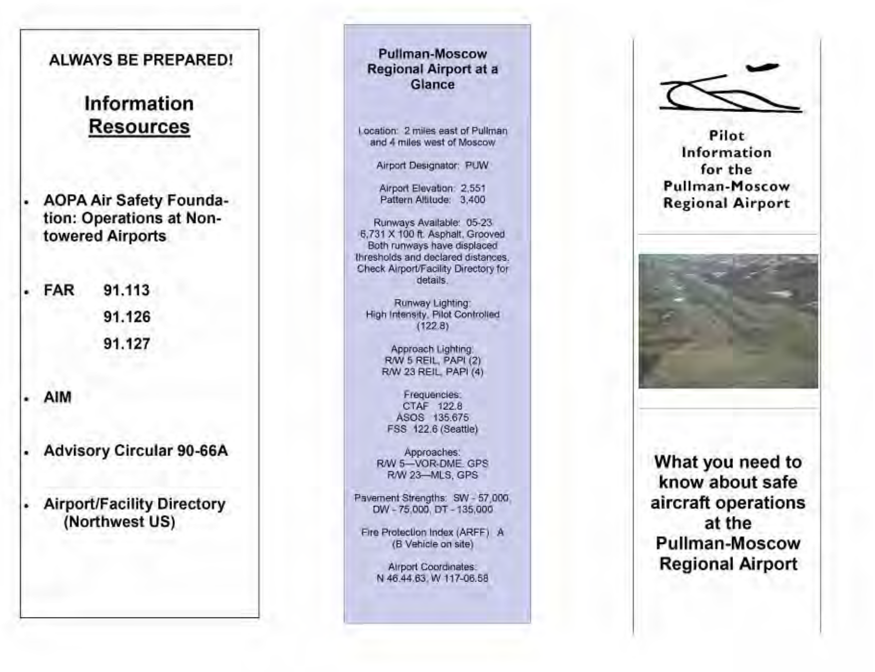
RWY 05-23: H6730X100 (ASPH-GRVD) S-57, D-75, DT-135 HIRL

RWY 05: REIL PAPI (P2L)—GA 3.0 TCH 55’, Thld dsplcd 290’
TORA 6730 TODA 6730 ASDA 6490 LDA 6200
Fence

RWY 23: REIL PAPI (P4L)—GA 4.0 THC 60’ Thld dsplcd 800’
TORA 6730 TODA 6730 ASDA 6040 LDA 5240
Ground

AIRPORT REMARKS Attended 1600-0200Z. Closed to unscheduled air carrier ops with more than 30 passenger seats except PPR call arpt manager 509-338-3223. Non-paved areas soft. No parking between rwy and taxiway and within 35’ of taxiway to the north. Landing fee. Pilots of aircraft with greater than a 78 foot wingspan or with a category C approach speed must include in arrival or departure communications that they are a large aircraft and/or category C aircraft. Pilots of all aircraft must delay taxiing and remain behind intermediate hold short line when large and/or approach category C aircraft operations are in progress. Activate HIRL Rwy 05-23—CTAF.

Tri-Fold Pilot Information Brochure



ALWAYS BE PREPARED!

Information
Resources

- **AOPA Air Safety Foundation: Operations at Non-towered Airports**
- **FAR 91.113**
  91.126
  91.127
- **AIM**
- **Advisory Circular 90-66A**
- **Airport/Facility Directory (Northwest US)**

Pullman-Moscow Regional Airport at a Glance

Location: 2 miles east of Pullman and 4 miles west of Moscow

Airport Designator: PUW

Airport Elevation: 2,551
Pattern Altitude: 3,400

Runways Available: 05-23
6,731 X 100 ft. Asphalt, Grooved
Both runways have displaced thresholds and declared distances. Check Airport/Facility Directory for details.

Runway Lighting:
High Intensity, Pilot Controlled (122.8)

Approach Lighting:
R/W 5 REIL, PAPI (2)
R/W 23 REIL, PAPI (4)

Frequencies:
CTAF 122.8
ASOS 135.675
FSS 122.6 (Seattle)

Approaches:
R/W 5—VOR-DME, GPS
R/W 23—MLS, GPS

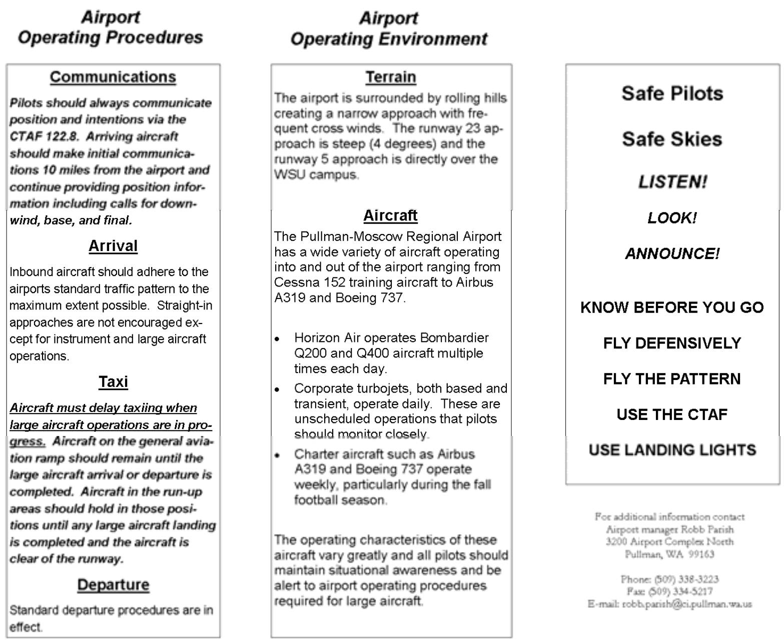
Pavement Strengths: SW - 57,000, DW - 75,000, DT - 135,000

Fire Protection Index (ARFF) A
(B Vehicle on site)

Airport Coordinates:
N 46.44.63, W 117-06.58

Pilot Information for the Pullman-Moscow Regional Airport

What you need to know about safe aircraft operations at the Pullman-Moscow Regional Airport



Airport Operating Procedures

Communications

Pilots should always communicate position and intentions via the CTAF 122.8. Arriving aircraft should make initial communications 10 miles from the airport and continue providing position information including calls for downwind, base, and final.

Arrival

Inbound aircraft should adhere to the airports standard traffic pattern to the maximum extent possible. Straight-in approaches are not encouraged except for instrument and large aircraft operations.

Taxi

Aircraft must delay taxiing when large aircraft operations are in progress. ***Aircraft on the general aviation ramp should remain until the large aircraft arrival or departure is completed. Aircraft in the run-up areas should hold in those positions until any large aircraft landing is completed and the aircraft is clear of the runway.***

Departure

Standard departure procedures are in effect.

Airport Operating Environment

Terrain

The airport is surrounded by rolling hills creating a narrow approach with frequent cross winds. The runway 23 approach is steep (4 degrees) and the runway 5 approach is directly over the WSU campus.

Aircraft

The Pullman-Moscow Regional Airport has a wide variety of aircraft operating into and out of the airport ranging from Cessna 152 training aircraft to Airbus A319 and Boeing 737.

- Horizon Air operates Bombardier Q200 and Q400 aircraft multiple times each day.
- Corporate turbojets, both based and transient, operate daily. These are unscheduled operations that pilots should monitor closely.
- Charter aircraft such as Airbus A319 and Boeing 737 operate weekly, particularly during the fall football season.

The operating characteristics of these aircraft vary greatly and all pilots should maintain situational awareness and be alert to airport operating procedures required for large aircraft.

Safe Pilots

Safe Skies

LISTEN!

LOOK!

ANNOUNCE!

KNOW BEFORE YOU GO

FLY DEFENSIVELY

FLY THE PATTERN

USE THE CTAF

USE LANDING LIGHTS

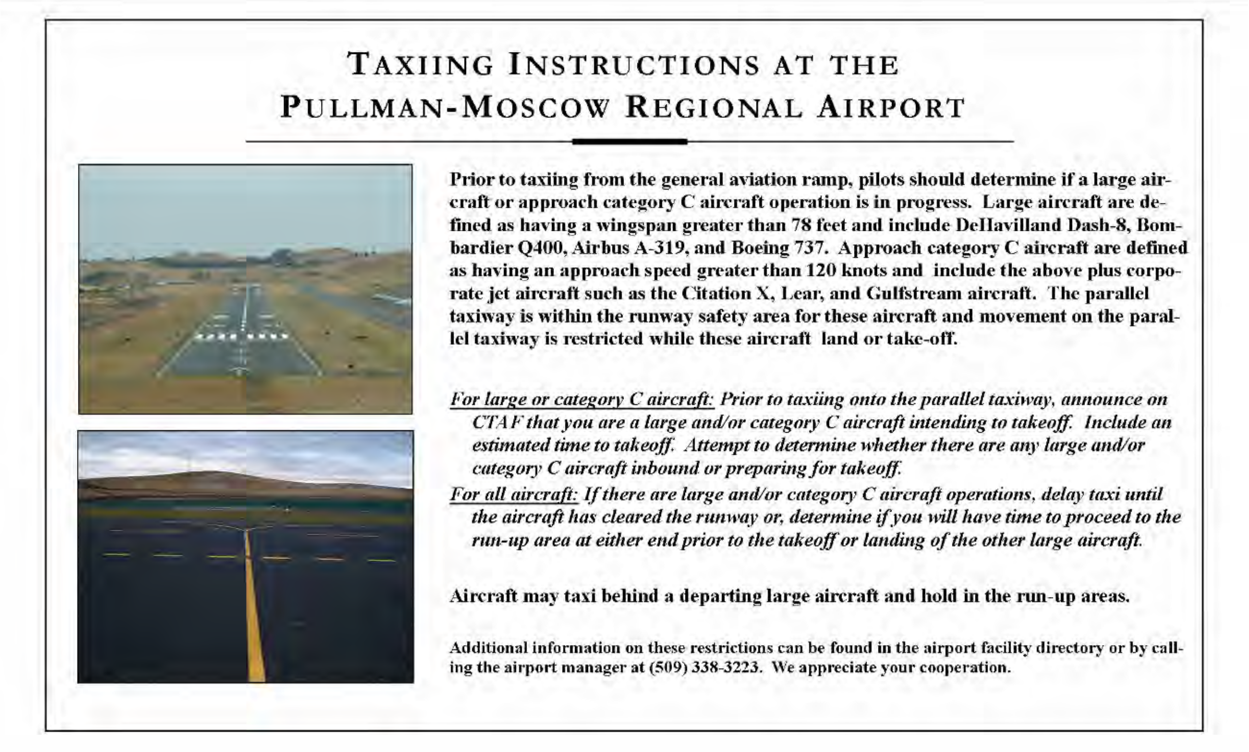
For additional information contact
Airport manager Robb Parish
3200 Airport Complex North
Pullman, WA 99163

Phone: (509) 338-3223
Fax: (509) 334-5217
E-mail: robb.parish@ci.pullman.wa.us

Runway Safety Area

Intermediate Hold-short Lines

Poster on Display in the FBO Office



TAXIING INSTRUCTIONS AT THE PULLMAN-MOSCOW REGIONAL AIRPORT

Prior to taxiing from the general aviation ramp, pilots should determine if a large aircraft or approach category C aircraft operation is in progress. Large aircraft are defined as having a wingspan greater than 78 feet and include DeHavilland Dash-8, Bombardier Q400, Airbus A-319, and Boeing 737. Approach category C aircraft are defined as having an approach speed greater than 120 knots and include the above plus corporate jet aircraft such as the Citation X, Lear, and Gulfstream aircraft. The parallel taxiway is within the runway safety area for these aircraft and movement on the parallel taxiway is restricted while these aircraft land or take-off.

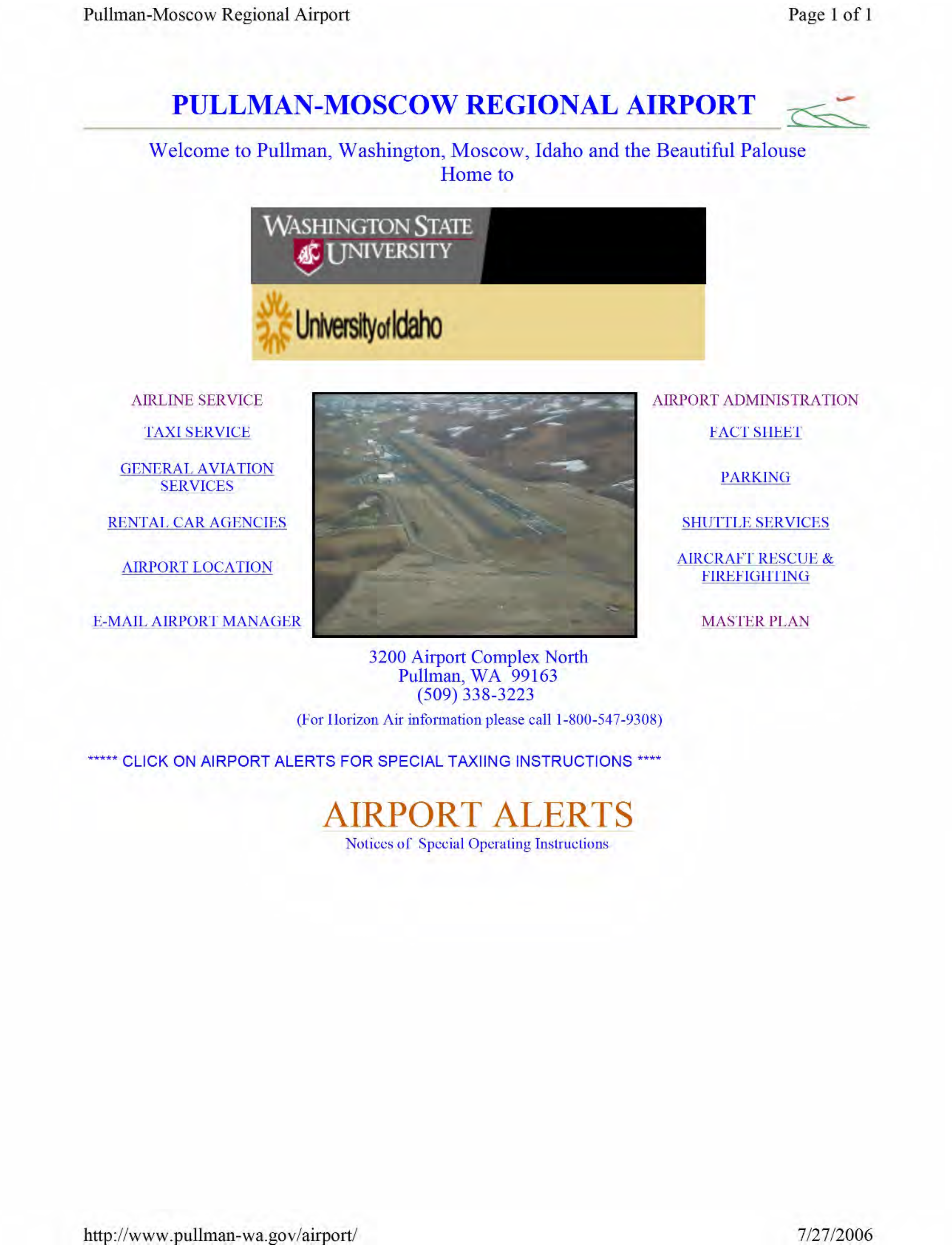
***For large or category C aircraft:* Prior to taxiing onto the parallel taxiway, announce on CTAF that you are a large and/or category C aircraft intending to takeoff. Include an estimated time to takeoff. Attempt to determine whether there are any large and/or category C aircraft inbound or preparing for takeoff.**

***For all aircraft:* If there are large and/or category C aircraft operations, delay taxi until the aircraft has cleared the runway or, determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.**

Aircraft may taxi behind a departing large aircraft and hold in the run-up areas.

Additional information on these restrictions can be found in the airport facility directory or by calling the airport manager at (509) 338-3223. We appreciate your cooperation.

Airport Web Page with Link to Taxiing Instructions



Pullman-Moscow Regional Airport Page 1 of 1

PULLMAN-MOSCOW REGIONAL AIRPORT

Welcome to Pullman, Washington, Moscow, Idaho and the Beautiful Palouse
Home to

WASHINGTON STATE UNIVERSITY

University of Idaho

AIRLINE SERVICE	AIRPORT ADMINISTRATION
TAXI SERVICE	FACT SHEET
GENERAL AVIATION SERVICES	PARKING
RENTAL CAR AGENCIES	SHUTTLE SERVICES
AIRPORT LOCATION	AIRCRAFT RESCUE & FIREFIGHTING
E-MAIL AIRPORT MANAGER	MASTER PLAN

3200 Airport Complex North
Pullman, WA 99163
(509) 338-3223

(For Horizon Air information please call 1-800-547-9308)

***** CLICK ON AIRPORT ALERTS FOR SPECIAL TAXIING INSTRUCTIONS ****

AIRPORT ALERTS
Notices of Special Operating Instructions

http://www.pullman-wa.gov/airport/ 7/27/2006

Airport Alerts links to the document shown on this page. The Operational Notice will be a permanent display on this page.

Operational Alert Page 1 of 1

PULLMAN-MOSCOW REGIONAL AIRPORT

Operational Notice

Prior to taxiing from the general aviation ramp, pilots should determine if a large aircraft or approach category C aircraft operation is in progress. Large aircraft are defined as having a wingspan greater than 78 feet and include DeHavilland Dash-8, Bombardier Q400, Airbus A-319, and Boeing 737. Approach category C aircraft are defined as having an approach speed greater than 120 knots and include the above plus corporate jet aircraft such as the Citation X, Lear, and Gulfstream aircraft. The parallel taxiway is within the runway safety area for these aircraft and movement on the parallel taxiway is restricted while these aircraft land or take-off.

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Additional information on these restrictions can be found in the airport facility directory or by calling the airport manager at 338-3223.

http://www.pullman-wa.gov/airport/airportalerts.htm 7/27/2006

Horizon Air Operational Procedures (Draft)

Specific Airport Procedures

Pullman (KPUW)

Due to the proximity of the parallel taxiway to the runway, procedures in addition to normal Radio Remote communications outlined in section 4 of the FOM are necessary during arrival and departure at KPUW.

For the purposes of this procedure large aircraft means those with a wingspan greater than 80 feet.

Arrival

- An announcement shall be made on CTAF that you are a large aircraft inbound.
  Include an estimated time to landing.
  - This is to allow any aircraft on the parallel taxiway time to exit or proceed to the run-up area near either end.

Departure

3. Prior to taxiing onto the parallel taxiway:
   - Announce on CTAF that you are a large aircraft intending to takeoff.
     Include an estimated time to takeoff.
   - Attempt to determine whether there are any large aircraft inbound or preparing for takeoff.
   - If there are other large aircraft operations,
     - Delay taxi until the aircraft has cleared the runway or,
     - Determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.
4. Immediately prior to takeoff:
   - Check for aircraft on the parallel taxiway.
   - If an aircraft is on the parallel taxiway,
     - Delay takeoff until the aircraft has exited the taxiway or,
     - The aircraft has proceeded to the run-up area at either end.
   - If an aircraft is on the parallel taxiway but is not exiting or proceeding to the run-up area at a reasonable speed,
     - Takeoff is authorized if the Captain has determined the other aircraft does not present a hazard.

The existence of any aircraft on the parallel taxiway does not constitute the need for a go-around, missed approach or aborted takeoff.

There is no requirement for the flight crew to monitor the status of the parallel taxiway during takeoff or landing.

Station personnel shall monitor and advise of any aircraft activity on the parallel taxiway prior to takeoff operations.

PULLMAN-MOSCOW REGIONAL AIRPORT

MARKET OUTLOOK AND AIRLINE ASSESSMENT

OCTOBER 28, 2010

MEAD & HUNT

AirService@meadhunt.com
(541) 689-9997

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INTRODUCTION

The constantly changing air transportation needs of communities and the dynamics of the airline industry create an on-going challenge for smaller communities in the United States. Today, smaller communities are faced with intense competition for air service. Following September 11, 2001, airlines, struggling to remain in business, reduced capacity nationwide and focused on the performance of the high density markets. Smaller communities experienced dramatic reductions in service; while, at the same time, airlines were phasing lower capacity aircraft out of their fleets. Now, these challenges have been further compounded by the fluctuating cost of fuel and the weak economy making service expansion and/or retention within regional airport markets like Pullman-Moscow even more difficult.

This *Market Outlook and Airline Assessment* is another effort to understand and evaluate the Pullman-Moscow air service market, to facilitate actions that counter the threat of air service reductions, and improve the odds for service improvements. To that end, this *Market Outlook and Airline Assessment* provides objective, comparative data compiled from industry sources on Pullman-Moscow's air service market. It is a performance report or "report card", and its purpose is to provide market information used to guide air service retention and development efforts; however, this is a very volatile time in the industry financially. Airlines take many factors into consideration when making capacity and route decisions.

Understanding today's issues within the industry can help a community identify potential opportunities and risks. While most of 2007 was a good year for the airlines, the airlines experienced large losses in 2008/2009 (reference airline earnings/losses **Table 1.1**). A 150 percent rise in oil prices from September 2007 to the peak in July 2008 put the industry on edge. Oil prices have been fluctuating between $60 and $80 per barrel. These 20 to 25 percent changes in oil prices continue to be a serious concern for the airlines and their cost structures. Complicating the environment is the current economic state of the nation. While oil prices have retreated from the record highs, the industry is still in distress due to the economy and longer term concern about where energy prices and the economy will end up.

To cope with the economic crisis, many airlines cut capacity so that they can squeeze out higher revenue on the remaining seats. Some airlines have cut capacity by as much as 10 to 15 percent year over year. Also, the industry is going through a large scale change in onboard service amenities. Many carriers have "unbundled" the services that used to be free. Checked baggage fees, paying for food and drink on board, fuel surcharges and other fees are designed to keep the airline's fare competitive with the low-cost carriers yet, at the same time, bring in a new stream of ancillary revenue to help offset the cost increases and lagging ticket revenues. Airlines are also continuing their relentless pursuit of lower costs. Fuel management programs and other process efficiencies help lower costs.

TABLE 1.1 AIRLINE EARNINGS/LOSS

	2007				2008				2009				2010	
AIRLINE	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Air Tran	2	42	17	(4)	(35)	(34)	(66)	29	29	47	11	10	(17)	39
Alaska	(16)	47	79	(18)	(36)	(14)	40	16	(25)	27	83	4	13	84
Allegiant	10	10	7	5	10	3	5	18	28	24	14	11	23	18
American	81	317	215	(184)	(328)	(284)	(360)	(214)	(341)	(319)	(265)	(415)	(452)	(11)
Continental	26	235	253	24	(85)	(25)	(145)	(96)	(132)	(169)	2	4	(136)	257
Delta	(6)	373	363	(105)	(274)	(137)	(26)	(340)	(693)	(191)	51	(225)	(192)	549
Frontier	(10)	(3)	17	(33)	(41)	(49)	(12)	(2)	20	24				
Jet Blue	(22)	21	23	(4)	(8)	(7)	(4)	4	20	30	20	11	(2)	30
Northwest	100	273	244	(8)	(239)	(377)	(317)							
Republic	19	19	20	24	20	22	17	19	2	14	3	1	(59)	
Southwest	33	195	133	87	43	121	69	61	(20)	59	23	74	24	216
United	(152)	274	498	(98)	(537)	(87)	(779)	(547)	(579)	(323)	(57)	(176)	(92)	430
US Airways	66	261	185	(42)	(239)	(101)	(242)	(220)	(260)	(95)	(110)	(32)	(89)	265
Total	**131**	**2,063**	**2,055**	**(355)**	**(1,749)**	**(969)**	**(1,820)**	**(1,271)**	**(1,952)**	**(873)**	**(225)**	**(733)**	**(979)**	**1,877**
			2007 Total :	**3,894**			**2008 Total:**	**(5,809)**			**2009 Total:**	**(3,783)**	**2010 YTD:**	**898**

Note: Results exclude special items including reorganization item. Airlines operating under Chapter 11 Bankruptcy are highlighted. US Airways = combined earnings with America West Airlines; Allegiant Air was a privately held company until Q4 2005. Northwest Earnings are reported with Delta starting Q4 2008. Republic Airways acquired Midwest and Frontier Airlines in Q3 2009.

Source: Airline press releases

The outlook is much more of the same until the economy improves and energy prices stabilize. Look for airlines to continue to "unbundle" their service programs so that they can generate more revenue. Also look for the airlines to continue to cut capacity and be aggressive in moving underperforming capacity into new routes or strong performance routes. Cost cutting and fuel saving programs will be at the top of every airline's agenda for the next few years.

EXECUTIVE SUMMARY

MARKET/AIRPORT OVERVIEW

Pullman-Moscow Regional Airport is served by Alaska Airlines/Horizon Air. Alaska/Horizon introduced the larger 76-seat Bombardier Dash 8-Q400 to the market. The larger plane allowed Pullman-Moscow to increase enplanements, but the load factor declined into the mid-60 percent. Annual airline seats have nearly doubled since 2007.

TOP ORIGIN AND DESTINATION MARKETS

From 2005 to 2009, Pullman-Moscow passenger traffic grew at a compounded annual rate of 8.9 percent, significantly above the national average which declined at a compounded annual rate of 1.9 percent. Revenue grew at a compounded annual rate of 6.1 percent while fares and yield declined at compounded annual rates of 2.6 and 1.1 percent, respectively. For year ended June 30, 2010, passengers and revenue increased five percent, while fares remained steady and yield decreased by three percent. With nonstop and direct service, Seattle and Boise are Pullman-Moscow's largest markets. Portland, Los Angeles and Anchorage were the next largest markets.

AIRLINE COMPARISON

Pullman-Moscow ranked 56th in passengers and 63rd in revenue out of the 81 domestic airports served by Alaska Airlines/Horizon Air. Pullman-Moscow ranked 59th in average fare and 33rd in yield. The Airport's average fare was $18 lower than Alaska/Horizon's domestic system average. Yield was four cents per mile higher than Alaska/Horizon's domestic average. Compared to year ended June 30, 2009, Pullman-Moscow's Alaska/Horizon passengers and revenue increased seven and nine percent, respectively.

On a load factor basis, Pullman-Moscow is performing below average at 66 percent. Alaska/Horizon's system average was 81 percent; however, compared to other markets served with the Q400, Pullman-Moscow's load factor was average. Pullman-Moscow's revenue per available seat mile (RASM) for the Seattle market was 22.4 cents per mile, similar to that of most other markets with similar stage lengths.

Pullman-Moscow's Alaska/Horizon service is potentially at risk with recent discussions of Alaska/ Horizon dropping the Lewiston tag service.

PASSENGER DEMAND

Twenty-six percent of catchment area travelers used Pullman-Moscow Regional Airport, 53 percent diverted to Spokane, 12 percent drove to Lewiston, seven percent diverted to Seattle-Tacoma, and two percent used other various competing airports for commercial air service. In the 2006 *Passenger Demand Analysis*, 27 percent used Pullman-Moscow Regional while 55, 12, six, and one percent used Spokane, Lewiston, Seattle, and other airports, respectively. Overall, retention is down one-half of a percentage point from the previous study.

Pullman-Moscow Regional Airport's total air service market, called the true market, is estimated at 255,722 annual origin and destination passengers. Domestic travelers accounted for 221,213 of the total true market. International travelers made up the remaining 34,509 passengers. The previous analysis in 2006 showed a true market size of 170,029 domestic and international passengers.

Sixty-four percent of travelers, or 164,625 passengers, were destined to one of the top 25 markets. Seattle was the number one destination with 17 percent of passengers. Pullman-Moscow retained 63 percent of passengers to/from Seattle. The next largest markets were Los Angeles, Anchorage, Boise, and Portland with retention percentages of 10, 13, 37, and 44 percent, respectively.

FACTORS AFFECTING AIR SERVICE DEMAND AND RETENTION

For year ended June 30, 2010, the one-way average domestic airfare for Pullman-Moscow was $140, $1 higher than Spokane, $33 lower than Lewiston, and $15 lower than Seattle. This is a significant decrease from Pullman-Moscow's 2006 average fare of $188. In individual markets, Pullman-Moscow had the lowest fare in two top 25 markets but had the highest fare in eight of the top 25 markets.

From 2005 through 2009, the average domestic airfare for Pullman-Moscow passengers decreased at a compounded annual rate of 2.6 percent. The average fares at Spokane and Lewiston increased at compounded annual rates of 3.0 and 2.0, respectively, while Seattle fares in 2009 were similar to their fare in 2005.

In September 2009, Pullman-Moscow offered nonstop service to one top 25 destination with 13 weekly frequencies. Spokane, Lewiston, and Seattle had service to 12, two, and 24 top 25 markets, respectively, with 357, 13, and 1,524 weekly flights.

MARKET/AIRPORT COMPARISON

For year ended June 30, 2010, Pullman-Moscow Regional Airport ranked 280th in passengers of 367 primary U.S. commercial service airports. International passengers accounted for seven percent of Pullman-Moscow's total passengers. This is below the national average of 10 percent. Compared to year ended June 30, 2009, total passengers increased by six percent, which was far better than the national passenger decline of one percent. Pullman-Moscow's average airfare was $13 lower than the national average and $10 lower than the Northwest region average.

OTHER AIRLINE INFORMATION

Other new route possibilities include Delta Air Lines' service to Salt Lake City and possibly Frontier Airlines' Denver service or United Airlines service to Denver or San Francisco. The Salt Lake City market would compete with existing service at Lewiston for the additional capacity. Frontier and United service to Denver and San Francisco are doubtful due to distance and aircraft availability.

NEXT STEPS

1. To maintain existing air service, regular visits with Alaska Airlines/Horizon Air should be conducted to make sure the market is meeting Alaska/Horizon's goals and expectations.
2. Published fares charged by Alaska/Horizon, particularly to connecting markets, should be reviewed periodically to see if there is a revenue improvement Alaska/Horizon can make.
3. Work with Washington State University and the University of Idaho to ensure visiting staff and teams use the local airport.
4. On an ongoing basis, Pullman-Moscow should continue to monitor air service performance. Airfares, passengers, revenue, and RASMs are essential to understanding air service performance. Tracking and analyzing these indicators is important to maintaining and growing air service.

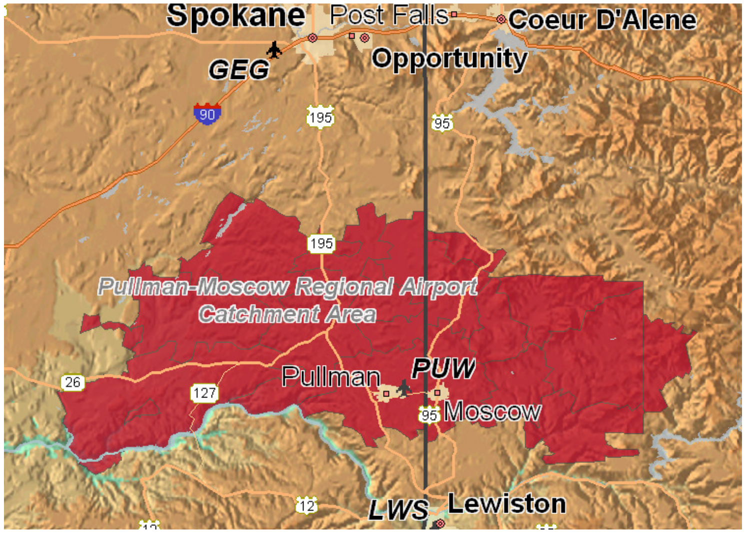
INFORMATION SOURCES

This *Market Outlook and Airline Assessment* uses the most recent U.S. Department of Transportation (DOT) data available, year ended June 30, 2010, from Data Base Products, Inc. and schedule data from apgDat. The Passenger Demand section also uses Marketing Information Data Tape (MIDT) bookings for year ended September 30, 2009. A glossary of terms is provided in *Appendix B*.

MARKET/AIRPORT OVERVIEW

The first step in evaluating the Pullman-Moscow air service market is understanding the past and present airline service. This section provides an overview of: the airport catchment area; historical, current, and future scheduled airline service; seat and passenger seasonality; and historical seats, passengers, load factor and departures.

EXHIBIT 3.1 AIRPORT CATCHMENT AREA



AIRPORT CATCHMENT AREA

An airport catchment area, or service area, is a geographic area surrounding an airport where it can reasonably expect to draw passenger traffic and is representative of the local market. The catchment area contains the population of travelers who should use Pullman-Moscow Regional Airport considering the drive time from the catchment area to competing airports. This population of travelers is Pullman-Moscow Regional Airport's focus market for air service improvements and represents the majority of travelers using the local airport. **Exhibit 3.1** identifies the Pullman-Moscow catchment area. The primary service area is comprised of 30 zip codes within the U.S. with a population of approximately 78,000 and is bordered to the south by Lewiston and to the north by Spokane.

SCHEDULED AIRLINE SERVICE

Table 3.1 shows Pullman-Moscow Regional Airport's weekly departures from April 2010 through April 2011. Pullman-Moscow is served by one airline, Horizon Air. Horizon operates flights on behalf of Alaska Airlines. Horizon combines the Pullman-Moscow flights with Lewiston to provide service to Seattle and one seasonal, one-stop flight to Boise. The tables show just the nonstop destinations even though passengers going to or from Lewiston can be traveling to Seattle or Boise. During the past year, Pullman-Moscow's service has ranged from 14 flights per week up to a high of 27 flights per week

TABLE 3.1 SCHEDULED AIRLINE SERVICE - AVERAGE FLIGHTS PER WEEK

DESTINATION	AIRLINE	CY 2010									CY 2011			
		APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR
Lewiston, ID	Alaska/ Horizon	14	14	7	7	8	13	13	13	13	13	13	14	14
Seattle/ Tacoma, WA	Alaska/ Horizon	13	13	7	7	8	13	13	13	13	13	13	13	13
Total flights per week		**27**	**27**	**14**	**14**	**16**	**26**	**26**	**26**	**26**	**26**	**26**	**27**	**27**

Note: As of October 19, 2010

Table 3.2 shows the historically scheduled airline service for the month of July from 2001 through 2010. Departures peaked in 2001, 2002, and 2007 at 35 departures per week. In July 2009 and 2010, Horizon dropped one Seattle flight per week for the summer season. The remainder of the year, Horizon provided three daily nonstop or one-stop flights to Seattle and one, one-stop flight to Boise via Lewiston.

TABLE 3.2 SCHEDULED AIRLINE SERVICE - CY 2001 TO 2010

DESTINATION	AIRLINE	MONTH OF JULY									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lewiston, ID	Alaska	14	14		14	14	14	21	13	7	7
Seattle/Tacoma, WA	Alaska	21	21	21	17	14	13	14	14	7	7
Total flights per week		**35**	**35**	**21**	**31**	**28**	**27**	**35**	**27**	**14**	**14**

Note: As of October 19, 2010

LOAD FACTOR, AVAILABLE SEATS, AND PASSENGERS

Exhibit 3.2 reflects Pullman-Moscow Regional Airport's available seats, onboard passengers (which includes Lewiston passengers that are on-board in Pullman), and load factors for arrivals and departures on a 12-month ending basis since 2006. Pullman-Moscow's load factor has been fairly consistent from a high of 78 percent in early 2008 to a low of 63 percent one year later. These load factors trail the national average but are not uncommon in regional markets served by Horizon. Seats increased to a high of 119,000 annual seats in April 2009 due to the replacement of the 37-seat Bombardier Dash-8-Q200s with 76-seat Bombardier Dash-8-Q400 (Q400). Passengers also increased following the rise in seats with the highest month peaking in April of 2009. Passengers have been relatively stable in 2009/2010. Outside of the summer capacity reduction, load factors and passenger traffic are good.

EXHIBIT 3.2 LOAD FACTOR, AVAILABLE SEATS, AND ONBOARD PASSENGERS

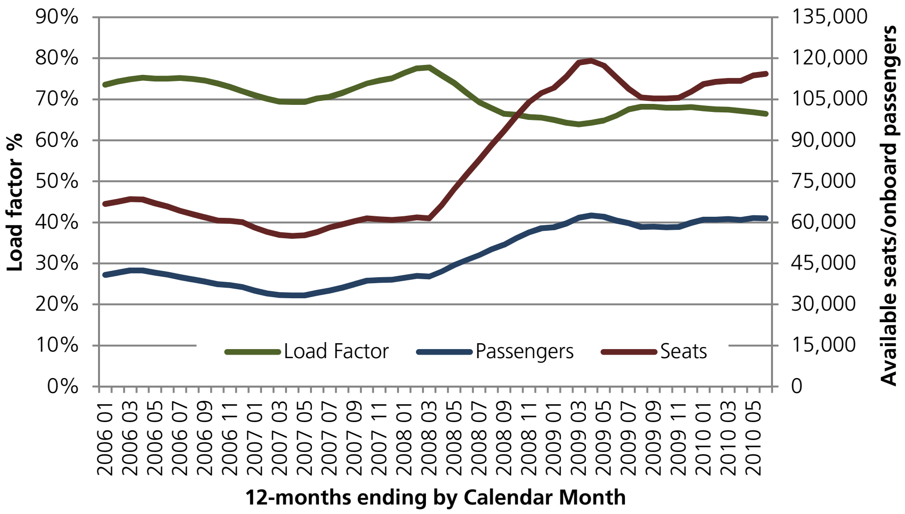


Table 3.3 provides a review of departures, load factors and seats by market and by quarter since 2007. Overall load factors are trending downward after peaking in fourth quarter 2007. Overall load factors are currently running in the mid to high 60 percent on all flights, with the Seattle/Tacoma fights filling just under 70 percent of the seats in the last year. Low load factors are expected on the Lewiston route as the flight is a "tag on" to the Seattle/Tacoma and Boise service.

TABLE 3.3 DEPARTURES, LOAD FACTOR AND SEATS BY MARKET

DESTINATION	AIRLINE	DATA ITEM	2007				2008				2009				2010	
			1	2	3	4	1	2	3	4	1	2	3	4	1	2
Lewiston, ID	Alaska	Departures	154	216	238	198	180	210	216	190	171	169	164	204	197	185
		Load Factor	50	48	44	59	51	36	35	42	39	39	39	43	35	35
		Seats	5,698	7,992	8,806	7,326	6,642	15,445	16,335	14,386	12,978	12,831	12,405	15,493	14,932	14,022
		Seats/dept	37	37	37	37	37	74	76	76	76	76	76	76	76	76
Seattle/Tacoma, WA	Alaska	Departures	232	189	216	202	224	215	216	188	172	170	165	206	199	187
		Load Factor	72	76	78	85	82	62	61	75	70	71	68	74	68	67
		Seats	8,566	6,975	7,992	7,456	8,288	15,593	16,336	14,273	13,018	12,869	12,519	15,607	15,122	14,212
		Seats/dept	37	37	37	37	37	73	76	76	76	76	76	76	76	76
Total		**Departures**	**386**	**405**	**454**	**400**	**404**	**425**	**432**	**378**	**343**	**339**	**329**	**410**	**396**	**372**
		Load Factor	**70**	**73**	**75**	**83**	**80**	**60**	**58**	**72**	**67**	**68**	**65**	**71**	**65**	**64**
		Seats	**14,264**	**14,967**	**16,798**	**14,782**	**14,930**	**31,038**	**32,671**	**28,659**	**25,996**	**25,700**	**24,924**	**31,100**	**30,054**	**28,234**
		Seats/dept	**37**	**37**	**37**	**37**	**37**	**73**	**76**	**76**	**76**	**76**	**76**	**76**	**76**	**76**

Note: As of October 19, 2010

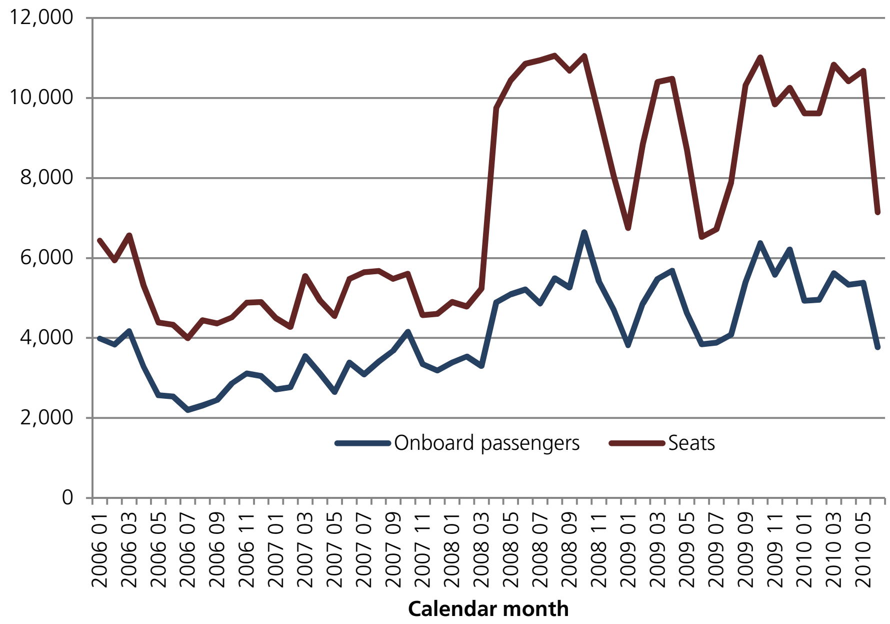
SEASONALITY

Exhibit 3.3 shows the seasonality of onboard passengers at Pullman-Moscow Regional Airport over four calendar years, January 2006 through June 2010. Pullman-Moscow is a moderately seasonal market with a slow period during the summer months and higher performance around school holidays including Spring Break in March and Thanksgiving break in November. Passengers have generally followed the seasonal pattern of available seats. January 2009 was abnormal as bad weather forced a higher than normal cancellation rate at Pullman-Moscow.

SUMMARY OF MAIN POINTS

- Passengers and seats increased with the reintroduction of the Q400 in mid 2008.
- Compared to industry averages, Pullman-Moscow's load factors are low and have declined due to the larger aircraft; however, its load factors are comparable to other similar Alaska/Horizon markets served with the Q400 aircraft.
- Nearly 70 percent of seats are filled on the Seattle route.
- Pullman-Moscow is a moderately seasonal market.

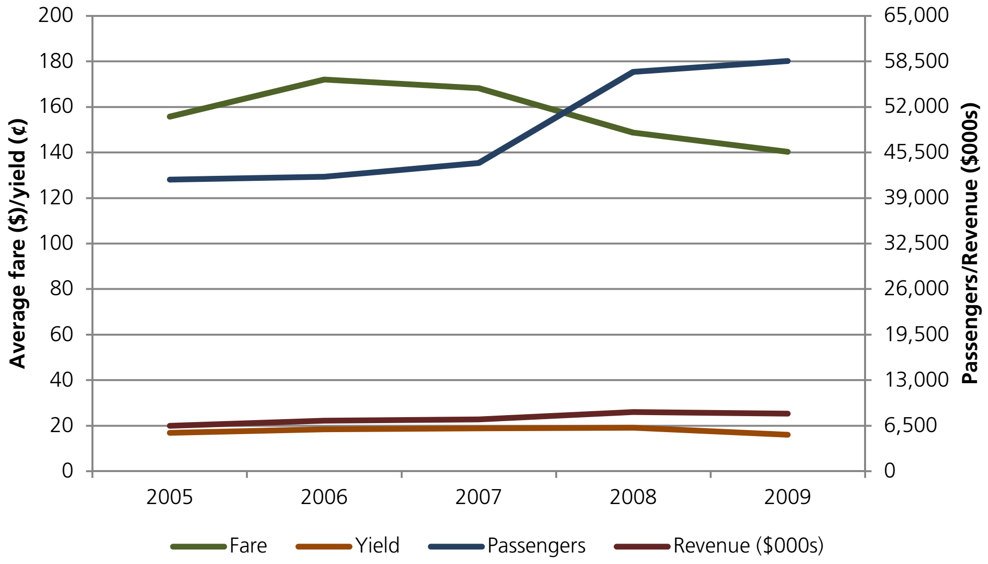
EXHIBIT 3.3 SEASONALITY



TOP ORIGIN AND DESTINATION MARKETS

This section provides information on Pullman-Moscow Regional Airport's top origin and destination markets. Passengers, revenue, fares, and yield and the year over year change for each are detailed by market.

EXHIBIT 4.1 PASSENGERS, REVENUE, FARE AND YIELD FIVE-YEAR TREND



FIVE-YEAR TREND

Exhibit 4.1 shows the five-year trend on passengers, revenue, fares and yield for Pullman-Moscow. Over the five-year period from 2005 to 2009, passengers improved at a compounded annual rate of 8.9 percent, well ahead of the national average of 1.9 percent decrease.

Over the five-year period, revenue increased at a compounded annual rate of 6.1 percent while fares and yield at Pullman-Moscow decreased at compounded annual rates of 2.6 and 1.1 percent, respectively. Nationally, revenue was static over the five-year period with a 1.2 percent compounded increase in fares and a 0.9 percent increase in yield.

Increasing Passengers and Revenue

Since year ended June 30, 2008, passengers and revenue increased by 20 and six percent, respectively. Revenue did not increase at the same rate as passengers due to an 11 percent decrease in fares.

TOP 25 ORIGIN AND DESTINATION MARKETS

Table 4.1 provides Pullman-Moscow Regional Airport's top 25 origin and destination domestic markets for year ended June 30, 2010. Pullman-Moscow served 62,150 origin and destination passengers and grew by five percent during the 12-month period generating $8.7 million in airline revenue. Pullman-Moscow had nonstop and one-stop service to the top two markets, Seattle and Boise. Pullman-Moscow's top 10 markets were primarily West Coast with Portland, Los Angeles and Anchorage rounding out the top five. Chicago (ORD) ranked as Pullman-Moscow's tenth largest market and was the largest non-West Coast market. Chicago, Orange County, Phoenix, Burbank, Boston and Fresno grew by 40 percent or more year over year while the Eugene market declined by more than 40 percent.

TABLE 4.1 TOP 25 ORIGIN AND DESTINATION PASSENGER MARKETS

RANK	AIRPORT	YEAR ENDED JUNE 30, 2010							% CHANGE YOY			
		PAX	PDEW	% ORIGIN	REV ($MIL)	FARE ($)	YIELD (¢)	ITIN MILES	PAX	REV	FARE	YIELD
1	Seattle/Tacoma, WA	27,850	38.2	53	2.6	92	36.5	252	5	0	(4)	(3)
2	Boise, ID	4,000	5.5	60	0.3	85	38.1	223	3	4	0	0
3	Portland, OR	3,200	4.4	46	0.4	120	29.5	405	(6)	(7)	(1)	(2)
4	Los Angeles, CA	2,640	3.6	57	0.4	162	13.5	1,200	35	15	(15)	(14)
5	Anchorage, AK	2,030	2.8	46	0.3	164	9.5	1,729	(1)	23	25	23
6	San Francisco, CA	1,350	1.8	64	0.2	164	17.6	932	38	29	(7)	(7)
7	Oakland, CA	1,310	1.8	59	0.2	158	17.1	922	17	30	11	11
8	San Diego, CA	1,160	1.6	78	0.2	152	11.7	1,304	7	9	2	2
9	Sacramento, CA	1,060	1.5	52	0.2	158	18.2	868	8	40	29	26
10	Chicago, IL (ORD)	1,040	1.4	80	0.3	255	12.7	2,012	93	149	29	30
11	San Jose, CA	1,020	1.4	51	0.2	160	16.9	948	10	35	24	25
12	Washington, DC (DCA)	880	1.2	85	0.3	347	13.4	2,595	4	3	(0)	(1)
13	Orange County, CA	880	1.2	58	0.1	158	12.8	1,230	40	22	(12)	(13)
14	Phoenix, AZ	810	1.1	63	0.1	167	12.3	1,360	42	49	5	5
15	Las Vegas, NV	740	1.0	80	0.1	175	15.3	1,143	(9)	(0)	9	8
16	Honolulu/Oahu, HI	650	0.9	68	0.2	288	9.6	2,992	(10)	(12)	(3)	(4)
17	Burbank, CA	550	0.8	60	0.1	152	12.7	1,197	45	19	(18)	(18)
18	Boston, MA	490	0.7	65	0.1	251	9.0	2,799	44	77	23	21
19	Bellingham, WA	470	0.6	43	0.0	90	26.1	344	21	(10)	(26)	(26)
20	Juneau, AK	400	0.5	20	0.1	139	11.9	1,163	(22)	(23)	(2)	(2)
21	Newark, NJ	390	0.5	46	0.1	213	8.0	2,657	(35)	(49)	(21)	(21)
22	Eugene, OR	350	0.5	29	0.0	137	28.4	484	(45)	(56)	(20)	(23)
23	Fresno, CA	350	0.5	46	0.1	162	15.7	1,036	119	66	(24)	(27)
24	Ontario, CA	350	0.5	37	0.1	153	12.3	1,236	(17)	(33)	(19)	(21)
25	Denver, CO	340	0.5	74	0.1	164	13.1	1,250	(23)	(4)	24	26
Total domestic markets		**62,150**	**85.1**	**56**	**8.7**	**140**	**16.6**	**839**	**5**	**5**	**(0)**	**(3)**

Revenue increased by five percent driven by the increase in passenger traffic. Fares remained steady at $140 and yield decreased by three percent. On an individual market basis, however, fares fluctuated significantly with Anchorage, Sacramento, Chicago, San Jose, Boston and Denver experiencing increases over more than 20 percent. Bellingham, Newark, Eugene and Fresno had decreases in fares of more than 20 percent.

SUMMARY OF MAIN POINTS

- Over the five-year period from 2005 to 2009, passengers improved at a compounded annual rate of 8.9 percent, while nationally passengers declined by 1.9 percent compounded annually.
- Over the five-year period from 2005 to 2009, revenue improved at a compounded annual rate of 6.1 percent. Nationally revenue remained static.
- Strong passenger and revenue growth were experienced in several origin and destination markets including: Chicago, Orange County, Phoenix, Burbank, Boston and Fresno.

AIRLINE COMPARISON

This section of the report compares Pullman-Moscow Regional Airport's performance with other airports served by Alaska Airlines/Horizon Air. From an airline standpoint, these comparisons are important. Airline planners review various indicators, including: passengers, revenue, fare, yield, RASM and load factors. A comparison of all domestic airports is provided to examine how Pullman-Moscow is performing in the airline's domestic system.

ALASKA AIRLINES/HORIZON AIR COMPARISON

Alaska Airlines is the sole air service provider with service provided by Horizon Air. Alaska's service is concentrated on north/south routes along the Pacific Coast between Alaska and Mexico. Limited service is provided to major eastern markets and to the four major Hawaiian Islands.

Table 5.1 shows how Pullman-Moscow ranks based on passengers among Alaska/Horizon's domestic markets. Pullman-Moscow ranked 56th out of 81 Alaska/Horizon domestic airports in terms of passengers and 63rd in terms of revenue. Pullman-Moscow ranked 59th in average fare and 33rd in yield. Pullman-Moscow's average fare was 12 percent lower than the Alaska/Horizon domestic system average, and yield was almost 31 percent above the system average on a much shorter itinerary distance, 826 miles, compared to the system average of 1,221 miles. Compared to year ended June 30, 2009, Pullman-Moscow's Alaska/Horizon passengers increased seven percent; the system average increased three percent. Revenue increased by nine percent which was greater than the system revenue increase of five percent.

TABLE 5.1 ALASKA AIRLINES - COMPARISON OF PASSENGERS, REVENUE, FARE AND YIELD (OUTBOUND ONLY)

		YEAR ENDED JUNE 30, 2010						% CHANGE YOY			
RANK	AIRPORT	DOM PAX	PDEW	DOM REV ($MIL)	FARE ($)	YIELD (¢)	ITIN MILES	PAX	REV	FARE	YIELD
44	Fresno, CA	52,080	142.7	8.5	163	19	883	0	(1)	(1)	(2)
45	Santa Barbara, CA	49,010	134.3	7.0	143	19	773	6	6	(0)	6
46	Lihue/Kauai, HI	48,350	132.5	10.7	221	7	3,008	6	(5)	(11)	(10)
47	Bethel, AK	46,950	128.6	10.1	214	28	769	5	4	(1)	5
48	Tucson, AZ	46,600	127.7	7.0	151	10	1,452	(4)	(6)	(3)	(2)
49	Yakima, WA	46,280	126.8	7.5	162	15	1,095	(3)	(3)	(0)	(8)
50	Billings, MT	44,830	122.8	8.1	181	17	1,089	2	1	(1)	(7)
51	Wenatchee, WA	42,470	116.4	6.3	148	14	1,019	(1)	(4)	(3)	(10)
52	Kodiak, AK	36,580	100.2	10.2	278	17	1,595	0	(1)	(1)	2
53	Kalispell/Glacier, MT	35,820	98.1	6.4	179	16	1,097	(5)	(3)	2	(4)
54	Eureka/Arcata, CA	32,330	88.6	5.0	156	19	809	1	8	7	(5)
55	Bozeman, MT	30,050	82.3	5.1	170	18	972	1	3	2	(2)
56	Pullman, WA	29,990	82.2	4.1	138	17	826	7	9	1	(3)
57	Lewiston, ID	28,870	79.1	4.0	138	17	834	(10)	(5)	6	(4)
58	Walla Walla, WA	28,590	78.3	4.1	143	14	995	1	(5)	(6)	(14)
59	Houston, TX (IAH)	27,860	76.3	5.0	181	8	2,255	371	152	(46)	(40)
60	Nome, AK	27,630	75.7	7.0	253	24	1,056	3	2	(0)	4
61	Prudhoe Bay, AK	26,270	72.0	10.1	384	51	750	(58)	(41)	41	29
62	Barrow, AK	24,960	68.4	6.8	273	25	1,100	(2)	(6)	(4)	(5)
63	Kotzebue, AK	24,550	67.3	6.1	250	27	936	2	4	1	(2)
64	Atlanta, GA	23,000	63.0	5.1	220	9	2,537	324	135	(44)	(40)
65	Redding, CA	22,850	62.6	3.6	157	19	807	(11)	(14)	(4)	(5)
66	Idaho Falls, ID	22,520	61.7	3.3	145	19	772	(10)	(19)	(9)	(6)
67	Great Falls, MT	18,640	51.1	3.5	187	19	990	(3)	(8)	(5)	(2)
68	Dutch Harbor, AK	16,920	46.4	11.5	682	28	2,416	0	(1)	(1)	(2)
All AS domestic markets		**14,969,460**	**41,012.2**	**2,331.8**	**156**	**13**	**1,221**	**3**	**5**	**2**	**(4)**

Lower Than System Average Load Factors

At 66 percent, Pullman-Moscow's performance on a load factor basis was low, 15 percentage points less than Alaska/Horizon's domestic system average of 81 percent; however, its load factor is comparable to other similar Alaska/Horizon markets served with the Q400 aircraft.

Table 5.2 shows Pullman-Moscow Regional Airport's departures, load factor and seats compared to other Alaska/Horizon markets ranked by departures for year ended June 30, 2010. With 1,505 annual departures and 114,312 annual seats provided by Alaska/Horizon, Pullman-Moscow had the 30th highest number of departures and the 37th highest number of seats out of the 81 domestic Alaska/Horizon markets. Compared to the prior year, departures and seats increased one percent. At 66 percent, Pullman-Moscow's performance on a load factor basis was low, 15 percentage points less than Alaska/Horizon's domestic system average of 81 percent. Pullman-Moscow's load factor remained steady compared to the prior year. Compared to other markets being served by the 76-seat Q400, Pullman-Moscow's load factor was average, outperforming Wenatchee, Pasco and Walla Walla but underperforming compared to several Montana and Idaho markets.

TABLE 5.2 ALASKA AIRLINES - COMPARISON OF DEPARTURES, SEATS AND LOAD FACTOR

		YEAR ENDED JUNE 30, 2010				CHANGE YOY			
RANK	AIRPORT	DEPART-URES	LOAD FACTOR %	SEATS	SEATS/ DEPT	DEPART-URES %	LOAD FACTOR PTS	LOAD FACTOR %	SEATS %
18	Medford, OR	2,454	74	185,728	76	(17)	6	9	(13)
19	Eugene, OR	2,384	62	180,114	76	(3)	0	0	2
20	Ketchikan, AK	2,303	60	308,173	134	1	(2)	(3)	1
21	Reno, NV	2,293	81	174,091	76	(23)	5	7	(23)
22	Pasco, WA	2,262	58	171,791	76	(13)	(6)	(10)	(2)
23	Burbank, CA	2,080	84	216,085	104	(13)	12	16	(19)
24	Ontario, CA	2,067	81	224,409	109	(10)	6	7	(8)
25	Palm Springs, CA	1,973	74	260,300	132	(12)	0	0	(8)
26	Bellingham, WA	1,945	84	157,666	81	(3)	26	44	5
27	Santa Rosa, CA	1,740	78	132,206	76	(3)	4	6	(3)
28	Denver, CO	1,713	85	255,482	149	(16)	5	6	(15)
29	Chicago, IL (ORD)	1,588	85	248,471	157	10	4	5	7
30	Pullman, WA	1,505	66	114,312	76	1	0	1	1
31	Long Beach, CA	1,407	84	117,354	83	7	9	11	(31)
32	Redding, CA	1,387	72	105,376	76	5	3	5	5
33	Lewiston, ID	1,376	59	104,516	76	(3)	1	1	(3)
34	Yakima, WA	1,344	54	102,060	76	(1)	(2)	(3)	2
35	Sitka, AK	1,237	63	178,663	144	(6)	1	2	(5)
36	Kahului/Maui, HI	1,128	85	177,096	157	151	(2)	(2)	151
37	Missoula, MT	1,096	70	83,190	76	0	(1)	(2)	0
38	Great Falls, MT	1,077	66	81,800	76	1	1	1	1
39	Washington, DC (DCA)	1,069	82	167,728	157	(1)	0	0	(1)
40	Nome, AK	1,064	48	100,764	95	6	(4)	(7)	14
41	Kotzebue, AK	1,051	47	99,248	94	3	(5)	(9)	11
42	Helena, MT	1,041	64	79,066	76	3	1	2	3
All AS domestic markets		**276,327**	**81**	**30,330,511**	**110**	**(8)**	**3**	**4**	**(6)**

Table 5.3 shows Pullman-Moscow compared to other Alaska/Horizon markets that have a similar number of seats that are provided by Alaska/Horizon. Pullman-Moscow ranked 37th out of 81 Alaska/Horizon domestic markets in terms of seats. Eight of the 24 comparison markets had lower load factors, and only two had lower revenue. Pullman-Moscow's fare was higher than only four comparison markets; however, Pullman-Moscow's average yield was higher than 17 of the 24 comparison markets.

TABLE 5.3 ALASKA AIRLINES - COMPARISON OF MARKETS RANKED BY SEATS

		YEAR ENDED JUNE 30, 2010									
RANK	AIRPORT	DOM PAX	DOM PAX PDEW	DOM REV PDEW ($000)	FARE ($)	YIELD (¢)	ITIN MILES	DEPART-URES	LOAD FACTOR %	SEATS	SEATS/ DEPT
25	Eugene, OR	86,180	236.1	36.4	154	15	1,000	2,384	62	180,114	76
26	Sitka, AK	54,710	149.9	29.7	198	19	1,027	1,237	63	178,663	144
27	Kahului/Maui, HI	147,030	402.8	81.5	202	8	2,672	1,128	85	177,096	157
28	Reno, NV	94,610	259.2	35.6	138	16	848	2,293	81	174,091	76
29	Pasco, WA	75,210	206.1	32.0	155	17	939	2,262	58	171,791	76
30	Washington, DC (DCA)	124,520	341.2	87.6	257	10	2,621	1,069	82	167,728	157
31	Bellingham, WA	119,440	327.2	45.0	137	13	1,085	1,945	84	157,666	81
32	Honolulu/Oahu, HI	133,850	366.7	83.1	227	8	2,977	965	92	151,505	157
33	Dallas, TX (DFW)	112,930	309.4	63.0	203	11	1,896	902	83	143,918	160
34	Boston, MA	128,080	350.9	75.4	215	8	2,708	874	87	137,152	157
35	Santa Rosa, CA	86,640	237.4	27.4	116	20	570	1,740	78	132,206	76
36	Long Beach, CA	91,360	250.3	25.3	101	10	981	1,407	84	117,354	83
37	Pullman, WA	29,990	82.2	11.3	138	17	826	1,505	66	114,312	76
38	Newark, NJ	91,760	251.4	49.3	196	7	2,633	722	87	113,570	157
39	Minneapolis, MN	61,190	167.6	28.9	172	10	1,801	715	85	108,609	152
40	Redding, CA	22,850	62.6	9.8	157	19	807	1,387	72	105,376	76
41	Lewiston, ID	28,870	79.1	11.0	138	17	834	1,376	59	104,516	76
42	Orlando, FL (MCO)	78,850	216.0	43.1	199	7	2,916	661	87	103,939	157
43	Yakima, WA	46,280	126.8	20.6	162	15	1,095	1,344	54	102,060	76
44	Nome, AK	27,630	75.7	19.1	253	24	1,056	1,064	48	100,764	95
45	Kotzebue, AK	24,550	67.3	16.8	250	27	936	1,051	47	99,248	94
46	Austin, TX	91,280	250.1	38.9	155	9	1,730	691	83	95,374	138
47	Bethel, AK	46,950	128.6	27.5	214	28	769	1,005	51	95,124	95
48	Missoula, MT	52,620	144.2	24.1	167	17	984	1,096	70	83,190	76
49	Kona/Hawaii, HI	68,280	187.1	40.6	217	8	2,773	527	87	82,661	157
All AS domestic markets		**14,969,460**	**41,012.2**	**6,388.4**	**156**	**12.8**	**1,221**	**276,327**	**81**	**30,330,511**	**110**

Exhibit 5.1 provides Pullman-Moscow's revenue per available seat mile (RASM) plotted against other markets served by Alaska/Horizon to Seattle/Tacoma. RASM is the unit revenue (i.e. revenue divided by seat miles) generated and is a key indicator to understanding and comparing performance of multiple stations/markets. One of Alaska/Horizon's shorter stage lengths to Seattle/Tacoma, Pullman-Moscow performed above average. For year ended June 30, 2010, Pullman-Moscow's RASM for the Seattle/Tacoma nonstop service was 22.4 cents per mile on a stage length of 250 miles. Pullman-Moscow's RASM was similar to that of other markets with similar stage lengths including Eugene (EUG) and Spokane (GEG). Pullman-Moscow out-performed Lewiston (LWS), Redmond (RDM) and Walla Walla (ALW).

EXHIBIT 5.1 ALASKA AIRLINES' SEATTLE UNIT REVENUE PERFORMANCE

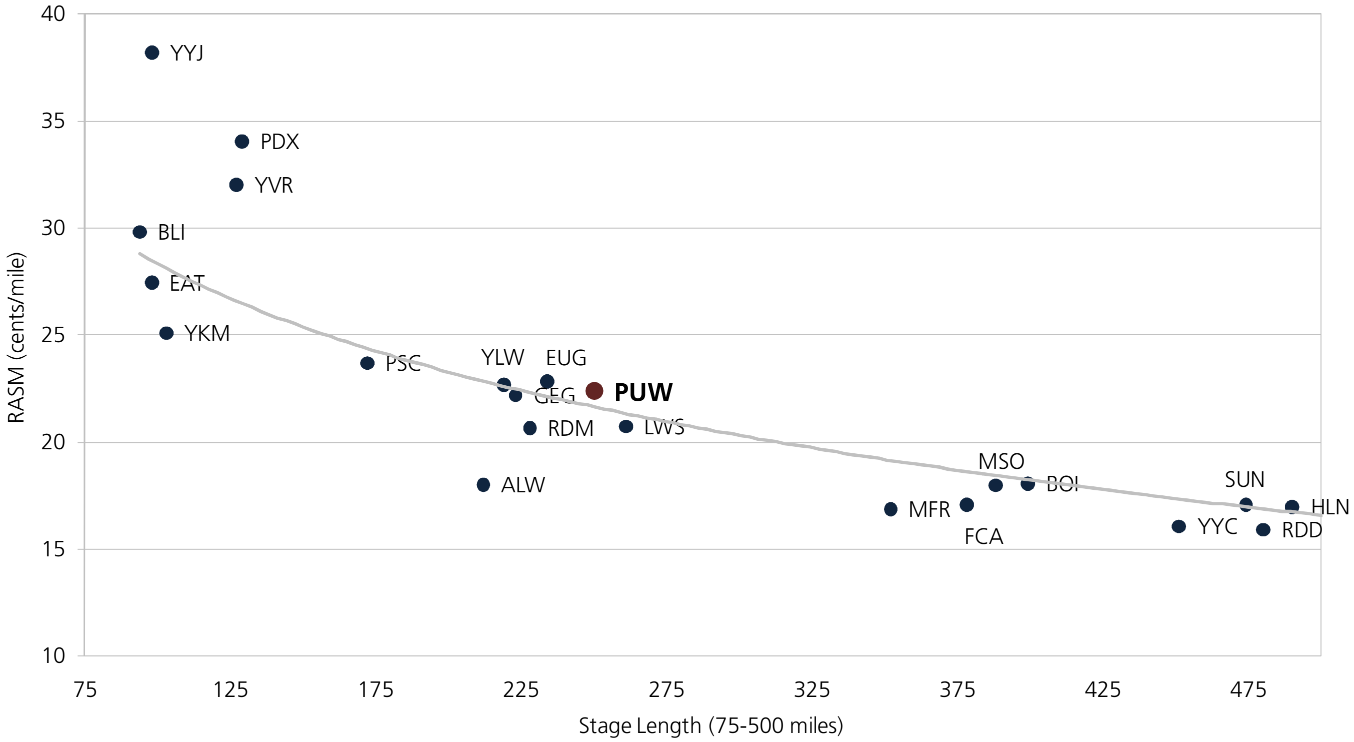


Table 5.4 shows the 12-month rolling RASM for Alaska/Horizon's Pullman-Moscow Seattle/Tacoma route. RASM peaked in the third quarter of 2006 at 29 cents per mile. Since then, RASM has declined to 22.4 cents per mile in the second quarter of 2010. Because RASM is a measure of revenue against the available seats, it should be noted that Alaska/Horizon added significant capacity in 2008 and 2009. While passengers and revenue increased in 2008 and 2009, the RASM did not keep up with the additional seats; however, many of the new seats were added by using larger 76-seat Q400 aircraft which are less costly to operate than the 37-seat Dash 8-Q200 that they replaced. While RASM has decreased, the arrival of the Q400 means that the cost per available seat mile (CASM) has also decreased which should maintain a comparable level of profitability.

TABLE 5.4 ALASKA AIRLINES SEATTLE RASM (12-MONTH ROLLING AVERAGE)

YEAR	QUARTER	RASM	CHANGE %
2006	Q1	28.0	5.3
	Q2	28.8	3.1
	Q3	29.0	0.7
	Q4	25.9	(10.7)
2007	Q1	23.6	(8.8)
	Q2	23.8	0.8
	Q3	25.0	4.9
	Q4	26.8	7.0
2008	Q1	28.1	5.0
	Q2	25.8	(8.2)
	Q3	23.4	(9.3)
	Q4	23.3	(0.5)
2009	Q1	22.2	(4.4)
	Q2	21.8	(1.9)
	Q3	22.4	2.5
	Q4	22.2	(0.7)
2010	Q1	22.1	(0.5)
	Q2	22.4	1.4

ALASKA AIRLINES/HORIZON AIR SERVICE AND FLEET

As seen in **Table 5.5**, Alaska's air service network is built around its Seattle hub and the three secondary focus cities, Anchorage, Los Angeles (LAX) and Portland. Alaska/Horizon has elected to modestly reduce capacity in the Anchorage and Seattle markets from 2009 to 2010 offset by an increase in capacity at Los Angeles. Overall departures have been reduced by only one percent.

TABLE 5.5 ALASKA AIRLINES - DEPARTURES AND SEATS BY HUB

	OCTOBER 2010			OCTOBER 2009			% CHANGE YOY		
HUB/FOCUS CITY	AVG DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE
Anchorage	42	5,054	120.7	42	5,144	123.7	1	(2)	(2)
Los Angeles (LAX)	41	5,196	126.3	40	4,978	123.1	2	4	3
Portland	88	8,121	92.4	90	8,081	90.2	(2)	0	2
Seattle/Tacoma	227	26,216	115.3	229	26,434	115.5	(1)	(1)	(0)
Total	**398**	**44,586**	**112.0**	**400**	**44,637**	**111.5**	**(1)**	**(0)**	**0**

Table 5.6, next page, recaps the hub/focus city distribution of Alaska/Horizon's fleet including its minor codeshare partner Pen Air. Announced plans were for the Bombardier CRJ-700 regional jet aircraft to be phased out in favor of the Bombardier Q400 turboprop. However, the current market has limited demand for selling CRJ-700 aircraft and delayed this planned fleet

simplification. While it is expected this fleet modification will eventually occur, it is uncertain whether this will result in a capacity reduction or a replacement by some combination of mainline and turboprop aircraft.

TABLE 5.6 ALASKA AIRLINES - REGIONAL PARTNER AIRCRAFT IN USE

REGIONAL PARTNER	AIRCRAFT TYPE	SEATING CAPACITY	ANC PEAK DAY DEPARTURES		LAX PEAK DAY DEPARTURES		PDX PEAK DAY DEPARTURES		SEA PEAK DAY DEPARTURES	
			FLIGHTS	% OF TOTAL	FLIGHTS	% OF TOTAL	FLIGHTS	% OF TOTAL	FLIGHTS	% OF TOTAL
Horizon Air	Bombardier DHC-8-Q400	76	0	0	14	35	40	43	94	40
	Bombardier CRJ-700	70	0	0	0	0	27	29	16	7
Pen Air	Saab 340	30	3	7	0	0	0	0	0	0
Alaska Airlines' mainline			40	93	26	65	25	27	124	53
Total			**43**	**100**	**40**	**100**	**92**	**100**	**234**	**100**

Note: October 2010; Peak Day = Thursday

Strategically, Alaska is expected to maintain its present course. They will aggressively defend their dominant position in the Alaska market, expand service to larger eastern markets and Hawaii as they identify opportunities and service between secondary Pacific Northwest points and California when markets appear capable of supporting 76-seat turboprop aircraft. With regard to merger possibilities, Alaska has not been prominently mentioned; however, Delta Air Lines and American Airlines have been mentioned as the most likely possibilities. The merger fervor has waned, and an Alaska merger in the near future is unlikely.

Pullman-Moscow's service is potentially at risk with recent discussions that Alaska/Horizon will drop the Lewiston tag service. Due to location relative to Spokane and that Pullman-Moscow passengers make up the majority of the existing combined market, Pullman-Moscow is the best option for Alaska/Horizon to retain the largest number of passengers from both Lewiston and Pullman.

SUMMARY OF MAIN POINTS

- Compared to year ended June 30, 2009, Pullman-Moscow's Alaska/Horizon passengers and revenue increased which have strengthened the route for Alaska/Horizon.
- Pullman-Moscow's 66 percent load factor is low compared to Alaska/Horizon's system average; however, the load factor is average compared to other markets served solely with the Q400 aircraft.
- RASM for year ended June 30, 2010, was above average.
- Pullman-Moscow's service is potentially at risk with recent discussions of Alaska/Horizon dropping the Lewiston tag service. Even though Pullman-Moscow is the best option for retaining passenger traffic, the community will need to be aggressive moving forward to retain this service.

PASSENGER DEMAND

This section estimates the total number of passengers in the catchment area; specifically, it analyzes the portion of passengers diverting from Pullman-Moscow Regional Airport. This section investigates destinations associated with travel to and from the catchment area. In addition, destinations are grouped into geographic regions to further understand the flow of air travel and by airline to determine what airline air travelers are using at competing airports.

METHODOLOGY

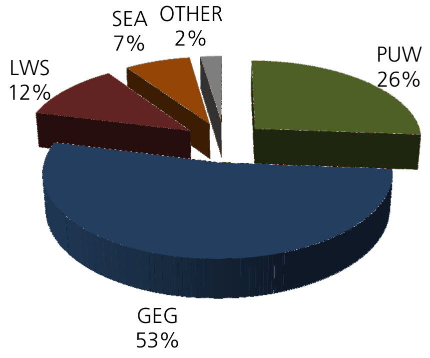
To determine total catchment area passenger demand and retention at Pullman-Moscow Regional Airport, Marketing Information Data Tape (MIDT) booking information from the Global Distribution Systems (GDS), which is used by travel agencies, and U.S. Department of Transportation (DOT) airline data are combined to provide a comprehensive overview of the air travel market. The information collected includes originating airports, destinations, and airlines used. For the purposes of this study, MIDT include bookings made by travel agencies in the Pullman-Moscow catchment area. It does not capture bookings issued directly by airline Web sites (e.g., www.alaskaair.com, www.united.com), agency Internet sites (e.g., www.travelocity.com, www.expedia.com), or directly through airline reservation offices. Data from Internet sites were not used in this study because MIDT data are sorted by zip code. Internet sites record all bookings as originating from the zip code in which the server resides. For example, all bookings for www.expedia.com are recorded with a Seattle zip code regardless of the air traveler's location, since the server for Expedia is located in Seattle. Accordingly, retention or diversion information cannot be derived from Internet site bookings. The data used include bookings for the zip codes in the catchment area, NOT all bookings. As a result, MIDT data represent a sample to measure the air travel habits of catchment area air travelers.

The near elimination of commissions paid to travel agencies and the greater acceptance of the Internet as a mode of commerce has reduced the number of tickets written by travel agencies. Some carriers, with limited dependence on travel agencies, transport a larger percentage of travelers than in years past. This factor makes it impossible to definitively quantify the percentage of passengers from the catchment area who are booking on one airline versus another; however, business travel, usually the highest yield traffic for airlines and the most sought after, is often contracted out to travel agencies to manage. As a result, airlines report that traditional travel agencies (and therefore GDS) will continue to play a vital role in the distribution of airline tickets. Therefore, although limitations exist, MIDT data accurately portray the airline booking habits of a large cross-section of catchment area travelers making the data useful to both airports and airlines. A total of 7,647 bookings were included in this analysis for year ended September 30, 2009. In the 2006 *Passenger Demand Analysis*, 13,676 bookings were included for calendar year 2005.

AIRPORT USE

Exhibit 6.1 provides a depiction of the airports used by Pullman-Moscow Regional Airport catchment area travelers. An estimated 26 percent of the catchment area's air travelers used Pullman-Moscow Regional Airport for their trips to and from the catchment area. Fifty-three percent diverted to Spokane International Airport, 12 percent to Lewiston-Nez Perce County Airport, seven percent to Seattle-Tacoma International Airport and the remaining two percent dispersed to various other airports including airports at: Portland, Boise, Pasco, Yakima, Wenatchee and Walla Walla. Compared to the 2006 analysis, retention remained stable dropping only a half percent.

EXHIBIT 6.1 AIRPORT USE



DOMESTIC AND INTERNATIONAL ITINERARIES

Table 6.1 shows passengers by domestic and international itineraries. Twenty-seven percent, or 59,020 domestic travelers, and 23 percent, or 7,912 international travelers, used Pullman-Moscow Regional Airport. Overall, Pullman-Moscow retained 26 percent or 66,932 of the estimated 255,722 domestic and international catchment area passengers. In the previous *Passenger Demand Analysis* conducted in 2006, Pullman-Moscow retained 27, 23, and 27 percent of the domestic, international, and total travelers, respectively. Retention has changed little since the previous analysis.

The largest number of diverting domestic air travelers, 53 percent of total domestic travelers, used Spokane International Airport; the highest number of diverting international air travelers, 50 percent of total international travelers, also used Spokane International Airport. Lewiston and Seattle-Tacoma are the other two primary competing airports garnering a share of Pullman-Moscow passengers with 12 and seven percent of total catchment area passengers, respectively. In 2006, 55 percent of travelers used Spokane, 12 percent used Lewiston, and six percent accessed Seattle-Tacoma.

TABLE 6.1 AIRPORT USE - DOMESTIC & INTERNATIONAL COMPARISON

RANK	ORIGINATING AIRPORT	PAX	2009 %	2006 %
	Domestic			
1	Spokane, WA	117,431	53	55
2	Pullman-Moscow, WA	59,020	27	27
3	Lewiston, ID	27,030	12	12
4	Seattle, WA	12,892	6	5
5	Other	4,840	2	1
	Subtotal	**221,213**	**100**	**100**
	International			
1	Spokane, WA	17,395	50	50
2	Pullman-Moscow, WA	7,912	23	23
3	Seattle, WA	5,611	16	21
4	Lewiston, ID	2,357	7	5
5	Other	1,234	4	1
	Subtotal	**34,509**	**100**	**100**
	Domestic and international			
1	Spokane, WA	134,826	53	55
2	Pullman-Moscow, WA	66,932	26	27
3	Lewiston, ID	29,387	12	12
4	Seattle, WA	18,503	7	6
5	Other	6,074	2	1
	Total	**255,722**	**100**	**100**

Other Airports Include: PDX, BOI, PSC, YKM, EAT, ALW

AIRPORT USE BY COMMUNITY

Airport use can be further defined by community to better understand how travelers from the Pullman-Moscow catchment area communities access commercial air service. **Table 6.2** shows retention by community. MIDT booking information is reported by travel agency location, and therefore this analysis assumes that the traveler's residence is in the same community as the travel agency where the ticket was purchased.

Only two communities, Moscow and Pullman, were included in this analysis. Pullman had a higher retention rate with 32 percent versus the Moscow community with 14 percent retention. A larger share of Moscow air travelers used Spokane and Lewiston for air travel. The current analysis is similar to the results in 2006 where the Pullman community used Pullman-Moscow Regional Airport 36 percent of the time versus the Moscow community which used the airport only 22 percent of the time.

The University of Idaho at Moscow does a lot of business with the State of Idaho and subsequently has significant travel to Boise. This is partly the reason for Lewiston and Spokane's higher retention rate for Moscow travelers. In 2005, Horizon discontinued connecting service from Pullman-Moscow to Boise via Lewiston, leaving travelers with the option to drive to Lewiston or Spokane. In February 2008, Alaska/Horizon reinstated the one-stop (except for summer months) which allows Moscow travelers to use the local airport.

TABLE 6.2 AIRPORT USE BY COMMUNITY

	2009 % AIRPORT USE					2006 % AIRPORT USE				
COMMUNITY	PUW	GEG	LWS	SEA	OTHER	PUW	GEG	LWS	SEA	OTHER
Colfax	N/A	N/A	N/A	N/A	N/A	1	82	7	10	0
Moscow	14	59	20	4	3	22	54	16	6	2
Pullman	32	49	7	9	2	36	51	8	5	0
Total	**26**	**53**	**12**	**7**	**2**	**27**	**55**	**12**	**6**	**1**

TRUE MARKET ESTIMATE

The airport catchment area (**Exhibit 3.1,** page 6) represents the geographic area from which the airport primarily attracts air travelers. Domestic airlines report origin and destination traffic statistics to the U.S. DOT on a quarterly basis. Used by itself, these traffic statistics do not quantify the total size of an air service market. By combining MIDT information with passenger data contained in the U.S. DOT airline reports, an estimate of the total air travel market by destination was calculated. Passenger numbers are estimated for domestic markets on a destination basis and a regional basis for international markets.

The MIDT data used in this report include information on initiated passengers ticketed by local travel agencies. This enables the identification of passenger retention and diversion. According to U.S. DOT airline reports for year ended June 30, 2010, 56 percent of Pullman-Moscow Regional Airport origin and destination passengers initiated air travel from Pullman-Moscow, and the other 44 percent began their trip from another city (e.g. New York, Dallas, or Phoenix). For the purposes of this analysis and estimation of the true market, the assumption is that that origin and destination passengers who begin their trip from beyond the catchment area (referred passengers) have the same retention rate as those originating travel from within the catchment area (initiated passengers).

TOP 25 TRUE MARKET DESTINATIONS

Table 6.3 provides the top 25 true market destinations. The top 25 destinations account for 64 percent of the travel to/from the Pullman-Moscow catchment area. Seattle was the number one market and accounted for 17 percent of all travel. Los Angeles and Anchorage followed as the second and third largest markets. Boise and Portland were the fourth and fifth largest markets. Since 2006, the top three markets remained the same. Within the top 10, the most significant changes were Las Vegas which jumped to sixth up from 19 in the previous analysis and Honolulu that came from 65th to the seventh largest market.

Appendix A, Top 50 true markets, provides the top 50 domestic true markets. The true market estimate is based on actual traffic and does not include travelers that are stimulated from changes in air service, i.e. availability of new or less expensive service. Estimating the number of passengers who would use the local airport and the air service improvements required to serve these new customers are topics of further study.

TABLE 6.3 TRUE MARKET ESTIMATE - TOP 25 DESTINATIONS

RANK	DESTINATION	PUW REPORTED PAX	DIVERTED PAX	TRUE MARKET	PDEW	2006 TRUE MARKET	2006 RANK	% CHANGE
1	Seattle, WA	26,630	15,628	42,258	58	25,955	1	63
2	Los Angeles, CA	1,950	17,550	19,500	27	11,268	2	73
3	Anchorage, AK	2,060	13,671	15,731	22	6,485	3	143
4	Boise, ID	3,870	6,488	10,358	14	5,028	8	106
5	Portland, OR	3,400	4,413	7,813	11	5,815	6	34
6	Las Vegas, NV	810	6,249	7,059	10	2,272	19	211
7	Honolulu, HI	720	5,455	6,175	8	296	65	1,988
8	Denver, CO	440	3,960	4,400	6	3,033	13	45
9	Minneapolis, MN	430	3,870	4,300	6	2,563	15	68
10	Oakland, CA	1,120	2,932	4,052	6	2,032	21	99
11	Washington, DC (DCA)	850	3,110	3,960	5	3,268	11	21
12	Juneau, AK	510	3,385	3,895	5	1,948	25	100
13	Chicago, IL (ORD)	540	3,182	3,722	5	2,341	17	59
14	San Jose, CA	930	2,745	3,675	5	2,702	14	36
15	Phoenix, AZ	570	2,462	3,032	4	5,859	5	(48)
16	Sacramento, CA	980	2,002	2,982	4	5,218	7	(43)
17	Bellingham, WA	390	2,588	2,978	4	1,948	24	53
18	Fairbanks, AK	360	2,389	2,749	4	2,007	22	37
19	San Francisco, CA	980	1,621	2,601	4	2,336	18	11
20	Ontario, CA	420	2,100	2,520	3	4,259	10	(41)
21	Atlanta, GA	240	2,160	2,400	3	1,479	31	62
22	Medford, OR	300	1,991	2,291	3	1,358	32	69
23	San Diego, CA	1,080	1,190	2,270	3	4,352	9	(48)
24	Palm Springs, CA	260	1,725	1,985	3	1,313	33	51
25	Eugene, OR	640	1,280	1,920	3	706	43	172
Top 25 destinations		**50,480**	**114,145**	**164,625**	**226**	**105,840**	**N/A**	**56**
Total domestic		**59,020**	**162,193**	**221,213**	**303**	**157,322**	**N/A**	**41**
Total international		**7,912**	**26,597**	**34,509**	**47**	**12,706**	**N/A**	**172**
All markets		**66,932**	**188,790**	**255,722**	**350**	**170,029**	**N/A**	**50**

High Retention to the Number One Market

Retention to/from Seattle was high at 63 percent due to the nonstop service available at Pullman-Moscow Regional Airport.

TOP 25 DOMESTIC DESTINATIONS BY ORIGINATING AIRPORT

Overall, Pullman-Moscow Regional Airport retained an estimated 27 percent of domestic catchment area air travelers or 59,020 of the 221,213 catchment area domestic origin and destination passengers. The top 25 domestic destinations accounted for 164,625 annual passengers or 74 percent of all domestic catchment area travelers (**Table 6.4**). Thirty-one percent of air travelers destined for one of the top 25 markets used Pullman-Moscow Regional Airport.

Among the top five markets, Pullman-Moscow Regional Airport had the highest retention (63 percent) in the Seattle market due to the nonstop service available. The Portland and Boise markets also had high retention rates of 37 and 44 percent, respectively. The Los Angeles and Anchorage markets were low with retention rates of less than 15 percent. Other markets with high retention rates (greater than 30 percent) within the top 25 included the West Coast markets of Sacramento, San Francisco, San Diego, and Eugene. The lowest retention rates were in eastern markets.

TABLE 6.4 TOP 25 DOMESTIC DESTINATIONS BY ORIGINATING AIRPORT

RANK	DESTINATION	ORIGIN AIRPORT %					TOTAL PAX
		PUW	GEG	LWS	SEA	OTHER	
1	Seattle, WA	63	32	4	0	1	42,258
2	Los Angeles, CA	10	86	2	2	0	19,500
3	Anchorage, AK	13	58	16	9	4	15,731
4	Boise, ID	37	12	49	1	0	10,358
5	Portland, OR	44	50	2	3	1	7,813
6	Las Vegas, NV	11	61	20	3	3	7,059
7	Honolulu, HI	12	26	2	56	4	6,175
8	Denver, CO	10	66	13	4	7	4,400
9	Minneapolis, MN	10	78	0	12	0	4,300
10	Oakland, CA	28	66	3	2	3	4,052
11	Washington, DC (DCA)	21	53	18	6	2	3,960
12	Juneau, AK	13	58	16	9	4	3,895
13	Chicago, IL (ORD)	15	67	10	5	4	3,722
14	San Jose, CA	25	71	1	2	0	3,675
15	Phoenix, AZ	19	55	21	4	2	3,032
16	Sacramento, CA	33	46	7	14	0	2,982
17	Bellingham, WA	13	58	16	9	4	2,978
18	Fairbanks, AK	13	58	16	9	4	2,749
19	San Francisco, CA	38	49	8	3	2	2,601
20	Ontario, CA	17	64	17	2	0	2,520
21	Atlanta, GA	10	67	16	2	6	2,400
22	Medford, OR	13	58	16	9	4	2,291
23	San Diego, CA	48	41	9	2	1	2,270
24	Palm Springs, CA	13	58	16	9	4	1,985
25	Eugene, OR	33	64	1	1	0	1,920
	Top 25 domestic	**31**	**51**	**11**	**6**	**2**	**164,625**
	Total domestic	**27**	**53**	**12**	**6**	**2**	**221,213**

Compared to the 2006 analysis, Pullman-Moscow's retention in the top three markets improved marginally to Seattle but decreased in the Los Angeles and Anchorage markets. Overall, retention for the top 25 markets and all domestic markets remained the same at 31 and 27 percent, respectively.

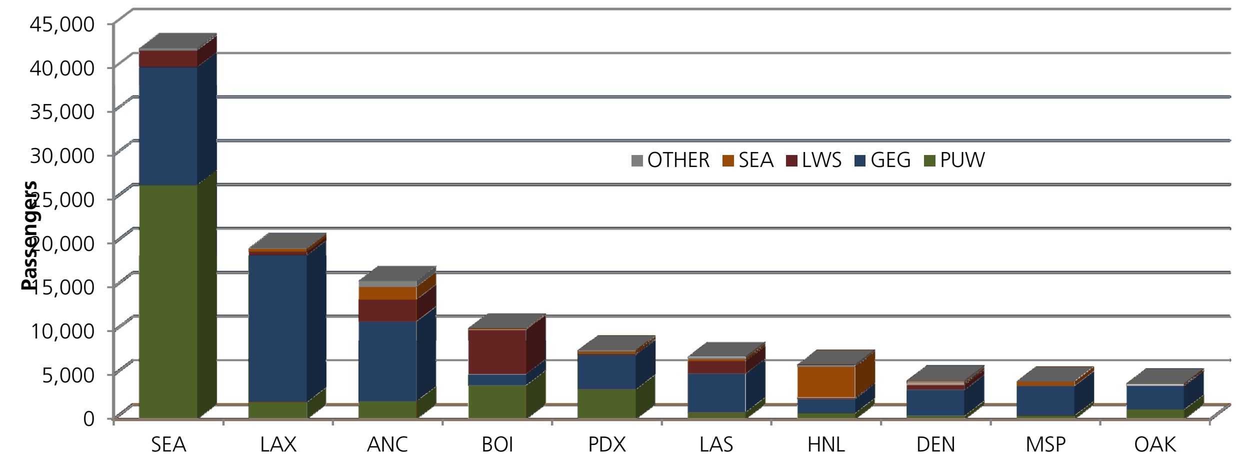
TOP 10 DESTINATIONS BY ORIGINATING AIRPORT

Table 6.5 shows the top 10 markets for catchment area passengers respective to the airport used. **Exhibit 6.2** displays overall retention and diversion for the top 10 destinations using a bar graph.

TABLE 6.5 TOP 10 DESTINATIONS BY ORIGINATING AIRPORT

	PUW		GEG		LWS		SEA	
RANK	DESTINATION	PAX	DESTINATION	PAX	DESTINATION	PAX	DESTINATION	PAX
1	Seattle, WA	26,630	Los Angeles, CA	16,756	Boise, ID	5,084	Honolulu, HI	3,469
2	Boise, ID	3,870	Seattle, WA	13,455	Anchorage, AK	2,481	Anchorage, AK	1,428
3	Portland, OR	3,400	Anchorage, AK	9,083	Seattle, WA	1,892	Minneapolis, MN	520
4	Anchorage, AK	2,060	Las Vegas, NV	4,339	Las Vegas, NV	1,446	New York, NY (JFK)	460
5	Los Angeles, CA	1,950	Portland, OR	3,906	Idaho Falls, ID	1,101	Sacramento, CA	417
6	Oakland, CA	1,120	Minneapolis, MN	3,350	Salt Lake City, UT	919	Juneau, AK	354
7	San Diego, CA	1,080	Denver, CO	2,911	Washington, DC (DCA)	695	Los Angeles, CA	340
8	Sacramento, CA	980	Oakland, CA	2,668	Phoenix, AZ	638	Bellingham, WA	270
9	San Francisco, CA	980	San Jose, CA	2,609	Juneau, AK	614	Portland, OR	253
10	San Jose, CA	930	Chicago, IL (ORD)	2,488	Denver, CO	575	Fairbanks, AK	250

EXHIBIT 6.2 RETENTION AND DIVERSION FOR TOP 10 DESTINATIONS



FEDERAL AVIATION ADMINISTRATION (FAA) GEOGRAPHIC REGIONS

It is important to identify and quantify air travel markets, but it is also important to measure air travel by specific geographic regions. Generally, airlines operate route systems that serve geographic areas. Additionally, most airline hubs are directional and flow passenger traffic to and from geographic regions, not just destinations within the region. Therefore, air service analysis exercises consider the regional flow of passenger traffic as well as passenger traffic to a specific city. Accordingly, this section analyzes the regional distribution of air travelers from the airport catchment area. For this exercise, the FAA geographic breakdown of the U.S. is used (**Exhibit 6.3**).

EXHIBIT 6.3 FAA GEOGRAPHIC REGIONS

High Domestic Travel to the Northwest and West Regions

The Northwest region was the most frequented region with 32 percent of total passengers; the West region followed with 29 percent of passengers.

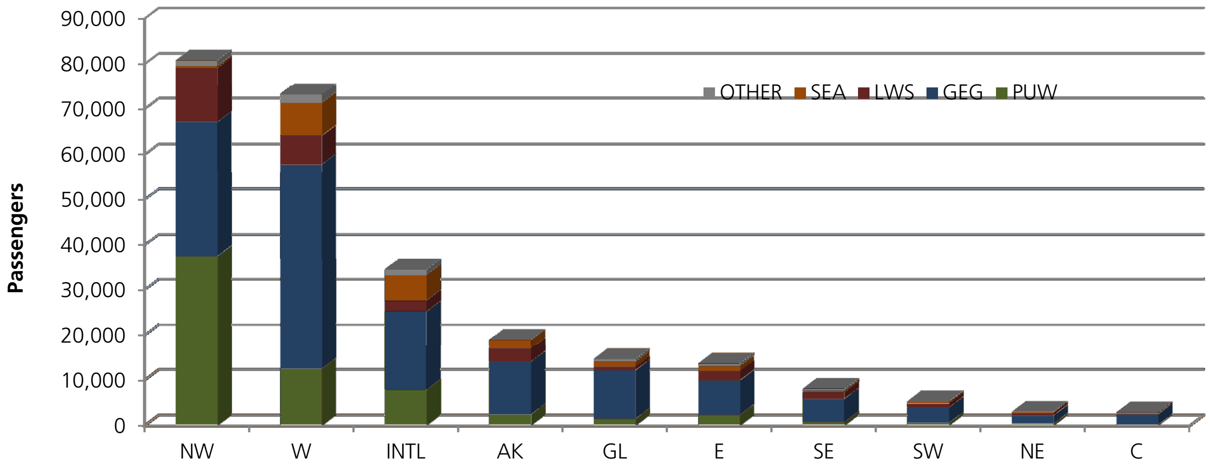
REGIONAL DISTRIBUTION OF TRAVELERS

Table 6.6 and **Exhibit 6.4** divide catchment area travel into the FAA's nine geographic regions and one catch-all international region. The Northwest Region was the most frequented with 80,912 annual passengers. The West Region followed the Northwest Region as the most frequented geographical area. Alaska was the third most frequented domestic region. Approximately 13 percent of catchment area travelers traveled to international destinations. The primary difference since the 2006 analysis was the West Region was the most frequented region in 2006 with the Northwest Region being the second most frequented region. In addition, there were a higher number of international travelers in the current analysis.

TABLE 6.6 REGIONAL DISTRIBUTION OF TRAVEL BY AIRPORT

AIRPORT		REGION										
		NW	W	INTL	AK	GL	E	SE	SW	NE	C	TOTAL
PUW	Pax	37,582	12,559	7,912	2,522	1,595	2,449	844	677	521	271	66,932
	%	56	19	12	4	2	4	1	1	1	0	100
GEG	Pax	29,631	45,383	17,395	11,591	10,623	7,561	5,139	3,395	1,788	2,320	134,826
	%	22	34	13	9	8	6	4	3	1	2	100
LWS	Pax	11,984	6,271	2,357	2,987	783	2,045	1,321	872	508	258	29,387
	%	41	21	8	10	3	7	4	3	2	1	100
SEA	Pax	450	7,182	5,611	1,923	1,135	1,099	427	339	239	98	18,503
	%	2	39	30	10	6	6	2	2	1	1	100
OTHER	Pax	1,265	1,947	1,234	0	575	553	394	103	0	3	6,074
	%	21	32	20	0	9	9	6	2	0	0	100
Total	**Pax**	**80,912**	**73,342**	**34,509**	**19,023**	**14,710**	**13,708**	**8,125**	**5,386**	**3,057**	**2,951**	**255,722**
	%	**32**	**29**	**13**	**7**	**6**	**5**	**3**	**2**	**1**	**1**	**100**

EXHIBIT 6.4 REGIONAL DISTRIBUTION OF TRAVEL



Distribution of International Travel

Thirteen percent of catchment area travelers had international itineraries. **Table 6.7** shows international travelers by airport and region. Europe was the most frequented international destination with 36 percent, or 12,513 of the total 34,509 catchment area international travelers. Mexico & Central America was the second largest international region with 19 percent, Asia was the third largest international region with 16 percent, and Canada was the fourth largest region amongst Pullman-Moscow catchment area international travelers with 14 percent.

While Seattle-Tacoma International Airport was the fourth largest competitor for Pullman-Moscow Regional Airport catchment area passengers on a domestic basis, it is the third most used competitive airport to Pullman-Moscow for international travelers with 5,611 annual passengers.

In the previous analysis, Canada was the third most traveled international destination instead of Asia which was fourth, and South America was the fifth most frequented international region instead of seventh.

TABLE 6.7 REGIONAL DISTRIBUTION OF INTERNATIONAL PASSENGERS

REGION		ORIGINATING AIRPORT					TOTAL
		PUW	GEG	LWS	SEA	OTHER	
Europe	Pax	3,367	5,331	730	2,806	280	12,513
	% of row	27	43	6	22	2	100
	% of column	43	31	31	50	23	36
Mexico & Central America	Pax	842	4,096	561	617	337	6,453
	% of row	13	63	9	10	5	100
	% of column	11	24	24	11	27	19
Asia	Pax	1,515	2,132	112	1,291	337	5,387
	% of row	28	40	2	24	6	100
	% of column	19	12	5	23	27	16
Canada	Pax	1,571	2,637	337	393	56	4,994
	% of row	31	53	7	8	1	100
	% of column	20	15	14	7	5	14
Australia & Oceania	Pax	56	729	281	112	168	1,347
	% of row	4	54	21	8	12	100
	% of column	1	4	12	2	14	4
Middle East	Pax	168	1,010	0	112	0	1,291
	% of row	13	78	0	9	0	100
	% of column	2	6	0	2	0	4
South America	Pax	168	729	56	0	56	1,010
	% of row	17	72	6	0	6	100
	% of column	2	4	2	0	5	3
Africa	Pax	224	505	0	168	0	898
	% of row	25	56	0	19	0	100
	% of column	3	3	0	3	0	3
Caribbean	Pax	0	224	281	112	0	617
	% of row	0	36	45	18	0	100
	% of column	0	1	12	2	0	2
Total passengers		**7,912**	**17,395**	**2,357**	**5,611**	**1,234**	**34,509**
% of row		**23**	**50**	**7**	**16**	**4**	**100**
% of column		**100**	**100**	**100**	**100**	**100**	**100**

Airlines

Information in this subsection identifies airline use by catchment area air travelers. The information is airport and airline specific. The intent is to determine which airlines are used to travel to specific destinations when air travel is accessed at an airport other than the local airport. Airline market share is based on MIDT data and is an estimation of carrier share. At Pullman-Moscow Regional Airport, Alaska Airlines/Horizon Air was the only airline that provided air service.

Airlines Used At Spokane International Airport

Table 6.8 shows the airlines used when travelers from the Pullman-Moscow Regional Airport catchment area originated travel at Spokane International Airport. Alaska/Horizon had the largest share of Pullman-Moscow area passengers at Spokane. Delta Air Lines, Southwest Airlines, United Airlines, and Frontier Airlines were the other top five airlines obtaining a share of diverting passengers. "Other" airlines collectively flew three percent of Pullman-Moscow catchment area passengers at Spokane International Airport. Compared to 2006, Alaska/Horizon and Southwest gained market share while United's market share declined. Frontier replaced America West in the top five airlines.

TABLE 6.8 AIRLINES USED AT SPOKANE INTERNATIONAL AIRPORT

RANK	DESTINATIONS	AIRLINE %						TOTAL PAX
		AS	DL	WN	UA	F9	OTHER	
1	Los Angeles, CA	92	0	7	0	1	0	16,756
2	Seattle, WA	99	0	1	0	0	0	13,455
3	Anchorage, AK	100	0	0	0	0	0	9,083
4	Las Vegas, NV	19	3	76	0	0	3	4,339
5	Portland, OR	87	0	13	0	0	0	3,906
6	Minneapolis, MN	7	84	0	7	0	2	3,350
7	Denver, CO	14	2	7	62	15	0	2,911
8	Oakland, CA	19	4	77	0	0	0	2,668
9	San Jose, CA	98	0	2	0	0	0	2,609
10	Chicago, IL (ORD)	71	7	0	12	0	10	2,488
11	Washington, DC (DCA)	10	53	0	18	17	3	2,086
12	Bellingham, WA	100	0	0	0	0	0	1,720
13	Phoenix, AZ	11	4	3	1	0	81	1,664
14	Ontario, CA	96	0	0	4	0	0	1,620
15	Honolulu, HI	55	41	0	0	0	4	1,615
16	Atlanta, GA	2	49	0	19	23	7	1,601
17	Fairbanks, AK	100	0	0	0	0	0	1,587
18	Sacramento, CA	86	0	14	0	0	0	1,376
19	Medford, OR	100	0	0	0	0	0	1,323
20	San Francisco, CA	83	1	0	15	0	0	1,283
21	Long Beach, CA	86	14	0	0	0	0	1,260
22	Boise, ID	45	0	55	0	0	0	1,252
23	Eugene, OR	100	0	0	0	0	0	1,237
24	Palm Springs, CA	100	0	0	0	0	0	1,146
25	Des Moines, IA	0	36	0	64	0	0	1,119
	Total top 25	**73**	**8**	**10**	**5**	**2**	**2**	**83,454**
	Total domestic	**60**	**17**	**9**	**8**	**2**	**3**	**117,431**

Horizon/Delta Similar Market Shares at Lewiston

Alaska/Horizon served approximately 49 percent of Pullman-Moscow passengers using Lewiston; Delta followed closely behind within one percentage point.

Airlines Used At Lewiston-Nez Perce County Airport

Table 6.9 displays Pullman-Moscow Regional Airport catchment area passenger's airline use at Lewiston-Nez Perce County Airport. Alaska/Horizon served 49 percent of Pullman-Moscow travelers diverting to Lewiston, followed closely by Delta. Alaska/Horizon had a higher share of passengers destined for the top 25 destinations versus all destinations at Lewiston. Since 2006, Delta has gained some market share overall increasing from 45 to 49 percent.

TABLE 6.9 AIRLINES USED AT LEWISTON-NEZ PERCE COUNTY AIRPORT

		AIRLINE %			TOTAL
RANK	DESTINATIONS	AS	DL	OTHER	PAX
1	Boise, ID	94	6	0	5,084
2	Anchorage, AK	100	0	0	2,481
3	Seattle, WA	100	0	0	1,892
4	Las Vegas, NV	28	60	12	1,446
5	Idaho Falls, ID	15	85	0	1,101
6	Salt Lake City, UT	0	100	0	919
7	Washington, DC (DCA)	14	86	0	695
8	Phoenix, AZ	21	79	0	638
9	Denver, CO	6	94	0	575
10	Ontario, CA	0	100	0	420
11	Orlando, FL	0	100	0	399
12	Chicago, IL (ORD)	0	95	5	386
13	Los Angeles, CA	40	60	0	378
14	Atlanta, GA	0	100	0	372
15	Boston, MA	15	85	0	340
16	Dallas, TX (DFW)	0	100	0	329
17	New York, NY (JFK)	0	100	0	329
18	Palm Springs, CA	57	43	0	313
19	Philadelphia, PA	0	100	0	286
20	Santa Barbara, CA	0	100	0	253
21	Sacramento, CA	30	70	0	209
22	Billings, MT	0	100	0	205
23	San Diego, CA	18	82	0	201
24	San Francisco, CA	9	73	18	196
25	Baltimore, MD	0	100	0	195
	Total top 25	**53**	**45**	**1**	**19,644**
	Total domestic	**49**	**49**	**1**	**27,030**

Airlines Used At Seattle-Tacoma International Airport

Table 6.10 shows catchment area passenger's airline preferences when diverting from Pullman-Moscow to Seattle-Tacoma International Airport. Delta was the primary airline used for diverting passengers at Seattle with a market share of 54 percent. Alaska/Horizon, Southwest, United, and American Airlines followed respectively.

TABLE 6.10 AIRLINES USED AT SEATTLE-TACOMA INTERNATIONAL AIRPORT

RANK	DESTINATIONS	AIRLINE %						TOTAL PAX
		DL	AS	WN	UA	AA	OTHER	
1	Honolulu, HI	99	1	0	0	0	1	3,469
2	Anchorage, AK	0	100	0	0	0	0	1,428
3	Minneapolis, MN	100	0	0	0	0	0	520
4	New York, NY (JFK)	100	0	0	0	0	0	460
5	Sacramento, CA	0	90	10	0	0	0	417
6	Los Angeles, CA	22	78	0	0	0	0	340
7	Washington, DC (DCA)	0	100	0	0	0	0	232
8	Las Vegas, NV	0	50	50	0	0	0	231
9	Dallas, TX (DFW)	20	40	0	0	40	0	206
10	Palm Springs, CA	0	100	0	0	0	0	180
11	Chicago, IL (ORD)	0	44	0	11	44	0	174
12	Denver, CO	0	40	0	20	0	40	169
13	Boston, MA	20	60	0	0	0	20	131
14	Billings, MT	100	0	0	0	0	0	118
15	Phoenix, AZ	0	20	80	0	0	0	114
16	Orlando, FL	20	20	0	40	20	0	95
17	San Jose, CA	0	100	0	0	0	0	91
18	Kahului, HI	100	0	0	0	0	0	90
19	San Francisco, CA	0	100	0	0	0	0	89
20	Lihue, HI	0	0	0	0	0	100	83
21	Raleigh/Durham, NC	100	0	0	0	0	0	69
22	Charlotte-Douglas, NC	80	0	0	0	0	20	63
23	Oakland, CA	0	67	33	0	0	0	61
24	Ontario, CA	0	100	0	0	0	0	60
25	Long Beach, CA	0	100	0	0	0	0	60
Total top 25		**55**	**37**	**3**	**1**	**2**	**2**	**8,950**
Total domestic		**54**	**35**	**3**	**2**	**2**	**3**	**12,892**

Airlines Used Total Catchment Area

Table 6.11 shows which airline catchment area travelers used regardless of the originating airport, Pullman-Moscow Regional Airport or a competing airport. Alaska/Horizon carried the vast majority of Pullman-Moscow Regional Airport catchment area passengers at 67 percent. Delta was second carrying 19 percent. Southwest, United, and Frontier made up the remaining top five airlines.

TABLE 6.11 AIRLINES USED AT ALL AIRPORTS

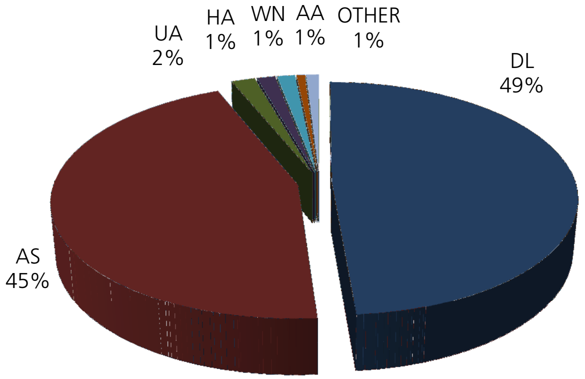
RANK	DESTINATIONS	AIRLINE %						TOTAL PAX
		AS	DL	WN	UA	F9	OTHER	
1	Seattle, WA	99	0	0	0	0	0	42,258
2	Los Angeles, CA	91	2	6	0	1	0	19,500
3	Anchorage, AK	100	0	0	0	0	0	15,731
4	Boise, ID	90	3	7	0	0	0	10,358
5	Portland, OR	93	0	7	0	0	0	7,813
6	Las Vegas, NV	30	16	49	2	0	2	7,059
7	Honolulu, HI	27	71	0	0	0	2	6,175
8	Denver, CO	14	14	5	47	18	1	4,400
9	Minneapolis, MN	7	87	0	5	0	1	4,300
10	Oakland, CA	43	4	52	0	0	1	4,052
11	Washington, DC (DCA)	31	48	0	10	9	3	3,960
12	Juneau, AK	100	0	0	0	0	0	3,895
13	Chicago, IL (ORD)	59	16	0	15	0	10	3,722
14	San Jose, CA	98	1	1	0	0	0	3,675
15	Phoenix, AZ	30	20	5	1	0	45	3,032
16	Sacramento, CA	87	5	8	0	0	0	2,982
17	Bellingham, WA	100	0	0	0	0	0	2,978
18	Fairbanks, AK	100	0	0	0	0	0	2,749
19	San Francisco, CA	84	6	0	10	0	0	2,601
20	Ontario, CA	81	17	0	2	0	0	2,520
21	Atlanta, GA	7	54	0	19	16	5	2,400
22	Medford, OR	100	0	0	0	0	0	2,291
23	San Diego, CA	83	13	2	2	0	0	2,270
24	Palm Springs, CA	93	7	0	0	0	0	1,985
25	Eugene, OR	100	0	0	0	0	0	1,920
	Total top 25	**79**	**10**	**5**	**3**	**1**	**2**	**164,625**
	Total domestic	**67**	**19**	**5**	**5**	**1**	**2**	**221,213**

Carrier Share

Exhibit 6.5 illustrates the airline preferences of Pullman-Moscow Regional Airport catchment area travelers who drove to a competing airport to access air service. When travelers diverted to a competing airport, Delta was the primary carrier used, with a 49 percent market share; this is significantly up from its 19 percent share when factoring all passengers, not just diverting travelers. Alaska/Horizon was second with 45 percent. Other carriers followed with shares two percent or less including United, Hawaiian Airlines, Southwest, and American. Other various airlines served the remaining one percent of catchment area travelers who diverted to a competing airport.

Most notable is the use of Alaska/Horizon at competing airports. With nonstop service offered by Alaska/Horizon at Pullman-Moscow Regional Airport, a greater share of those passengers should be retained at the local airport. Fare disparities are the likely cause of diversion to competing airports when this airline is used at competing airports.

EXHIBIT 6.5 CARRIER SHARE OF DIVERTING PASSENGERS



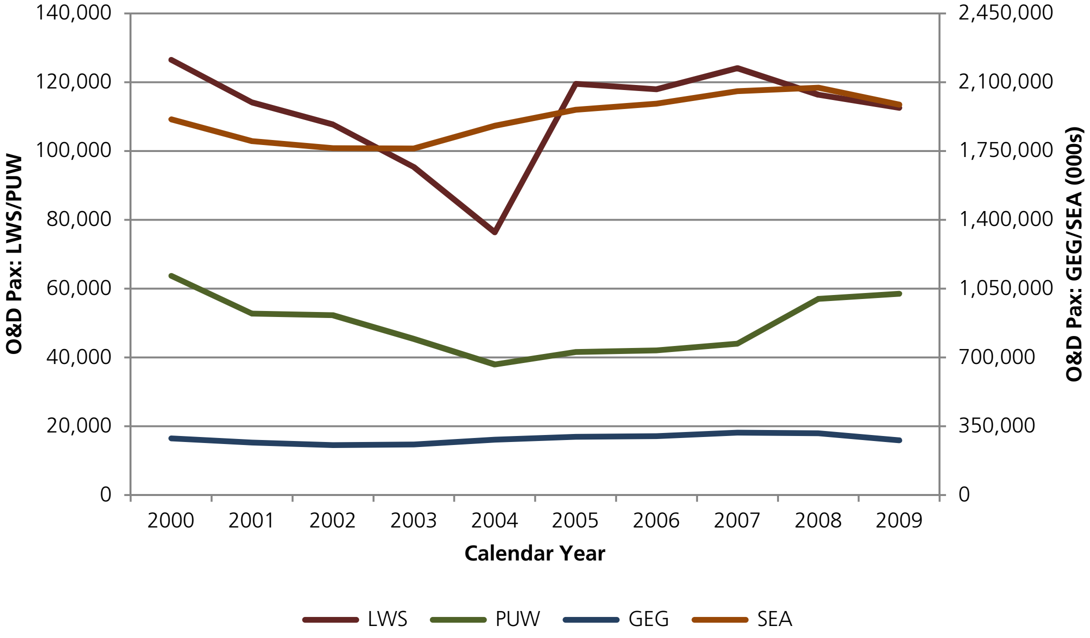
SUMMARY OF MAIN POINTS

- An estimated 26 percent of catchment area air travelers used Pullman-Moscow Regional Airport for air service. Fifty-three percent used Spokane, 12 percent used Lewiston, seven percent used Seattle-Tacoma, and two percent used other airports. A higher percentage of domestic travelers, 27 percent, used the local airport at Pullman-Moscow than international travelers, 23 percent. Retention of air travelers changed little since the previous analysis completed in 2006.
- The top five true markets included: Seattle, Los Angeles, Anchorage, Boise, and Portland. Pullman-Moscow retained 63, 10, 13, 37, and 44 percent of air travelers in those markets, respectively.
- Thirty-two percent of travelers are destined for the Northwest; an additional 29 percent are destined for the West region.
- When diverting to an alternate airport, air travelers used Delta 49 percent of the time, Alaska/Horizon 45 percent of the time, and other airlines for the remainder of travel. Air travelers that used Alaska/Horizon primarily did so because of lower fares or availability of nonstop service.

FACTORS AFFECTING AIR SERVICE DEMAND AND RETENTION

This section examines several factors that have affected and will continue to affect air service demand in the Pullman-Moscow area and the Airport's ability to retain passengers. The factors affecting an airport's ability to retain passengers included in this section are: airfares, travel time from competing airports, nonstop service availability at competing airports, and the quality and capacity of air service offered by competing airports.

EXHIBIT 7.1 PASSENGER TRENDS



PASSENGER ACTIVITY COMPARISON

To better understand the changes in passenger volumes at Pullman-Moscow Regional Airport and the primary competing airports, **Exhibit 7.1** provides a depiction of domestic origin and destination passengers over the last 10 years. During this period, Pullman-Moscow Regional Airport's origin and destination passengers decreased at a compounded annual rate of 0.9 percent. Lewiston's and Spokane's passengers also decreased at compounded annual rates of 1.3 percent and 0.4 percent, respectively. Seattle passengers increased at a compounded annual rate of 0.4 percent.

AIRFARES

High Average Fare
Pullman-Moscow had the lowest fare in only two of the top 25 markets; however, it had the highest fare in eight of the top 25 markets.

When a traveler decides which airport to access for travel, airfares play a large role. Airfares affect air service demand and an airport's ability to retain passengers. One-way airfares (excluding taxes and Passenger Facility Charges (PFC)) paid by travelers are used to measure the relative fare competitiveness between Pullman-Moscow, Spokane, Lewiston, and Seattle. Fares listed for competing airports are for all air travelers using competing airports and are not reflective of the average fare paid by catchment area travelers diverting to competing airports.

Table 7.1 shows one-way average airfares for the top 25 catchment area domestic destinations. Average airfares are a result of many factors including: length of haul, availability of seats, business versus leisure fares, and airline competition. The overall average fare for year ended June 30, 2010, at Pullman-Moscow Regional Airport was $140, which was $1 higher than Spokane, but $33 lower than Lewiston and $15 lower than Seattle. In individual markets, Pullman-Moscow had the lowest fare in the Anchorage and Juneau markets. However, Pullman-Moscow had the highest fare in eight of the top 25 markets. In the previous study, Pullman-Moscow's average domestic fare was $40 higher than Spokane, $7 higher than Lewiston, and $16 higher than Seattle.

TABLE 7.1 U.S. DOT AVERAGE DOMESTIC ONE-WAY FARES

RANK	DESTINATION	AVG ONE-WAY FARE				MAX DIFF
		PUW	GEG	LWS	SEA	
1	Seattle, WA	$92	$77	$98	N/A	$15
2	Los Angeles, CA	$162	$137	$166	$120	$42
3	Anchorage, AK	$164	$223	$235	$228	($59)
4	Boise, ID	$85	$72	$90	$86	$13
5	Portland, OR	$120	$79	$125	$100	$40
6	Las Vegas, NV	$175	$122	$152	$113	$63
7	Honolulu, HI	$288	$228	$223	$195	$93
8	Denver, CO	$164	$115	$165	$121	$48
9	Minneapolis, MN	$214	$171	$252	$160	$53
10	Oakland, CA	$158	$121	$164	$95	$63
11	Washington, DC (DCA)	$347	$217	$293	$232	$129
12	Juneau, AK	$139	$213	$200	$200	($62)
13	Chicago, IL (ORD)	$255	$203	$230	$185	$69
14	San Jose, CA	$160	$126	$152	$110	$50
15	Phoenix, AZ	$167	$134	$164	$134	$34
16	Sacramento, CA	$158	$126	$165	$117	$41
17	Bellingham, WA	$90	$104	$117	$71	$19
18	Fairbanks, AK	$330	$316	$256	$283	$73
19	San Francisco, CA	$164	$146	$159	$106	$58
20	Ontario, CA	$153	$140	$194	$121	$32
21	Atlanta, GA	$215	$219	$275	$206	$9
22	Medford, OR	$138	$130	$161	$107	$30
23	San Diego, CA	$152	$130	$155	$129	$23
24	Palm Springs, CA	$128	$144	$177	$124	$4
25	Eugene, OR	$137	$116	$127	$120	$22
Average domestic fare		**$140**	**$139**	**$172**	**$155**	**$1**

Note: Year Ended June 30, 2010; Fares do not include taxes or Passenger Facility Charges

Exhibit 7.2 tracks the average fares at Pullman-Moscow, Spokane, Lewiston, and Seattle from 2005 through 2009. **Exhibit 7.3** charts the average fare for the airports adjusted for inflation (2005 dollars). Based on U.S. DOT airline data from 2005 through 2009, average fares at Pullman-Moscow Regional Airport have ranged from $140 (2009) to $172 (2006). The average fare at Spokane has ranged from $120 (2005) to $139 (2008), the average fare at Lewiston has ranged from $155 (2005) to $184 (2006), and Seattle fares have ranged from $145 (2009) to $162 (2008).

Overall, average domestic fares over the five-year period decreased at a compounded annual rate of 2.6 percent at Pullman-Moscow. The average fare increased at Lewiston and Spokane at an annual rate of 2.0 percent at Lewiston and 3.0 percent at Spokane. Fares increased at Seattle during the five-year period but returned to 2005 levels in 2009.

Adjusted for inflation, airfares at Pullman-Moscow decreased 4.8 percent annually, airfares at Spokane increased by 0.6 percent, and airfares at Seattle decreased 2.3 percent compounded annually. Lewiston's airfares remained approximately the same.

EXHIBIT 7.2 FIVE-YEAR AVERAGE DOMESTIC ONE-WAY FARE TREND

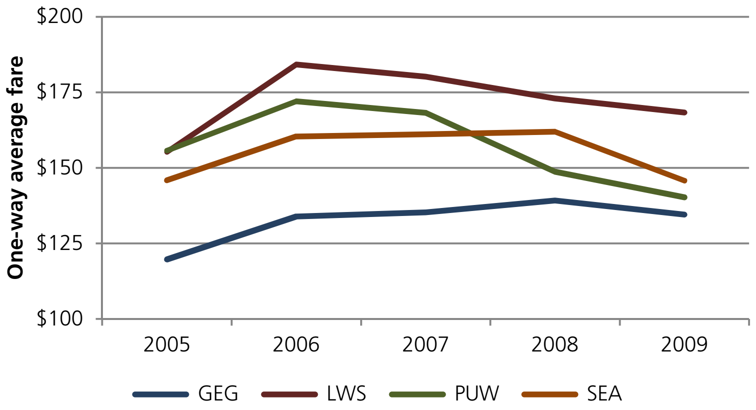
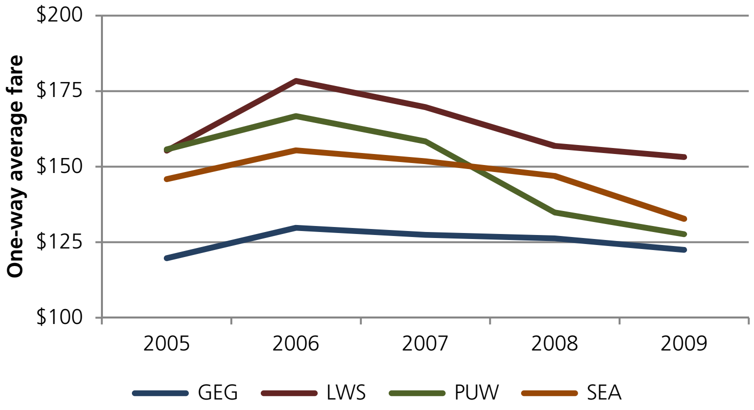


EXHIBIT 7.3 FIVE-YEAR AVERAGE DOMESTIC ONE-WAY FARE TREND (2005 DOLLARS)



TRAVEL TIME COMPARISON

Table 7.2 displays the overall flight time from Pullman-Moscow Regional Airport to the top 10 catchment area destinations that do not have nonstop service and require a connection. A comparison of the travel time from Pullman-Moscow Regional Airport with the amount of time it takes to drive to a competing airport and use nonstop service is also provided.

Accessible connecting flights at a hub require a minimum connecting time allowance of 45 minutes to be included in the comparison. Drive times from the Pullman-Moscow Regional Airport to the competing airports are estimated. A Pullman-Moscow Regional Airport passenger can conveniently access air service at the local airport and save time in four of the top 10 connecting destinations. For three top 10 connecting destinations, Las Vegas, Honolulu and Oakland, it is faster to drive to Spokane International Airport or Seattle-Tacoma International Airport and take the available nonstop flight.

TABLE 7.2 TRAVEL TIME COMPARISON (MINUTES)

RANK	CONNECTING DESTINATIONS	PUW CONNECT	GEG NONSTOP	LWS NONSTOP	SEA NONSTOP	TIME SAVINGS
1	Los Angeles, CA	285	N/A	N/A	441	156
2	Anchorage, AK	337	N/A	N/A	501	164
3	Boise, ID	98	155	102	366	4
4	Portland, OR	160	160	N/A	335	0
5	Las Vegas, NV	363	235	N/A	434	(128)
6	Honolulu, HI	702	N/A	N/A	646	(56)
7	Denver, CO	N/A	219	N/A	438	N/A
8	Minneapolis, MN	N/A	269	N/A	476	N/A
9	Oakland, CA	300	220	N/A	410	(80)
10	Washington, DC (DCA)	464	N/A	N/A	580	116

Note: Schedule on October 14, 2010, as of October 25, 2010

PUW estimated connect time = flight time plus minimum 45 minute online connection

GEG total travel time = estimated drive time of 1:35 minutes from PUW plus nonstop elapsed time

LWS total travel time = estimated drive time of 0:54 minutes from PUW plus nonstop elapsed time

SEA total travel time = estimated drive time of 4:51 minutes from PUW plus nonstop elapsed time

Nonstop Service to One of the Top 25 Destinations

Pullman-Moscow Regional Airport offered nonstop service to one of the top 25 catchment area destinations with 13 weekly frequencies.

NONSTOP SERVICE AVAILABILITY

Travelers drive to competing airports to access air service for many reasons, one of which is service availability. **Table 7.3** compares the level of air service offered at Pullman-Moscow Regional Airport with that offered at the primary competing airports.

In October 2010, Pullman-Moscow Regional Airport offered nonstop service to one of the top 25 catchment area destinations with 13 weekly frequencies. Overall, Pullman-Moscow had service to two destinations, Seattle and Lewiston. Spokane had service to 12 of the top 25 markets with 357 weekly flights and had service to 13 destinations overall. Lewiston had service to two of the top 25 destinations and four destinations overall. Seattle had service to all top 25 destinations, save itself, with 1,524 weekly departures and served 85 markets overall.

TABLE 7.3 NONSTOP SERVICE COMPARISON

		WEEKLY DEPARTURES			
RANK	DESTINATION	PUW	GEG	LWS	SEA
1	Seattle, WA	13	149	7	0
2	Los Angeles, CA	0	0	0	129
3	Anchorage, AK	0	0	0	125
4	Boise, ID	0	19	6	61
5	Portland, OR	0	52	0	203
6	Las Vegas, NV	0	14	0	75
7	Honolulu, HI	0	0	0	32
8	Denver, CO	0	49	0	110
9	Minneapolis, MN	0	14	0	61
10	Oakland, CA	0	13	0	76
11	Washington, DC (DCA)	0	0	0	14
12	Juneau, AK	0	0	0	21
13	Chicago, IL (ORD)	0	7	0	84
14	San Jose, CA	0	6	0	54
15	Phoenix, AZ	0	14	0	88
16	Sacramento, CA	0	6	0	54
17	Bellingham, WA	0	0	0	41
18	Fairbanks, AK	0	0	0	14
19	San Francisco, CA	0	14	0	126
20	Ontario, CA	0	0	0	20
21	Atlanta, GA	0	0	0	54
22	Medford, OR	0	0	0	13
23	San Diego, CA	0	0	0	42
24	Palm Springs, CA	0	0	0	7
25	Eugene, OR	0	0	0	20
Total top 25 frequencies		**13**	**357**	**13**	**1,524**
Number of top 25 served		**1**	**12**	**2**	**24**
Total destinations served		**2**	**13**	**4**	**85**

Note: Sample week in October 2010

QUALITY OF AIR SERVICE AT COMPETING AIRPORTS

The quality of air service offered by an airport is a factor in a traveler's decision when selecting where to originate or terminate air service. In general, passengers prefer larger aircraft over smaller aircraft, and jet aircraft over turboprop aircraft. For the purposes of this section, quality of air service is measured by size of aircraft and jets versus turboprops. Pullman-Moscow Regional Airport is solely served by Alaska Airlines/Horizon Air with 76-seat Bombardier Q400 turboprop aircraft. In October 2010, there were an average of 26 weekly departures and 1,976 weekly seats.

Table 7.4 provides weekly departures and seats by aircraft type at Spokane International Airport. Spokane has an array of aircraft flying to and from the airport ranging from small turboprops to narrow-body jets for a total of 408 departures a week with approximately 41,527 seats. Alaska/Horizon had 38 percent of all departures and 33 percent of all seats at Spokane. Southwest Airlines followed with the second highest share of departures and the highest share of seats.

TABLE 7.4 WEEKLY DEPARTURES AND SEATS AT SPOKANE INTERNATIONAL AIRPORT

AIRCRAFT TYPE	SEAT RANGE	WEEKLY DEPARTURES						
		AS	WN	UA	DL	F9	US	TOTAL
Turboprop	19-30	0	0	21	0	0	0	21
	51-76	112	0	0	0	0	0	112
Regional jet	30-50	0	0	22	7	0	0	29
	51-70	15	0	7	6	0	0	28
	71-100	0	0	0	24	0	0	24
Narrow body jet	100-125	7	105	5	0	14	14	145
	126-160	4	0	8	21	0	0	33
	161-200	16	0	0	0	0	0	16
Total departures		**154**	**105**	**63**	**58**	**14**	**14**	**408**
% of total		**38%**	**26%**	**15%**	**14%**	**3%**	**3%**	**100%**
Total seats		**13,578**	**14,385**	**3,900**	**5,884**	**1,904**	**1,876**	**41,527**
% of total		**33%**	**35%**	**9%**	**14%**	**5%**	**5%**	**100%**

Note: Week of October 18, 2010

Table 7.5 provides weekly departures and seats by aircraft type at Lewiston-Nez Perce County Airport. Lewiston had 40 flights a week with 2,676 seats with turboprop and regional jet aircraft. Alaska/Horizon provided the majority of flights with 65 percent of departures and 74 percent of seats. Delta Air Lines provided the other 35 percent of departures and 26 percent of seats.

TABLE 7.5 WEEKLY DEPARTURES AND SEATS AT LEWISTON-NEZ PERCE COUNTY AIRPORT

AIRCRAFT TYPE	SEAT RANGE	WEEKLY DEPARTURES		
		AS	DL	TOTAL
Turboprop	51-76	26	0	26
Regional jet	30-50	0	14	14
Total departures		**26**	**14**	**40**
% of total		**65%**	**35%**	**100%**
Total seats		**1,976**	**700**	**2,676**
% of total		**74%**	**26%**	**100%**

Note: Week of October 18, 2010

Table 7.6 provides weekly departures and seats by aircraft type at Seattle-Tacoma International Airport. Seattle-Tacoma International Airport's service is provided by turboprops and regional, narrow-body, and wide-body jets. Turboprop aircraft comprise 27 percent of total departures at Seattle. A total of 2,874 weekly flights depart from Seattle with 368,350 seats. Alaska/Horizon had the largest share of capacity at Seattle with 55 percent of departures and 50 percent of seats.

TABLE 7.6 WEEKLY DEPARTURES AND SEATS AT SEATTLE-TACOMA INTERNATIONAL AIRPORT

AIRCRAFT TYPE	SEAT RANGE	WEEKLY DEPARTURES						
		AS	WN	UA	DL	AA	OTHER	TOTAL
Turboprop	19-30	0	0	81	0	0	0	81
	31-50	0	0	0	0	0	55	55
	51-76	636	0	0	0	0	0	636
Regional jet	30-50	0	0	0	0	0	14	14
	51-70	104	0	40	0	0	0	144
	71-100	0	0	0	14	0	0	14
Narrow body jet	<100	14	0	0	0	0	0	14
	100-125	128	271	23	0	0	76	498
	126-160	180	0	45	37	83	183	528
	161-200	529	0	62	120	7	31	749
	>200	0	0	0	14	0	19	33
Wide body jet	200-240	0	0	0	23	0	0	23
	241-280	0	0	7	7	0	30	44
	281-320	0	0	0	14	0	20	34
	>350	0	0	0	0	0	7	7
Total departures		**1,591**	**271**	**258**	**229**	**90**	**435**	**2,874**
% of total		**55%**	**9%**	**9%**	**8%**	**3%**	**15%**	**100%**
Total seats		**183,509**	**37,022**	**27,270**	**41,561**	**13,208**	**65,780**	**368,350**
% of total		**50%**	**10%**	**7%**	**11%**	**4%**	**18%**	**100%**

Note: Week of October 18, 2010

RETENTION RATE SENSITIVITY

Considering the previous factors of airfares, travel time, nonstop service, and quality of service, a retention rate sensitivity analysis follows in **Table 7.7**. The purpose is to show how small changes in retention affect total passenger volume at the local airport. Passengers in total and for each of the top 25 markets are calculated using varying degrees of retention. An increase in retention of 10 percent would create an additional 25,572 passengers (35 passengers daily each way) for the Pullman-Moscow Regional Airport.

TABLE 7.7 RETENTION RATE SENSITIVITY

RANK	DESTINATION	REPORTED PAX	RETENTION %	RETENTION IMPROVEMENT		
				5%	10%	15%
1	Seattle, WA	26,630	63	28,743	30,856	32,969
2	Los Angeles, CA	1,950	10	2,925	3,900	4,875
3	Anchorage, AK	2,060	13	2,847	3,633	4,420
4	Boise, ID	3,870	37	4,388	4,906	5,424
5	Portland, OR	3,400	44	3,791	4,181	4,572
6	Las Vegas, NV	810	11	1,163	1,516	1,869
7	Honolulu, HI	720	12	1,029	1,337	1,646
8	Denver, CO	440	10	660	880	1,100
9	Minneapolis, MN	430	10	645	860	1,075
10	Oakland, CA	1,120	28	1,323	1,525	1,728
11	Washington, DC (DCA)	850	21	1,048	1,246	1,444
12	Juneau, AK	510	13	705	899	1,094
13	Chicago, IL (ORD)	540	15	726	912	1,098
14	San Jose, CA	930	25	1,114	1,297	1,481
15	Phoenix, AZ	570	19	722	873	1,025
16	Sacramento, CA	980	33	1,129	1,278	1,427
17	Bellingham, WA	390	13	539	688	837
18	Fairbanks, AK	360	13	497	635	772
19	San Francisco, CA	980	38	1,110	1,240	1,370
20	Ontario, CA	420	17	546	672	798
21	Atlanta, GA	240	10	360	480	600
22	Medford, OR	300	13	415	529	644
23	San Diego, CA	1,080	48	1,193	1,307	1,420
24	Palm Springs, CA	260	13	359	459	558
25	Eugene, OR	640	33	736	832	928
	Total top 25	**50,480**	**31**	**58,711**	**66,943**	**75,174**
	Total domestic	**59,020**	**27**	**70,081**	**81,141**	**92,202**
	Total international	**7,912**	**23**	**9,637**	**11,363**	**13,088**
	Total of all markets	**66,932**	**26**	**79,718**	**92,504**	**105,290**

SUMMARY OF MAIN POINTS

- From 2000 to 2009, while Pullman-Moscow passengers as reported to the U.S. DOT declined at a compounded annual rate of 0.9 percent, Lewiston's and Spokane's passengers also decreased at compounded annual rates of 1.3 percent and 0.4 percent, respectively. Seattle passengers increased at a compounded annual rate of 0.4 percent.
- Pullman-Moscow had the lowest fare in two top 25 markets but had the highest fare in eight top 25 markets. Overall, Pullman-Moscow's fare was slightly higher than Spokane but lower than Lewiston and Seattle.
- While Spokane had service to 13 top 25 destinations with 357 weekly frequencies, Pullman-Moscow had nonstop service to only one top 25 destination with 13 weekly frequencies.
- With an improvement of 10 percent in retention, total passengers will increase to 92,504, an increase of over 25,000 passengers annually.

MARKET/AIRPORT COMPARISON

The Market/Airport Comparison section provides a benchmark for Pullman-Moscow Regional Airport. This section compares Pullman-Moscow's performance to other airports across the U.S. and the Northwest Region for year ended June 30, 2010. This section also provides a more detailed comparison to similarly sized airports within the Northwest Region.

TABLE 8.1 TOP U.S. AIRPORTS BY PASSENGERS (OUTBOUND ONLY)

		YEAR ENDED JUNE 30, 2010					% CHANGE YOY	
RANK	AIRPORT	DOM PAX (000S)	DOM & INTL PAX (000S)	% INTL	TOTAL PDEW	INTL PDEW	DOM PAX	DOM & INTL PAX
268	Valdosta, GA	39	41	5	111	5	1	2
269	Barrow, AK	38	38	0	104	0	2	2
270	Roswell, NM	37	39	5	106	5	11	12
271	Kapalua/Maui, HI	37	39	7	108	7	(14)	(13)
272	Homer, AK	36	36	0	98	0	(6)	(7)
273	Gunnison, CO	36	36	0	99	0	(5)	(5)
274	St. George, UT	36	36	2	100	2	(15)	(16)
275	Dothan, AL	33	38	12	103	12	(18)	(16)
276	Dubuque, IA	33	35	6	95	6	(15)	(15)
277	San Juan, PR	31	32	1	87	1	82	75
278	Prudhoe Bay, AK	31	31	1	85	1	(53)	(52)
279	Albany, GA	30	32	5	87	4	(8)	(8)
280	Pullman, WA	30	33	7	89	6	6	4
281	Grand Island, NE	30	30	0	81	0	134	140
282	Manhattan, KS	30	32	6	86	5	173	177
283	New Haven, CT	29	32	9	89	8	(6)	(5)
284	Columbus, MS	29	31	7	86	6	(6)	(7)
285	Walla Walla, WA	29	30	4	83	4	1	0
286	Vieques, PR	29	29	0	79	0	33	38
287	Stockton, CA	29	29	2	81	1	8	7
288	Dillingham, AK	29	29	1	80	1	(2)	(2)
289	Fort Collins, CO	29	29	0	79	0	(8)	(8)
290	Santa Fe, NM	28	30	5	82	4	3,535	3,652
291	Punta Gorda, FL	28	28	0	76	0	197	201
292	Columbia, MO	27	28	4	78	3	37	39
Total all U.S. markets		**423,750**	**472,965**	**10**	**129,580**	**13,484**	**(1)**	**(1)**

Note: International pax include gateway pax only; nonstop international pax are not included

RANKING OF U.S. AIRPORTS

Table 8.1 provides a ranking and comparison of U.S. airports by passengers. The passenger ranking includes both domestic and international passengers; however, only gateway passengers (i.e. passengers connecting through a domestic airport to an international destination) are included due to access restrictions on international data.

In a ranking of domestic and international passengers, Pullman-Moscow Regional Airport ranked 280th in passengers of 367 primary U.S. commercial service airports. International passengers accounted for seven percent of Pullman-Moscow's total passengers. This is generally higher than airports of similar size but is below the national average of 10 percent. Compared to the year ended June 30, 2009, total passengers increased by four percent which exceeded the national decline of one percent.

Table 8.2 shows a ranking of revenue amongst U.S. passenger airports. Pullman-Moscow Regional Airport's revenue generation ranked 292nd. This is a lower ranking than passengers due to Pullman-Moscow's lower than average fare of $139 compared to other destination airports with a similar level of passengers such as Cody and Walla Walla. Pullman-Moscow's fare lags behind the national average of $152; yet, Pullman-Moscow's average itinerary miles (length of trip) was 844 miles compared to the national average of 1,165. This shorter distance makes the 10 percent difference in fares more reasonable due to shorter itineraries. Correspondingly, Pullman-Moscow's yield is higher than the national average at 16.5 cents versus 13.0 cents. Compared to year ended June 30, 2009, Pullman-Moscow's domestic revenue increased by six percent. Nationally, airline revenue decreased by one percent.

TABLE 8.2 TOP U.S. AIRPORTS RANKED BY REVENUE (OUTBOUND ONLY)

		YEAR ENDED JUNE 30, 2010								% CHANGE YOY			
RANK	AIRPORT	DOM REV ($MIL)	FARE ($)	YIELD (¢)	ITIN MILES	DOM PAX (000S)	$0 FARE %	PDEW	DOM PAX RANK	DOM REV	FARE	YIELD	DOM PAX
280	Aberdeen, SD	4.9	263	21.4	1,227	19	9.6	51	317	(14)	(6)	(5)	(9)
281	Columbia, MO	4.9	178	19.2	926	27	1.1	75	292	44	5	0	37
282	Pellston, MI	4.8	231	20.1	1,152	21	13.0	57	311	(15)	(9)	(12)	(7)
283	Meridian, MS	4.8	308	26.2	1,179	15	5.8	42	324	(5)	10	11	(13)
284	Martha's Vineyard, MA	4.7	114	41.1	277	41	1.9	113	263	5	7	(0)	(2)
285	Beaumont/Pt. Arthur, TX	4.6	253	25.9	975	18	4.3	50	319	(10)	1	(1)	(11)
286	Bemidji, MN	4.6	236	19.8	1,187	19	10.8	53	315	(4)	(6)	(4)	2
287	Brunswick, GA	4.6	182	17.7	1,031	25	7.9	69	298	(8)	2	4	(10)
288	Presque Isle, ME	4.5	287	20.3	1,417	16	3.6	43	323	(5)	(8)	(12)	3
289	Rhinelander, WI	4.4	190	15.2	1,250	23	8.5	63	303	(12)	(5)	(5)	(7)
290	Cody, WY	4.3	180	13.9	1,293	24	8.8	66	299	(26)	(21)	(19)	(7)
291	Dillingham, AK	4.3	148	26.2	566	29	4.7	79	288	(6)	(4)	0	(2)
292	Pullman, WA	4.2	139	16.5	844	30	8.9	83	280	6	0	(2)	6
293	Inyokern, CA	4.2	413	22.8	1,807	10	7.3	28	355	(5)	(4)	(7)	(1)
294	Walla Walla, WA	4.2	145	14.3	1,011	29	10.3	80	285	(6)	(6)	(13)	1
295	Longview, TX	4.2	191	17.8	1,075	22	6.3	60	308	8	4	1	4
296	Hancock, MI	4.1	202	15.5	1,300	20	8.2	56	312	(18)	(7)	(6)	(11)
297	Waterloo, IA	4.0	213	17.3	1,233	19	8.0	52	316	(11)	(2)	(2)	(10)
298	Williamsport, PA	3.9	199	16.1	1,234	20	4.7	54	313	(1)	2	4	(3)
299	Rock Springs, WY	3.8	206	19.7	1,045	19	2.3	51	318	(25)	(12)	(18)	(14)
300	Lanai/Lanai, HI	3.7	91	23.9	381	41	0.5	112	264	(2)	3	(10)	(5)
301	Kapalua/Maui, HI	3.6	97	20.7	468	37	0.7	100	271	(14)	0	1	(14)
302	North Bend, OR	3.5	154	10.9	1,407	23	6.8	63	304	(29)	(10)	(23)	(21)
303	St. George, UT	3.3	94	12.0	779	36	6.8	97	274	(6)	11	7	(15)
304	Klamath Falls, OR	3.3	153	10.3	1,483	22	5.2	59	309	(13)	(10)	(23)	(3)
Total U.S. domestic markets		**64,231.9**	**152**	**13.0**	**1,165**	**423,750**	**6.2**	**116,096**	**N/A**	**(1)**	**(0)**	**(1)**	**(1)**

High Average Airfare

Out of the top 300 passenger airports, Pullman-Moscow Regional Airport had the 227th highest airfare. Pullman-Moscow's airfare is eight percent lower than the national average.

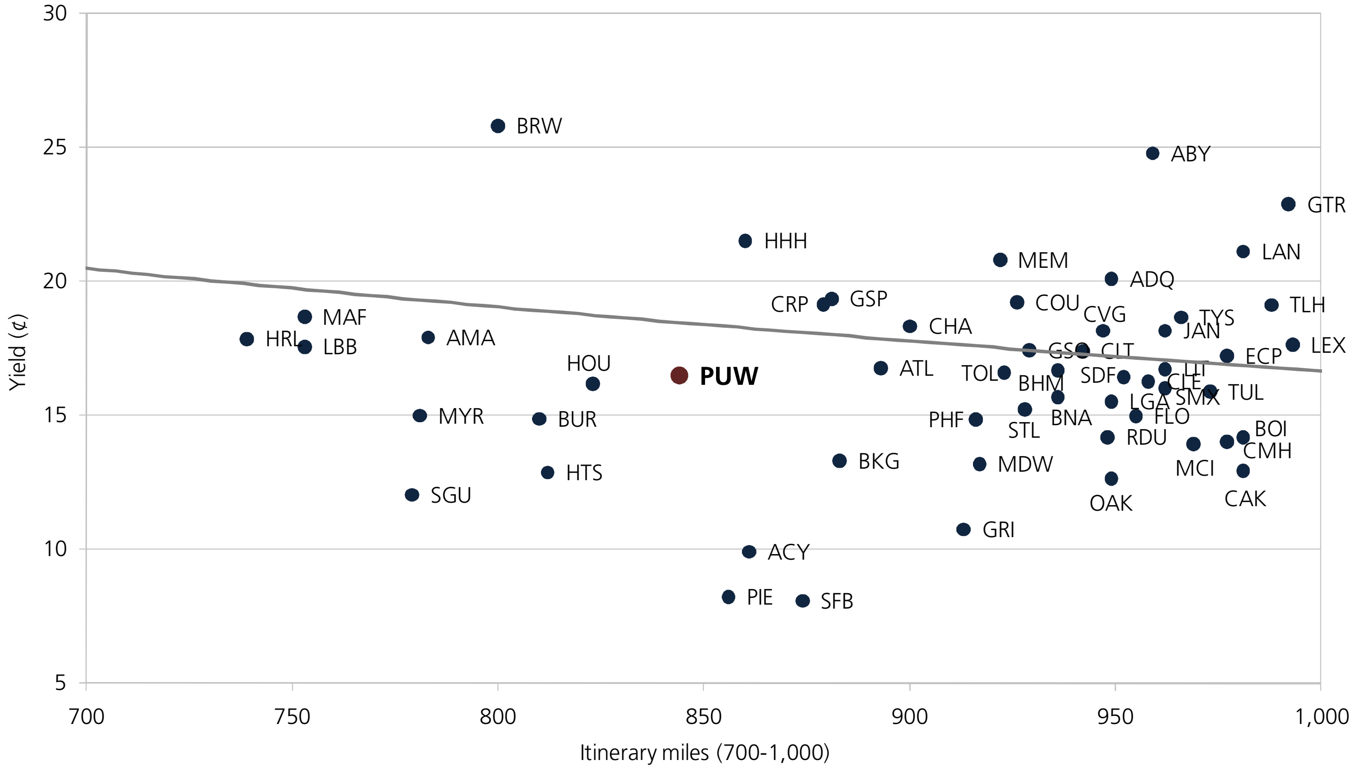
Table 8.3 provides a ranking of Pullman-Moscow Regional Airport's fares compared to the other U.S. passenger airports (only the top 300 passenger airports included in the analysis). Pullman-Moscow had the 227th highest fare. At $139, Pullman-Moscow's fare was eight percent lower than the national average of $152. Pullman-Moscow's remained the same year over year. Fares nationally also remained the same compared to year ended June 30, 2009. Pullman-Moscow's lower than average fares reflect Alaska Airlines' pricing strategy to keep Pullman-Moscow fares in line with Spokane.

TABLE 8.3 U.S. DOMESTIC PASSENGER AIRPORTS RANKED BY FARE

		YEAR ENDED JUNE 30, 2010			CHANGE YOY	
RANK	AIRPORT	FARE ($)	PAX RANK	REV RANK	$	%
215	Dayton, OH	143	80	81	(1)	(1)
216	Albuquerque, NM	142	54	56	(1)	(1)
217	Indianapolis, IN	142	45	45	3	2
218	Allentown, PA	142	121	133	(12)	(8)
219	Phoenix, AZ	141	8	13	1	1
220	Pittsburgh, PA	141	43	43	5	3
221	Manchester, NH	141	70	71	6	4
222	St. Louis, MO	141	27	31	(1)	(1)
223	Erie, PA	141	194	216	(12)	(8)
224	Jacksonville, FL	141	52	54	4	3
225	Midland/Odessa, TX	141	118	128	0	0
226	Amarillo, TX	140	123	134	6	4
227	Pullman, WA	139	280	292	0	0
228	Bullhead City, AZ	139	241	257	10	7
229	Boise, ID	139	76	78	5	3
230	Westchester County, NY	139	83	87	(0)	(0)
231	Spokane, WA	138	71	75	1	1
232	Sacramento, CA	138	35	34	1	1
233	West Palm Beach, FL	138	49	50	2	1
234	Bloomington, IL	137	153	167	(2)	(2)
235	Columbus, OH	137	50	51	(2)	(1)
236	Rochester, NY	137	78	82	(2)	(2)
237	Orange County, CA	137	33	33	(3)	(2)
238	Ontario, CA	137	56	57	(0)	(0)
239	Redmond, OR	136	164	185	(8)	(6)
Total U.S. domestic markets		**152**	**N/A**	**N/A**	**(0)**	**(0)**

Pullman-Moscow ranked 113th in average yield among the top 300 U.S. passenger airports; however, the ranking has little meaning unless reviewed against itinerary miles. **Exhibit 8.1** provides a chart showing average yield by itinerary miles for U.S. passenger airports (top 300 passenger airports) and shows performance for those airports with itinerary miles ranging from 700 to 1,000 miles. With an average of 844 itinerary miles and a yield of 16.51 cents, Pullman-Moscow performed below average compared to other airports with similar itinerary miles.

EXHIBIT 8.1 U.S. PASSENGER AIRPORTS – YIELD BY ITINERARY MILES



Strong Average Passenger/ Revenue Growth

Pullman-Moscow's passengers and revenue grew at six percent while passengers in the Northwest region remained static and revenue declined by one percent.

NORTHWEST REGION AIRPORTS

To provide a narrower, regional comparison, **Table 8.4** compares Pullman-Moscow Regional Airport to other airports in the Northwest region. For purposes of this analysis and as defined by the FAA, the Northwest region includes the states of Colorado, Idaho, Montana, Oregon, Utah, Washington and Wyoming (see **Exhibit 6.3**, page 26). Of the 78 commercial service airports in the Northwest region, Pullman-Moscow ranked 34th in a ranking of domestic passengers. Pullman-Moscow's average airfare was six percent below the Northwest region average, and the average yield exceeded the Northwest region average by 37 percent. Pullman-Moscow's passengers and revenue increased by six percent. Passengers in the Northwest remained steady, and revenues fell by one percent.

TABLE 8.4 NORTHWEST REGION PASSENGER MARKETS (OUTBOUND ONLY)

		YEAR ENDED JUNE 30, 2010						% CHANGE YOY			
RANK	AIRPORT	DOM PAX	PDEW	DOM REV ($MIL)	FARE ($)	YIELD (¢)	ITIN MILES	PAX	REV	FARE	YIELD
22	Great Falls, MT	140,380	385	27.8	198	15.9	1,249	7	(1)	(7)	(6)
23	Idaho Falls, ID	128,150	351	26.0	203	18.1	1,126	2	3	2	1
24	Steamboat Springs, CO	105,540	289	18.3	174	13.1	1,326	(11)	(5)	6	2
25	Helena, MT	88,820	243	19.2	216	16.2	1,336	13	3	(9)	(11)
26	Montrose, CO	88,240	242	16.6	188	13.8	1,366	5	7	2	0
27	Casper, WY	70,850	194	14.2	200	18.6	1,079	3	(15)	(18)	(18)
28	Lewiston, ID	53,630	147	9.2	172	15.6	1,103	(5)	(2)	3	0
29	Yakima, WA	49,600	136	8.2	166	14.8	1,120	(8)	(12)	(4)	(7)
30	Sun Valley, ID	46,830	128	8.4	179	16.0	1,122	(12)	(21)	(10)	(10)
31	Wenatchee, WA	43,100	118	6.4	149	14.5	1,033	(1)	(4)	(3)	(9)
32	Gunnison, CO	36,060	99	6.3	174	14.7	1,185	(5)	(2)	3	2
33	St. George, UT	35,500	97	3.3	94	12.0	779	(15)	(6)	11	7
34	Pullman, WA	30,370	83	4.2	139	16.5	844	6	6	0	(2)
35	Walla Walla, WA	29,020	80	4.2	145	14.3	1,011	1	(6)	(6)	(13)
36	Fort Collins, CO	28,830	79	1.7	58	9.2	627	(8)	(16)	(9)	(9)
37	Seattle, WA (Boeing)	26,700	73	1.6	59	61.5	95	(6)	1	8	(3)
38	Gillette, WY	26,400	72	5.4	205	18.9	1,084	0	(12)	(13)	(16)
39	Cody, WY	24,120	66	4.3	180	13.9	1,293	(7)	(26)	(21)	(19)
40	Twin Falls, ID	23,830	65	3.0	125	11.1	1,127	1	2	0	2
41	North Bend, OR	22,950	63	3.5	154	10.9	1,407	(21)	(29)	(10)	(23)
42	Butte, MT	22,520	62	6.0	264	18.9	1,398	(2)	(6)	(4)	(4)
43	Klamath Falls, OR	21,650	59	3.3	153	10.3	1,483	(3)	(13)	(10)	(23)
44	Rock Springs, WY	18,540	51	3.8	206	19.7	1,045	(14)	(25)	(12)	(18)
45	Pocatello, ID	17,900	49	2.3	128	11.5	1,110	(16)	(28)	(14)	(11)
46	Sheridan, WY	14,020	38	2.9	206	22.2	929	(9)	(12)	(4)	(8)
Total Northwest region markets		**39,407,560**	**107,966**	**5,875**	**149**	**12.0**	**1,239**	**(0)**	**(1)**	**(1)**	**(2)**

Note: Northwest Region includes Colorado, Idaho, Montana, Oregon, Utah, Washington and Wyoming

NORTHWEST REGION SERVICE COMPARISON

Table 8.5 shows a comparison of seats, departures and load factor for the 25 markets shown in **Table 8.4** (previous page). Seats for year ended June 30, 2010, ranged from 31,000 to 253,000. Of the 78 Northwest Region markets, Pullman-Moscow had the 29th highest number of seats and 40th highest number of departures. On a load factor basis, Pullman-Moscow underperformed the Northwest Region with an average load factor of 66 percent compared to a regional average of 83 percent. However, in comparison to markets comparable to Pullman-Moscow in population size and aircraft used, the 66 percent load factor is in line with other comparable markets.

TABLE 8.5 NORTHWEST REGION SIMILAR SIZE AIRPORTS - SERVICE COMPARISON

		YEAR ENDED JUNE 30, 2010				CHANGE YOY			
RANK	AIRPORT	SEATS	DEPART-URES	SEATS/ DEPT	LOAD FACTOR	SEATS %	DEPART-URES %	LOAD FACTOR PT	LOAD FACTOR %
22	Great Falls, MT	252,659	3,674	69	74	(8)	(9)	3	4
23	Idaho Falls, ID	195,140	3,348	58	75	(10)	(12)	10	14
24	Steamboat Springs, CO	169,519	1,758	96	62	(16)	(21)	(1)	(2)
25	Helena, MT	191,147	3,096	62	67	2	(3)	5	8
26	Montrose, CO	127,041	2,426	52	75	4	1	3	4
27	Casper, WY	115,122	2,326	49	68	(10)	(13)	10	15
28	Lewiston, ID	136,841	2,023	68	68	(2)	(2)	2	3
29	Yakima, WA	102,795	1,349	76	55	(3)	(8)	(3)	(6)
30	Sun Valley, ID	91,523	2,531	36	62	(16)	(13)	6	10
31	Wenatchee, WA	76,882	1,012	76	62	(11)	(22)	5	9
32	Gunnison, CO	65,203	1,053	62	55	(11)	(5)	2	3
33	St. George, UT	73,875	2,463	30	50	(18)	(18)	3	6
34	Pullman, WA	114,312	1,505	76	66	1	1	0	1
35	Walla Walla, WA	63,632	838	76	55	2	(17)	(2)	(4)
36	Fort Collins, CO	32,886	219	150	87	(3)	(4)	(3)	(3)
37	Seattle, WA (Boeing)	48,931	5,565	9	53	(8)	(7)	1	2
38	Gillette, WY	75,425	3,056	25	43	(11)	1	2	4
39	Cody, WY	40,142	1,109	36	63	(19)	3	8	13
40	Twin Falls, ID	48,130	1,587	30	58	3	2	(1)	(1)
41	North Bend, OR	36,420	1,214	30	65	(26)	(22)	6	9
42	Butte, MT	34,825	697	50	66	(18)	(13)	1	2
43	Klamath Falls, OR	42,945	1,432	30	50	(8)	(4)	2	4
44	Rock Springs, WY	59,313	2,024	29	40	(4)	(3)	(2)	(5)
45	Pocatello, ID	42,165	1,404	30	47	(9)	(5)	(4)	(8)
46	Sheridan, WY	31,985	1,219	26	46	(18)	(13)	(2)	(5)
Total NW region markets		**83,213,198**	**885,001**	**94**	**83**	**(4)**	**(3)**	**3**	**4**

SUMMARY OF MAIN POINTS

- Pullman-Moscow experienced an increase in passengers that was higher than national and regional averages.
- Pullman-Moscow's increase in revenue was higher than national and regional averages.
- Pullman-Moscow's fares were lower than national and regional averages.
- Pullman-Moscow's yield was significantly above the national average; however, Pullman-Moscow's yield was slightly below other airports with similar itinerary miles.
- On a load factor basis, Pullman-Moscow underperformed the Northwest Region but was comparable to other markets of similar population size and served with the Q400 aircraft.

OTHER AIRLINE INFORMATION

This section evaluates airlines that potentially could serve the airport. Potential new carriers are evaluated on factors favoring their serving the market and factors which may cause them to bypass serving the market.

Pullman-Moscow and its surrounding catchment area are served by Alaska Airlines/Horizon Air. Similar to other markets of this size, the catchment area market size and the distance to carriers' hubs generally limit the airlines that could serve the market in the foreseeable future. This section examines airlines that are not now serving the market but may be potential possibilities in the future.

DELTA AIR LINES

Delta Air Lines as a result of its merger with Northwest Airlines operates an extensive route network with hubs at Atlanta, Cincinnati, Detroit, Memphis, Minneapolis, New York (LGA and JFK) and Salt Lake City. Pacific Northwest service is focused on the Salt Lake City hub and to a lesser extent the Minneapolis hub. **Table 9.1** provides frequency and capacity changes at the hubs. The most notable changes have been the scale back of the Cincinnati hub, the growth at the Detroit, Minneapolis and New York (LGA) hubs and limited growth of the Salt Lake City hub.

TABLE 9.1 DELTA AIR LINES - DEPARTURES AND SEATS BY HUB

	OCTOBER 2010			OCTOBER 2009			% CHANGE YOY		
HUB	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE
Atlanta, GA	965	116,818	121.1	972	110,950	114.1	(1)	5	6
Cincinnati, OH	146	10,924	74.8	206	14,108	68.5	(29)	(23)	9
Detroit, MI	513	44,969	87.7	451	40,034	88.9	14	12	(1)
Memphis, TN	164	20,494	124.9	160	18,546	115.9	3	11	8
Minneapolis, MN	153	15,627	102.1	124	12,582	101.7	24	24	0
New York, NY (JFK)	213	15,580	73.3	213	15,255	71.6	(0)	2	2
New York, NY (LGA)	447	43,074	96.4	408	39,925	97.8	10	8	(1)
Salt Lake City, UT	288	25,996	90.1	276	23,549	85.5	5	10	5
Total	**2,889**	**293,482**	**101.6**	**2,809**	**274,950**	**97.9**	**3**	**7**	**4**

Delta's fleet distribution by hub is depicted in **Table 9.2**. Delta has announced that the Saab 340 fleet will be eliminated, approximately 100 regional jets will be removed from the fleet and the smaller mainline DC-9-30 and 40s will exit the fleet.

TABLE 9.2 DELTA AIR LINES - REGIONAL PARTNER AIRCRAFT IN USE

			ATL PEAK DAY DEPARTURES		CVG PEAK DAY DEPARTURES		DTW PEAK DAY DEPARTURES		MEM PEAK DAY DEPARTURES		MSP PEAK DAY DEPARTURES		JFK PEAK DAY DEPARTURES		LGA PEAK DAY DEPARTURES		SLC PEAK DAY DEPARTURES	
AIRLINE	AIRCRAFT TYPE	SEATING CAPACITY	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL
Atlantic Southeast Airlines	CRJ-200	50	242	24	1	1	3	1	49	22	0	0	0	0	0	0	0	0
	CRJ-700	70	74	7	10	6	16	3	6	3	0	0	0	0	0	0	0	0
	CRJ-900	76	15	2	3	2	6	1	5	2	0	0	0	0	0	0	0	0
Chautauqua	ERJ-145	50	0	0	14	9	9	2	5	2	0	0	25	15	12	7	0	0
Comair	CRJ-200	50	10	1	59	38	56	10	19	9	14	3	13	8	4	2	0	0
	CRJ-700	70	3	0	10	6	2	0	3	1	0	0	0	0	19	11	0	0
	CRJ-900	76	3	0	4	3	2	0	7	3	9	2	13	8	0	0	0	0
Compass	E-175	76	3	0	0	0	14	3	0	0	50	11	0	0	12	7	0	0
Mesaba	CRJ-200	50	0	0	0	0	21	4	0	0	34	7	0	0	0	0	0	0
	CRJ-900	76	0	0	8	5	17	3	10	5	27	6	9	5	0	0	36	12
	Saab 340	34	10	1	0	0	19	3	8	4	34	7	0	0	0	0	0	0
Pinnacle	CRJ-200	50	7	1	14	9	195	36	56	25	51	11	19	11	10	6	0	0
	CRJ-900	76	39	4	0	0	2	0	1	0	0	0	0	0	0	0	0	0
Shuttle America	E-175	76	0	0	0	0	2	0	2	1	0	0	1	1	35	21	0	0
SkyWest	CRJ-200	50	0	0	3	2	0	0	2	1	45	10	0	0	0	0	86	28
	CRJ-700	70	0	0	0	0	0	0	0	0	9	2	0	0	0	0	22	7
	CRJ-900	76	0	0	0	0	0	0	0	0	11	2	0	0	0	0	35	12
	EMB-120	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	10
Delta Air Lines' mainline			589	59	31	20	180	33	48	22	180	39	87	52	76	45	94	31
Total			**995**	**100**	**157**	**100**	**544**	**100**	**221**	**100**	**464**	**100**	**167**	**100**	**168**	**100**	**304**	**100**

Note: October 2010; Peak Day = Thursday

Delta is expected to remain aggressive in international markets. With the indicated fleet changes, flight frequency will be down in some markets and hubs will have lesser capacity reductions since there will be some offset due to mainline fleet additions. The Salt Lake City hub, as the network's only western hub, will continue to grow modestly. Pullman-Salt Lake City service in a 50-seat regional jet is a potential future new service for the catchment area providing alternate new connecting opportunities to the south and east. The existing Lewiston-Salt Lake City service is a complicating factor since Delta will be forced to decide between adding Lewiston frequency or providing Pullman-Moscow service as area traffic to Salt Lake City and beyond grows. Further Delta merger possibilities are very unlikely.

FRONTIER AIRLINES

Frontier Airlines operates hubs at Denver and Milwaukee with scheduled frequency and seats as shown in **Table 9.3** with Denver being the dominant hub. Frequency and capacity at both hubs were reduced during the merger of Frontier and Midwest Airlines. Additions in service are anticipated now that they have completed the merger; however, it is unclear how aircraft resources will be allocated going forward.

TABLE 9.3 FRONTIER AIRLINES - DEPARTURES AND SEATS BY HUB

HUB/FOCUS CITY	OCTOBER 2010			OCTOBER 2009			% CHANGE YOY		
	DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE	DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE	DAILY DEPARTURES	DAILY SEATS	SEATS/ DEPARTURE
Denver, CO	150	18,583	123.5	156	18,693	119.9	(3)	(1)	3
Milwaukee, WI	83	5,284	63.8	88	5,735	64.9	(6)	(8)	(2)
Total	**233**	**23,867**	**102.3**	**244**	**24,428**	**100.0**	**(5)**	**(2)**	**2**

Table 9.4 shows the mix between operations of the Bombardier Q400 turboprop aircraft, Embraer Regional Jets and mainline jet aircraft. Republic has announced the elimination of the Bombardier Q400 fleet. It is anticipated that the 76-seat Embraer 170 will replace the Q400. Current indications are that Embraer E-190 aircraft will serve larger, longer haul markets replacing Airbus A319s and that Airbus A318s will be replaced by Airbus A320s over time.

TABLE 9.4 FRONTIER AIRLINES - REGIONAL PARTNER AIRCRAFT IN USE

REGIONAL PARTNER	AIRCRAFT TYPE	SEATING CAPACITY	DEN PEAK DAY DEPARTURES		MKE PEAK DAY DEPARTURES	
			FLIGHTS	% OF TOTAL	FLIGHTS	% OF TOTAL
Chautauqua	ERJ-135	37	0	0	32	82
	ERJ	50	0	0	23	59
Lynx Air	Bombardier Q400	74	4	3	0	0
Frontier Airlines' mainline			149	97	39	100
Total			**153**	**100**	**39**	**100**

Note: October 2010; Peak Day = Thursday

It is expected that Frontier will gradually grow the Denver hub. While Pullman-Denver service provides the same or better connecting options as Salt Lake City, southbound connecting options are circuitous. Another factor making Frontier Denver service challenging is the most likely aircraft type available would be the 99-seat Embraer E-190 which may be too much capacity for the market. Less than daily service may be a consideration to offset the ability to fill larger gauge equipment on a daily basis. Post-merger, some smaller 76-seat Embraer E-170 aircraft are being used at Denver but it is limited at this time. No other merger possibilities are likely in the short term.

United Airlines' Service Opportunity

United San Francisco service is possible, but additional market growth is required. Denver service is a potential alternative to Salt Lake City service.

UNITED AIRLINES

United Airlines post-merger with Continental Airlines operates hubs at Chicago (ORD), Cleveland, Denver, Houston (IAH), Los Angeles, Newark, San Francisco and Washington (IAD). **Table 9.5** shows that Chicago (ORD), Denver, Los Angeles, San Francisco and Washington (IAD) have experienced some growth in frequency while Cleveland and Newark have remained relatively unchanged and Houston has lost some frequency. Overall departures and seats are up two percent year over year.

TABLE 9.5 UNITED AIRLINES - DEPARTURES AND SEATS BY HUB

	OCTOBER 2010			OCTOBER 2009			% CHANGE YOY		
HUB	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE	AVG DAILY DEPARTURES	AVG DAILY SEATS	SEATS/ DEPARTURE
Chicago, IL (ORD)	4,304	395,651	91.9	4,062	395,183	97.3	6	0	(6)
Cleveland, OH	1,241	79,334	63.9	1,241	81,530	65.7	0	(3)	(3)
Denver, CO	2,846	268,334	94.3	2,723	264,334	97.1	5	2	(3)
Houston, TX (IAH)	4,165	396,323	95.2	4,193	392,672	93.6	(1)	1	2
Los Angeles, CA	1,446	147,830	102.2	1,387	138,249	99.7	4	7	3
Newark, NJ	2,749	291,804	106.1	2,739	289,188	105.6	0	1	1
San Francisco, CA	1,818	201,953	111.1	1,786	192,520	107.8	2	5	3
Washington, DC (IAD)	2,064	188,934	91.5	2,007	181,042	90.2	3	4	1
Total	**20,633**	**1,970,163**	**95.5**	**20,138**	**1,934,718**	**96.1**	**2**	**2**	**(1)**

Note: Includes Continental Airlines

Table 9.6 demonstrates the mix of mainline aircraft and regional carrier aircraft by hub. Only at Washington (IAD) does the number of mainline flights exceed the number of regional carrier flights. This occurred as United shrunk its mainline fleet, particularly smaller 737 aircraft, and outsourced markets to its regional codeshare partners. There will be some shuffling in United's regional jet aircraft fleet as Mesa's smaller regional jets (50 seats or less) are being eliminated.

TABLE 9.6 UNITED AIRLINES - REGIONAL PARTNER AIRCRAFT IN USE BY HUB

			ORD PEAK DAY DEPARTURES		CLE PEAK DAY DEPARTURES		DEN PEAK DAY DEPARTURES		IAH PEAK DAY DEPARTURES		LAX PEAK DAY DEPARTURES		EWR PEAK DAY DEPARTURES		SFO PEAK DAY DEPARTURES		IAD PEAK DAY DEPARTURES	
AIRLINE	AIRCRAFT TYPE	SEATING CAPACITY	DEPT	% OF TOTAL	DEP	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL
Atlantic Southeast	CRJ-200	50	11	2	0	0	0	0	0	0	0	0	0	0	42	14	0	0
CommutAir	Dash 8-Q200	37	0	0	35	17	0	0	0	0	0	0	26	6	7	2	0	0
Chautauqua	ERJ-145	50	0	0	26	13	0	0	17	3	0	0	0	0	0	0	0	0
Colgan	Q400	72	4	1	7	3	0	0	0	0	0	0	41	10	1	0	0	0
	Saab 340	34	0	0	0	0	0	0	51	0	0	0	0	0	32	0	0	0

TABLE 9.6 UNITED AIRLINES - REGIONAL PARTNER AIRCRAFT IN USE BY HUB

			ORD PEAK DAY DEPARTURES		CLE PEAK DAY DEPARTURES		DEN PEAK DAY DEPARTURES		IAH PEAK DAY DEPARTURES		LAX PEAK DAY DEPARTURES		EWR PEAK DAY DEPARTURES		SFO PEAK DAY DEPARTURES		IAD PEAK DAY DEPARTURES	
AIRLINE	AIRCRAFT TYPE	SEATING CAPACITY	DEPT	% OF TOTAL	DEP	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL	DEPT	% OF TOTAL
ExpressJet	ERJ	50	3	0	84	41	0	0	310	47	0	0	149	36	3	1	0	0
	ERJ-145	50	103	0	9	0	0	0	0	0	0	0	0	0	19	0	0	0
GoJet	CRJ-700	66	41	7	0	0	15	4	0	0	0	0	4	1	13	4	0	0
Gulfstream	Beechcraft	19	0	0	11	5	0	0	0	0	0	0	0	0	0	0	0	0
Mesa	Dash 8-Q200	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CRJ-200	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CRJ-700	66	26	4	0	0	0	0	0	0	0	0	0	0	31	11	0	0
Shuttle America	E-170	70	58	9	0	0	27	6	2	0	0	0	0	0	18	6	0	0
SkyWest	CRJ-200	50	73	12	0	0	140	33	0	0	34	16	0	0	0	0	33	13
	CRJ-700	66	49	8	3	1	72	17	2	0	31	15	0	0	4	1	28	11
	Brasilia 120	30	0	0	0	0	4	1	0	0	48	23	0	0	0	0	63	24
Trans States	ERJ-145	49	36	6	1	0	0	0	0	0	0	0	4	1	38	13	0	0
United Airlines' mainline			225	36	31	15	160	38	275	42	98	46	189	46	86	29	137	52
Total			**629**	**100**	**207**	**100**	**418**	**100**	**657**	**100**	**211**	**100**	**413**	**100**	**294**	**100**	**261**	**100**

Note: October 2010; Peak Day = Thursday; Includes Continental Airlines

United's future strategy is unclear until the merger with Continental is complete. It is expected that all hub operations will be continued with Denver potentially experiencing more growth than the other hubs. Pullman-Moscow's future new service opportunities are focused on Denver, Los Angeles and San Francisco. Service to Denver is dependent on eastbound demand as is the case with Frontier. United's advantage versus Frontier is the availability of 50-seat regional jets. Pullman-San Francisco is potentially the more likely opportunity when market growth is sufficient to make the service economically viable.

OTHER AIRLINES

Recent industry consolidation including Delta/Northwest, United/Continental, and now Southwest Airlines/AirTran Airways is resulting in fewer potential service providers throughout the US. Despite this trend, new start-up airlines such as Airline Visions LLC have emerged. Airline Visions LLC is initially planning on operating between three to 10 30-seat turboprop aircraft based in the southeast US. As smaller aircraft types such as 30-seat turboprops and 50-seat regional jets are retired by the major airlines and their regional partners, additional new start-up niche airlines may emerge, though no known new or other potential service providers other than SeaPort Airlines and Kenmore Airlines operate in the Pullman-Moscow region today.

SUMMARY OF MAIN POINTS

- Delta Salt Lake City service is a potential opportunity offering attractive eastbound and southbound connecting opportunities, but further market growth is needed. Delta's Salt Lake City-Lewiston service may cause Delta to be reluctant to consider Pullman-Moscow service. Delta is reducing some of its 50-seat regional jet feet while expanding its 70-seat and greater fleet.
- United San Francisco service is a potentially attractive future opportunity, but additional market growth is required.
- Frontier or United Denver service is a potential alternative to Salt Lake City service. Without competitive southbound connecting opportunities, additional growth in eastbound traffic is needed. At present, Frontier's available aircraft are too large to operate daily compared to United's 50-seat regional jets.
- Due to industry consolidation and contraction, other potential service providers are not apparent at this time. Though niche upstart carriers like Airline Visions LLC are looking to expand their turboprop operations, they currently do not operate in the western US and are therefore not likely to provide Pullman-Moscow service in the near term.

NEXT STEPS

This part of the report addresses next steps that Pullman-Moscow Regional Airport should consider to retain and/or improve air service.

The air service options for the Pullman-Moscow Regional Airport catchment area have remained relatively unchanged over the last four years. Lewiston with Delta Air Lines' service to Salt Lake City and Spokane with service to a number of destinations and augmented by the presence of low-fare carrier Southwest Airlines provide competition for local catchment area air travelers. However, there are some encouraging developments. Horizon Air upgraded equipment in the Seattle market from 37-seat turboprops to 76-seat turboprops in 2008. Though the capacity is shared with Lewiston, the Pullman/Moscow market has responded positively with enplanements up 22 percent in 2009. Since 2005, origin and destination passengers have grown at a compounded annual rate of approximately 8.9 percent.

Catchment area diversion remains high and virtually unchanged. Catchment area retention remains at slightly over 26 percent with diversion to Spokane at approximately 53 percent and diversion to Lewiston at approximately 12 percent. The net result of increased local airport use and unchanged catchment area retention is an approximate 50 percent increase in true market size to 350 passengers per day each way. This may partially be a result of booking data anomalies due to a change in the mix of travel agent MIDT bookings and other bookings. It is certain that the true market size has increased but the magnitude may be questionable. Seattle, Los Angeles and Anchorage remain the top three true markets with Boise, Portland, Las Vegas, Honolulu, Denver, Minneapolis and Oakland rounding out the top 10 markets while Phoenix, Sacramento, Orange County, Ontario and San Diego dropped down.

Primary Focus on Existing Air Service
Pullman-Moscow Regional Airport should focus air service development efforts on stabilizing the Alaska/Horizon service currently in the market.

For the year ended June 30, 2010, average domestic fares at Pullman-Moscow declined approximately $15 from annual 2005 levels while comparable Spokane also increased approximately $15 and Lewiston fares increased approximately $13. The fare spread between Pullman-Moscow average domestic fares and comparable Spokane fares declined from being approximately $36 higher in 2005 to being approximately $1 higher for the year ended June 30, 2010. Pullman-Moscow fares were equal to Lewiston in 2005 but were $33 lower in the more recent period. These fare relationship improvements undoubtedly contributed to the increase in passengers at Pullman-Moscow Regional Airport.

INCUMBENT AIRLINE SERVICE

Of utmost importance for Pullman-Moscow Regional Airport is retaining existing air service. To do so, it is strongly recommended that Pullman-Moscow Regional Airport staff meet regularly with Alaska/Horizon staff to make sure that the market is meeting Alaska/Horizon's goals and expectations. Over the past year, the passenger and revenue increase for Alaska/Horizon has strengthened the route; however, load factors are below Alaska/Horizon's market average. The RASM was just above the Alaska/Horizon market average for year ended June 30, 2010. This information should be shared with Alaska/Horizon and discussed to work together in ensuring the future success of the service, particularly with the proposed consideration of dropping the Lewiston tag.

It is important to continue monitoring Alaska/Horizon's performance. Doing so will alert community leaders to negative trends and offers background information for discussing issues with Alaska/Horizon. In general, schedules, schedule completions, load factors, and inbound/outbound passengers should be monitored monthly by flight. Published airfares and top origin and destination markets should be monitored by quarter. Performance should be benchmarked against other similar size markets twice yearly, and traffic performance should be compared to identity issues for discussion with Alaska/Horizon when needed.

While fares improved over the last few years at Pullman-Moscow Regional Airport, on a market-by-market basis, fares are higher in several top 25 markets. Pullman-Moscow Regional Airport should periodically track published airfares. Periodic tracking of airfares and follow-up communication with Alaska/Horizon may minimize pricing disparities and potentially reduce passenger diversion. Working with Washington State University and the University of Idaho to ensure visiting staff and teams use the local airport will also help reduce passenger diversion.

POTENTIAL AIR SERVICE OPPORTUNITIES

Service to Salt Lake City and San Francisco are potential opportunities but may require additional market growth. The Delta Air Lines' Salt Lake City service at nearby Lewiston can make it difficult to justify service to Pullman-Moscow but may be a viable alternative to additional frequency to Lewiston or Spokane. San Francisco service would provide much needed alternative

connecting routings to the major southern California and Arizona markets as well as international connections. United Airlines' Pasco-San Francisco service has not performed exceptionally with load factors for the year ended June 30, 2010, ranging from a low in August 2009 of 55 percent to a high of 79 percent in December 2009. The average for year ended June 30, 2010, was 68 percent, low for 50-seat regional jet operations. Spokane service has performed better with an average for year ended June 30, 2010, of 79 percent.

At this point in time, Pullman-Moscow Regional Airport should focus air service development efforts on stabilizing the Alaska/Horizon service currently in the market. After the Alaska/Horizon service stabilizes and further market growth has been experienced, discussion and analysis should be conducted regarding new service opportunities.

APPENDIX A. TOP 50 TRUE MARKETS

TABLE A.1 TOP 50 TRUE MARKETS

		REPORTED	RETENTION	TRUE	ORIGIN AIRPORT OF DIVERTING PAX			
RANK	DESTINATION	PAX	%	MARKET	GEG	LWS	SEA	OTHER
1	Seattle, WA	26,630	63	42,258	13,455	1,892	0	280
2	Los Angeles, CA	1,950	10	19,500	16,756	378	340	76
3	Anchorage, AK	2,060	13	15,731	9,083	2,481	1,428	679
4	Boise, ID	3,870	37	10,358	1,252	5,084	152	0
5	Portland, OR	3,400	44	7,813	3,906	145	253	109
6	Las Vegas, NV	810	11	7,059	4,339	1,446	231	231
7	Honolulu, HI	720	12	6,175	1,615	131	3,469	240
8	Denver, CO	440	10	4,400	2,911	575	169	305
9	Minneapolis, MN	430	10	4,300	3,350	0	520	0
10	Oakland, CA	1,120	28	4,052	2,668	102	61	102
11	Washington, DC (DCA)	850	21	3,960	2,086	695	232	97
12	Juneau, AK	510	13	3,895	2,249	614	354	168
13	Chicago, IL (ORD)	540	15	3,722	2,488	386	174	135
14	San Jose, CA	930	25	3,675	2,609	45	91	0
15	Phoenix, AZ	570	19	3,032	1,664	638	114	46
16	Sacramento, CA	980	33	2,982	1,376	209	417	0
17	Bellingham, WA	390	13	2,978	1,720	470	270	129
18	Fairbanks, AK	360	13	2,749	1,587	434	250	119
19	San Francisco, CA	980	38	2,601	1,283	196	89	53
20	Ontario, CA	420	17	2,520	1,620	420	60	0
21	Atlanta, GA	240	10	2,400	1,601	372	37	149
22	Medford, OR	300	13	2,291	1,323	361	208	99
23	San Diego, CA	1,080	48	2,270	934	201	37	18
24	Palm Springs, CA	260	13	1,985	1,146	313	180	86
25	Eugene, OR	640	33	1,920	1,237	21	21	0
26	New York, NY (JFK)	190	10	1,900	921	329	460	0
27	Salt Lake City, UT	90	5	1,800	744	919	29	17
28	Boston, MA	340	19	1,778	968	340	131	0
29	Long Beach, CA	240	14	1,680	1,260	120	60	0

TABLE A.1 TOP 50 TRUE MARKETS

RANK	DESTINATION	REPORTED PAX	RETENTION %	TRUE MARKET	ORIGIN AIRPORT OF DIVERTING PAX			
					GEG	LWS	SEA	OTHER
30	Santa Barbara, CA	210	13	1,604	926	253	146	69
31	Idaho Falls, ID	160	10	1,600	254	1,101	0	85
32	Orange County, CA	630	40	1,560	750	180	0	0
33	Dallas, TX (DFW)	370	24	1,542	617	329	206	21
34	Detroit, MI	140	10	1,400	992	188	27	54
35	Orlando, FL	190	14	1,330	627	399	95	19
36	Reno, NV	350	27	1,310	800	50	40	70
37	Columbus, OH	170	13	1,303	1,105	0	28	0
38	Des Moines, IA	130	10	1,300	1,119	0	51	0
39	Billings, MT	170	13	1,298	750	205	118	56
40	Fresno, CA	160	13	1,222	705	193	111	53
41	Pittsburgh, PA	170	15	1,105	808	43	0	85
42	New Orleans, LA	110	10	1,100	885	90	15	0
43	Baltimore, MD	110	10	1,100	747	195	49	0
44	Ketchikan, AK	140	13	1,069	617	169	97	46
45	Redmond, OR	130	13	993	573	157	90	43
46	Lihue, HI	120	13	916	529	145	83	40
47	Philadelphia, PA	130	15	884	468	286	0	0
48	Newark, NJ	600	72	833	167	33	33	0
49	St. Louis, MO	80	10	800	576	128	16	0
50	Raleigh/Durham, NC	100	13	764	441	120	69	33
Top 50 Destinations		**55,710**	**28**	**196,817**	**102,605**	**23,582**	**11,111**	**3,809**
Total Domestic		**59,020**	**27**	**221,213**	**117,431**	**27,030**	**12,892**	**4,840**
Total International		**7,912**	**23**	**34,509**	**17,395**	**2,357**	**5,611**	**1,234**
Total All Markets		**66,932**	**26**	**255,722**	**134,826**	**29,387**	**18,503**	**6,074**

Appendix B. Glossary

Airport catchment area (ACA)

The geographic area surrounding an airport from which that airport can reasonably expect to draw passenger traffic. The airport catchment area is sometimes called the service area.

Airline codes

AA	American Airlines
AS	Alaska Airlines/Horizon Air
DL	Delta Air Lines
F9	Frontier Airlines
UA	United Airlines
US	US Airways
WN	Southwest Airlines

Airport catchment area (ACA)

The geographic area surrounding an airport from which that airport can reasonably expect to draw passenger traffic. The airport catchment area is sometimes called the service area.

Airport codes

ABY	Albany, GA
ACY	Atlantic City, NJ
ADQ	Kodiak, AK
ALW	Walla Walla, WA
AMA	Amarillo, TX
ANC	Anchorage, AK
ATL	Atlanta, GA

Airport codes (continued)

BHM	Birmingham, AL
BKG	Branson, MO
BLI	Bellingham, WA
BNA	Nashville, TN
BOI	Boise, ID
BRW	Barrow, AK
BUR	Burbank, CA
CAK	Akron/Canton, OH
CHA	Chattanooga, TN
CLE	Cleveland, OH
CLT	Charlotte-Douglas, NC
CMH	Columbus, OH
COU	Columbia, MO
CRP	Corpus Christi, TX
CVG	Cincinnati, OH
DCA	Washington-National, DC
DEN	Denver, CO
DFW	Dallas-Ft. Worth, TX
DTW	Detroit, MI
EAT	Wenatchee, WA
ECP	Panama City, FL
EUG	Eugene, OR
EWR	Newark, NJ
FCA	Kalispell/Glacier, MT
FLO	Florence, SC
GEG	Spokane, WA
GRI	Grand Island, NE
GSP	Greenville/Spartanburg, SC

Airport codes (continued)

GTR	Columbus, MS
HHH	Hilton Head Island, SC
HLN	Helena, MT
HNL	Honolulu, HI
HOU	Houston-Hobby, TX
HRL	Harlingen, TX
HTS	Huntington, WV
IAD	Washington-Dulles, DC
IAH	Houston-Intercontinental, TX
JAN	Jackson, MS
JFK	New York-Kennedy, NY
LAN	Lansing, MI
LAS	Las Vegas, NV
LAX	Los Angeles, CA
LBB	Lubbock, TX
LEX	Lexington, KY
LGA	New York-LaGuardia, NY
LIT	Little Rock, AR
LWS	Lewiston, ID
MAF	Midland/Odessa, TX
MCI	Kansas City, MO
MCO	Orlando-International, FL
MDW	Chicago-Midway, IL
MEM	Memphis, TN
MFR	Medford, OR
MKE	Milwaukee, WI
MSO	Missoula, MT
MSP	Minneapolis, MN

Airport codes (continued)

MYR	Myrtle Beach, SC
OAK	Oakland, CA
ORD	Chicago-O'Hare, IL
PDX	Portland, OR
PHF	Newport News, VA
PIE	St. Petersburg, FL
PSC	Pasco, WA
PUW	Pullman, WA
RDD	Redding, CA
RDM	Redmond, OR
RDU	Raleigh/Durham, NC
SDF	Louisville, KY
SEA	Seattle, WA
SFB	Orlando-Sanford, FL
SFO	San Francisco, CA
SGU	St. George, UT
SLC	Salt Lake City, UT
SMX	Santa Maria, CA
STL	St. Louis, MO
SUN	Sun Valley, ID
TLH	Tallahassee, FL
TOL	Toledo, OH
TUL	Tulsa, OK
TYS	Knoxville, TN
YKM	Yakima, WA
YLW	Kelowna, Canada
YVR	Vancouver, Canada
YYC	Calgary, Canada
YYJ	Victoria, Canada

Ancillary revenue

Additional passenger revenue collected by airlines that are not included in the published airfare including: charges for baggage, seat assignments, meals, other services, and other travel related costs for hotel rooms.

Average airfare

The average of the airfares reported by the airlines to the U.S. DOT. The average airfare does not include taxes or passenger facility charges and represents one-half of a roundtrip ticket (one-way).

Codeshare(s), codeshare partners, codeshare agreements

A marketing practice in which two airlines share the same two-letter code used to identify carriers in the computer reservation systems used by travel agents.

Destination airport

Any airport where the air traveler spends four hours or more. This is the Federal Aviation Administration definition.

Diversion

Passengers who do not use the local airport for air travel, but instead use a competing airport to originate the air portion of their trip.

Enplanement

A passenger boarding a commercial aircraft.

FAA

Acronym for the Federal Aviation Administration.

GDS/CRS

Acronyms for Global Distribution Systems, also known as Computer Reservation Systems. There are four Global Distribution Systems in the United States, including Amadeus, Galileo International (Apollo), Sabre, Inc., and Worldspan.

Hub

An airport used by an airline as a transfer point to get passengers to their intended destination. It is part of a hub and spoke model, where travelers moving between airports not served by direct flights change planes en route to their destination. Also an airport classification system used by the FAA (e.g., non-hub, small hub, medium hub, and large hub.

Initiated (origin) passengers

Origin and destination passengers who began their trip from within the catchment area.

International gateway passenger

Passengers connecting through a domestic airport to an international destination.

Itinerary miles

Average total flight miles.

Load factor
The percentage of airplane capacity that is used by passengers.

Local market
The number of air travelers who travel between two points via nonstop air service.

MIDT
Acronym for Marketing Information Data Tapes provided by the Global Distribution Systems.

Narrow-body jet
A jet aircraft with a single aisle designed for seating over 100 passengers.

Nonstop flight
Air travel between two points without stopping at an intermediate airport.

Northwest Region
The Northwest region as defined by the FAA includes Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming.

Onboard passengers
The number of passengers transported on one flight segment.

Origin and destination (O&D) passengers
Includes all originating and destination passengers. In this report, it describes the passengers arriving and departing an airport.

Originating airport
The airport used by an air traveler for the first enplanement of a commercial air flight.

Passenger Facility Charge
Fee imposed by airports of $1 to $4.50 on enplaning passengers. The fees are used by airports to fund FAA approved airport improvement projects.

Pax
Abbreviation for passengers.

PDEW
Abbreviation for passengers daily each way.

Point-to-point
Nonstop service that does not stop at an airline's hub and whose primary purpose is to carry local traffic rather than connecting traffic.

RASM
Acronym for Revenue per Available Seat Mile, also referred to as unit revenue. Available seat-miles are aircraft miles flown on each flight stage multiplied by the seat capacity available for sale.

Referred passengers
Origin and destination passengers who began their trip from outside the catchment area.

Regional jet
A jet aircraft with a single aisle designed for seating fewer than 100 passengers.

Retained passengers (retention)
Passengers who use the local airport for air travel instead of using a competing airport to originate the air portion of their trip.

Stage length
Distance of itinerary nonstop leg.

Stimulated passengers
Additional/"new" passengers that are generated by the introduction of service or by decreases in airfares not included in the true market.

True market
Total number of air travelers, including those who are using a competing airport, in the geographic area served by Pullman-Moscow Regional Airport. The true market estimate includes the size of the total market and for specific destinations.

Turboprop aircraft

A type of engine that uses a jet engine to turn a propeller. Turboprops are often used on regional and business aircraft because of their relative efficiency at speeds slower than, and altitudes lower than, those of a typical jet.

U.S. DOT

Acronym for Continental States Department of Transportation.

Wide-body jet

A jet aircraft with two aisles designed for seating greater than 175 passengers.

Yield

Yield is calculated by dividing total revenue by total itinerary miles.

YOY

Acronym for Year over Year.

Zero fare passengers

Zero fare passengers are passengers who paid no fare because they used frequent-flyer mileage points in lieu of cash. A zero fare passenger is different from a non-revenue passenger. Non-revenue passengers are usually airline employees and are not included in the U.S. DOT reported data.

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MEAD & HUNT

Technical Memorandum

To: Pullman-Moscow Regional Airport
FAA Seattle Airports District Office
From: Mead & Hunt
Date: January 28, 2011

Subject: PUW Master Plan Study Phase II – Runway Length Requirements

1. Executive Summary

The purpose of this memorandum is to present the near-term (5-year) runway length requirements of Pullman-Moscow Regional Airport's (PUW) key users. The runway length analysis contained in the PUW Master Plan Study Phase I, completed in 2007, identified 7,500 feet as the near-term runway length requirement at PUW based on the performance characteristics of the Citation X. This memorandum utilizes the five-step procedure for determining required runway lengths at airports – as described in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* – to identify the required runway lengths of the following three key PUW user groups:

- General Aviation (GA) Jet Operators
- Commercial Air Carriers
- Part 121 Charter Operators

A summary of the five-step procedure for determining required runway lengths is contained in **Appendix D** to this memorandum. For federally-funded runway projects, AC 150/5325-4B establishes a required "substantial use threshold" of 500 or more annual itinerant operations by an individual aircraft, or a category of aircraft with similar operating characteristics. AC 150/5325-4B states that the required runway length is "the longest resulting length after any adjustments for all the critical design aircraft under evaluation."

Although Part 121 charter operators require the longest runway lengths of the three key user groups at PUW, these lengths are not justified because operations by the Airbus A319 and the Boeing 737-800 do not meet the "substantial use threshold" of 500 annual itinerant operations. The annual operations of the other two key user groups – GA jet operators and commercial air carriers – both exceed the "substantial use threshold" of 500 annual itinerant operations. As established in Section 3.1 of this memorandum, the runway length requirement for the *Large Aircraft with a MTOW up to and including 60,000 Pounds* utilized by GA jet operators is 7,100 feet. As established in Section 3.2 of this memorandum, the runway length requirement for the Bombardier Q400 aircraft utilized by commercial air carriers is 6,600 feet.

Because 7,100 feet is "the longest resulting length after any adjustments for all the critical design aircraft under evaluation" whose annual itinerant operations exceed the "substantial use" criterion, PUW should plan to implement this runway length in the near-term.

2. Master Plan Study Phase I Runway Length Analysis Recap

A runway length analysis was conducted as part of the PUW Master Plan Study Phase I. The analysis identified the Citation X as the near-term critical design aircraft for runway length, and the Canadair Regional Jet (CRJ) 900 as the long-term critical design aircraft for runway length.

Phase I identified a near-term runway length of 7,500 feet based on consultation with the Citation X pilot operating handbook. The analysis states that Citation X performance charts “reveal that a runway length of 7,500 feet maximizes the operational utility of the aircraft up to ambient temperatures of 90°F (32°C). Above 90°F, the Citation X experiences climb gradient restrictions which reduce its takeoff weight.”

Phase I identified a long-term runway length of 8,000 feet, based on takeoff length requirements contained in the CRJ-900 airport planning manual. Implementing this long-term length was explored in Phase I as part of an engineering feasibility assessment.

3. Near-Term Runway Length Requirements of Key User Groups at PUW

This section presents near-term runway length requirements of three key user groups at PUW – general aviation (GA) jet operators, commercial air carriers, and Part 121 charter operators – following the five-step procedure described in AC 150/5325-4B and summarized in **Appendix D** to this memorandum.

3.1 General Aviation (GA) Jet Operator Runway Length Requirements

GA jet aircraft operating at PUW include both based and transient aircraft. Based and transient GA jet aircraft operating at PUW are owned and operated by users throughout the United States, including small businesses, large corporations, fractional ownership companies, charter operators, flight training businesses, government agencies, medical evacuation businesses, and recreational pilots.

Operational data collected from the FAA Enhanced Traffic Management System Counts (ETMSC) database shows an average of 722 annual operations by GA jet operators utilizing *Large Aircraft with a MTOW up to and including 60,000 Pounds* from 2005 through 2009 at PUW. During this period, 35 aircraft types in this category conducted operations at PUW.

AC 150/5325-4B provides separate runway length charts for two subcategories of *Large Aircraft with a MTOW up to and including 60,000 Pounds*: *Aircraft that Make up 75% of the Fleet* (75% of Fleet) and the *Remaining 25% of Aircraft that Make up 100% of the Fleet* (Remaining 25% of Fleet). The 75% of Fleet aircraft are defined as those requiring less than 5,000 feet of runway at mean sea level and the standard day temperature (SDT) of 59°F. The Remaining 25% of Fleet aircraft are defined as those requiring at least 5,000 feet of runway at mean sea level and the SDT of 59°F, and make up 100% of *Large Aircraft with a MTOW up to and including 60,000 Pounds* when combined with the 75% of Fleet aircraft.
Operations by GA jet operators with *Large Aircraft with a MTOW up to and including 60,000 Pounds* from 2005 through 2009 are presented in **Table 1**.

Table 1: Operations by GA *Large Aircraft with a MTOW up to and including 60,000 Pounds*, 2005-2009

	Aircraft Operations by Year				
Aircraft Type	**2005**	**2006**	**2007**	**2008**	**2009**
75% of Fleet Aircraft Operations					
Beechjet 400A	20	24	20	16	8
Challenger 300	2	2	2	8	6
Citation CJ1	36	38	42	18	2
Citation CJ2	2	2	4	6	10
Citation CJ3	0	0	2	8	18
Citation Excel/XLS	12	8	16	28	18
Citation I/SP	16	12	2	2	2
Citation II/Bravo	214	138	142	130	122
Citation II/SP	10	2	0	0	6
Citation III/VI/VII	40	62	80	44	52
Citation Sovereign	4	0	2	8	38
Citation V/Ultra/Encore	20	16	22	24	32
Falcon 10	4	2	4	8	2
Falcon 20	0	2	10	6	2
Falcon 50	2	10	6	0	0
Falcon 900	0	0	2	6	0
IAI 1124 Westwind	2	10	12	8	12
Learjet 20 Series	6	0	0	6	0
Learjet 31/A/B	14	14	4	20	12
Learjet 35/36	20	22	42	34	14
Learjet 40	0	4	0	6	0
Learjet 45	14	4	20	28	10
Raytheon Premier 1	18	4	20	4	8
Sabreliner 40/60	0	2	0	0	0
Fairchild-Dornier 328JET	0	2	0	2	0
75% of Fleet Subtotal	**456**	**380**	**454**	**420**	**374**
Remaining 25% of Fleet Aircraft Operations					
Challenger 600/601/604	8	16	12	16	22
Citation X	180	246	256	326	274
Falcon 2000	0	4	8	2	0
Gulfstream G150	0	0	0	0	4
Gulfstream G200	4	2	4	0	0
Hawker 800	20	6	14	6	14
IAI Astra 1125	0	4	0	2	0
Learjet 55	0	10	2	2	2
Learjet 60	6	22	10	6	12
Lockheed Jetstar 731	0	6	0	0	0
Remaining 25% of Fleet Subtotal	**218**	**316**	**306**	**360**	**328**
Total Operations	**674**	**696**	**760**	**780**	**702**

Source: FAA Enhanced Traffic Management System Counts (ETMSC)
Note: The ETMSC database only accounts for operations in which the flight crew filed an IFR flight plan with FAA. ETMSC data does not include VFR operations that may have been conducted at PUW. As a result, the numbers of ***actual*** annual operations by these aircraft from 2005 through 2009 were likely higher than the numbers shown here.

As shown in Table 1, 25 of the 35 *Large Aircraft with a MTOW up to and including 60,000 Pounds* are 75% of Fleet aircraft, and ten are Remaining 25% of Fleet aircraft. From 2005 through 2009, an average

Neither of the two subcategories of GA jet aircraft, taken by itself, conducted more than 500 annual itinerant operations at PUW from 2005 through 2009. However, Remaining 25% of Fleet aircraft operations may be counted towards the “substantial use threshold” for 75% of Fleet runway length requirements. Conversely, 75% of Fleet aircraft operations cannot be counted towards the “substantial use threshold” for the Remaining 25% of Fleet runway length requirements. This is because Remaining 25% of Fleet aircraft typically have more demanding runway length requirements than 75% of Fleet aircraft. Because there was an average of 722 annual operations by *Large Aircraft with a MTOW up to and including 60,000 Pounds* from 2005 through 2009 – 416 of which were conducted by 75% of Fleet aircraft and 306 of which were conducted by Remaining 25% of Fleet aircraft, totaling 722 annual operations for 100% of the Fleet – 75% of Fleet runway length requirements are justified at PUW, as 722 exceeds the “substantial use threshold” of 500 annual itinerant operations.

For *Large Aircraft with a MTOW up to and including 60,000 Pounds*, the required runway length is determined according to a family grouping of aircraft having similar performance characteristics and operating weights. The method yields required runway lengths for two distinct family groupings within the 75% of Fleet and Remaining 25% of Fleet subcategories by dividing them based on useful loads. Useful load is the difference between the maximum allowable structural gross weight and the operating empty weight of an aircraft. In short, useful load consists of passengers, cargo, and usable fuel. The FAA provides four family groupings for which runway length requirements are determined under this method: *75% of Fleet at 60% Useful Load*, *75% of Fleet at 90% Useful Load*, *Remaining 25% of Fleet at 60% Useful Load*, and *Remaining 25% of Fleet at 90% Useful Load*.

To determine the required runway lengths for these four family groupings, airport elevation (2,556 feet MSL) and mean maximum daily temperature of the hottest month (83°F) are applied to the AC 150/5325-4B performance charts in **Exhibit 1**. The performance chart results are presented in **Table 2**.

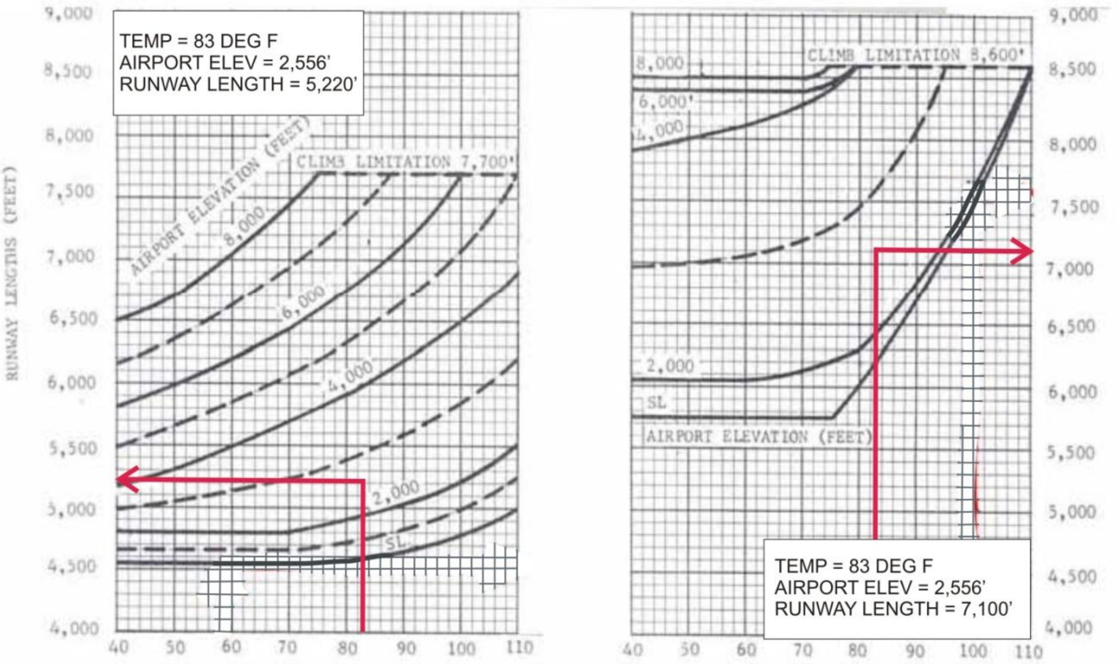
Table 2: Unadjusted PUW Runway Length Requirements for *Large Aircraft with a MTOW up to and including 60,000 Pounds*

Airport Elevation	2,556 feet MSL
Mean Maximum Daily Temperature of the Hottest Month	83° F
Family Grouping	**Runway Length**
75% of Fleet at 60% Useful Load	5,220 feet
75% of Fleet at 90% Useful Load	7,100 feet
Remaining 25% of Fleet at 60% Useful Load	6,250 feet
Remaining 25% of Fleet at 90% Useful Load	8,700 feet

Sources: AC 150/5325-4B *Runway Length Requirements for Airport Design*, January 2011
FAA Airport/Facility Directory, PUW Master Plan Study Phase I

Exhibit 1: Performance Charts for *Large Aircraft with a MTOW up to and including 60,000 Pounds*

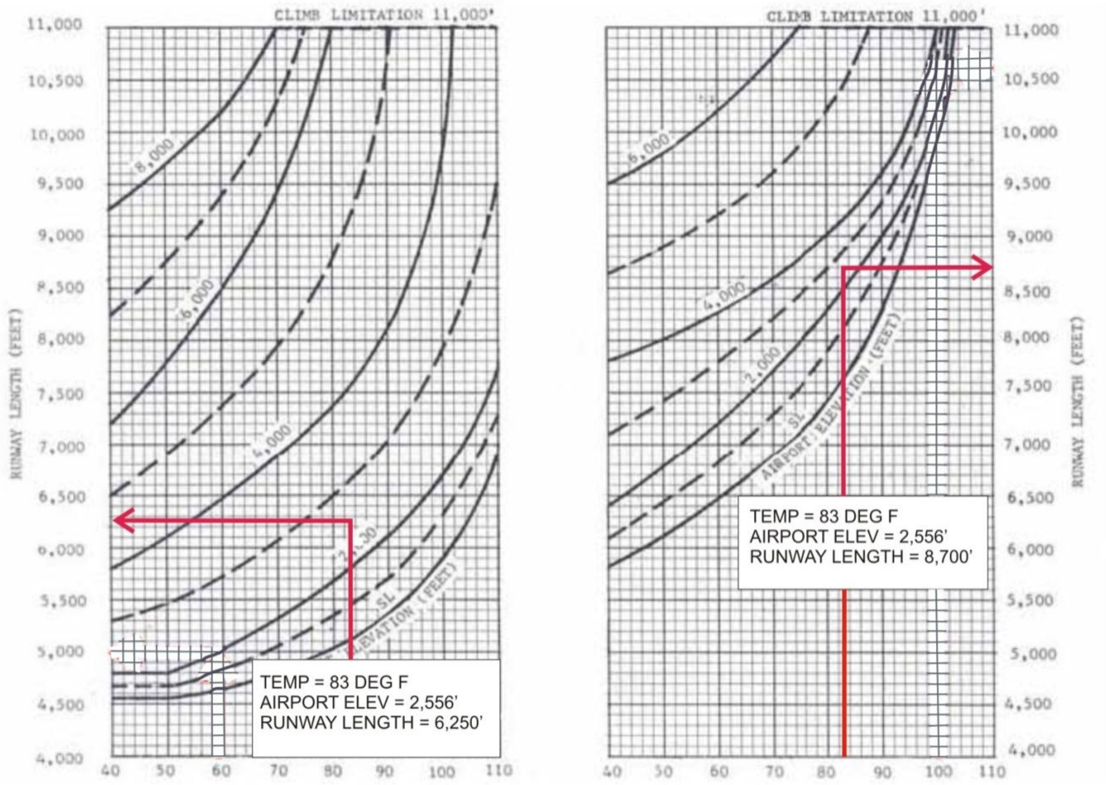
75% OF FLEET AT 60% USEFUL LOAD **75% OF FLEET AT 90% USEFUL LOAD**



TEMP = 83 DEG F
AIRPORT ELEV = 2,556'
RUNWAY LENGTH = 5,220'

TEMP = 83 DEG F
AIRPORT ELEV = 2,556'
RUNWAY LENGTH = 7,100'

REMAINING 25% OF FLEET AT 60% USEFUL LOAD **REMAINING 25% OF FLEET AT 90% USEFUL LOAD**



TEMP = 83 DEG F
AIRPORT ELEV = 2,556'
RUNWAY LENGTH = 6,250'

TEMP = 83 DEG F
AIRPORT ELEV = 2,556'
RUNWAY LENGTH = 8,700'

Source: AC 150/5325-4B, *Runway Length Requirements for Airport Design*

Note: X-axis value is mean daily maximum temperature of the hottest month of the year, in degrees Fahrenheit.

As established previously, 75% of Fleet runway length requirements are justified in the near-term by an average of 722 annual operations by *Large Aircraft with a MTOW up to and including 60,000 Pounds* from 2005 through 2009. The typical useful loads for these operations determine the runway length requirement for 75% of Fleet aircraft at PUW. AC 150/5325-4B, Paragraph 303, states that the 60% Useful Load curve "is to be used for those aircraft operating with no more than a 60% useful load factor." As a result, operations with useful loads up to and including 60% qualify for inclusion in the 75% of Fleet at 60% Useful Load grouping, and operations with useful loads above 60% qualify for inclusion in the 75% of Fleet at 90% Useful Load family grouping.

AC 150/5325-4B, Paragraph 103, states that "the design objective for the main primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions." PUW critical design aircraft operators have a variety of flight purposes, origins, and destinations, with different haul length and useful load requirements. Generally, longer haul lengths require higher useful loads to accommodate fuel carriage and consumption. Data was collected from Flightaware.com to determine typical haul lengths for critical design aircraft operators. As shown in **Exhibit 2**, the data indicate that origins and destinations for most 2009 PUW critical design aircraft operations were outside Washington and Idaho, ranging as far as New York, Florida, southern Mexico, and Alaska. The 702 operations conducted by *Large Aircraft with a MTOW up to and including 60,000 Pounds* in 2009 are categorized by haul length in **Table 3**.

Table 3: Haul Lengths for Operations by *Large Aircraft with a MTOW up to and including 60,000 Pounds*, 2009

Haul Length Range	Aircraft Operations	Percentage of Total
500 NM or less	280	40%
500 NM to 999 NM	148	21%
1,000 NM or greater	274	39%

Source: Flightaware.com
NM = Nautical miles

As shown in Table 3, 60% of operations by *Large Aircraft with a MTOW up to and including 60,000 Pounds* at PUW in 2009 involved haul lengths of greater than 500 nautical miles, two-thirds of which involved haul lengths greater than 1,000 nautical miles. Aircraft operations with long haul lengths like these typically necessitate high useful loads.

PDF and insert map

Weight restrictions resulting from inadequate runway length have a significant impact on operators' ability to maximize efficiency by taking off with an ideal fuel, passenger, and cargo load. Reduction in passenger and cargo load reduces operator revenues, and acquiring fuel at another airport en route to the final destination is inconvenient for both the operator and its customers, and results in additional operating costs.

Because "the design objective for the main primary runway is to provide a runway length for all aircraft that will regularly use it without causing operational weight restrictions", the 7,100 foot length shown in Table 2 for the family grouping 75% of Fleet at 90% Useful Load of *Large Aircraft with a MTOW up to and including 60,000 Pounds* is selected as the unadjusted runway length requirement for GA jet operators at PUW. This length is 370 feet longer than PUW's existing runway length of 6,730 feet.

AC 150/5325-4B allows an adjustment for effective runway gradient. However, the Master Plan Study Phase I found that the optimal replacement runway alignment can be implemented with a zero effective runway gradient. As a result, no effective runway gradient adjustment is applied as part of this runway length analysis.

AC 150/5325-4B allows an adjustment for wet or slippery runway conditions, as these conditions negatively affect aircraft braking performance. For runway lengths obtained from the 60% Useful Load curves in Exhibit 1, the increase provided is 15% or up to a 5,500-foot runway length, whichever is less. If the 60% Useful Load runway length exceeds 5,500 feet, no adjustment is provided. For runway lengths obtained from the 90% Useful Load curves in Exhibit 1, the increase provided is 15% or up to a 7,000-foot length, whichever is less. If the 90% Useful Load runway length exceeds 7,000 feet, no adjustment is provided. The resulting required runway lengths for the four family groupings of *Large Aircraft with a MTOW up to and including 60,000 Pounds* are presented in **Table 4**.

Table 4: PUW Runway Length Requirements for *Large Aircraft with a MTOW up to and including 60,000 Pounds*, Adjusted for Wet or Slippery Runway Conditions

Family Grouping	Runway Length
75% of Fleet at 60% Useful Load	5,500 feet
75% of Fleet at 90% Useful Load	7,100 feet
Remaining 25% of Fleet at 60% Useful Load	6,250 feet
Remaining 25% of Fleet at 90% Useful Load	8,700 feet

Sources: AC 150/5325-4B *Runway Length Requirements for Airport Design*, January 2011 FAA Airport/Facility Directory, PUW Master Plan Study Phase I

Because the required runway length obtained from the curves in Exhibit 1 exceeds 7,000 feet for the 75% of Fleet at 90% Useful Load family grouping, there is no adjustment provided for wet or slippery conditions. As a result, based on the family grouping runway length determination method, the required runway length for GA jet operators at PUW in the near-term is 7,100 feet.

3.2 Commercial Air Carrier Runway Length Requirements

The main commercial air carrier at PUW is Horizon Air. Until 2008, Horizon Air primarily utilized the Bombardier Q200 on its scheduled flights from PUW to Seattle-Tacoma International Airport (SEA) and Lewiston-Nez Perce County Airport (LWS). In the late 2000s, Horizon Air changed its fleet mix, replacing the 37-seat Q200 with the 70-seat Bombardier Q400. Annual operations by the Q200 and the Q400 from 2005 through 2009 are presented in **Table 5**.

Table 5: Horizon Air Operations at PUW, 2005-2009

	Operations by Year				
Aircraft	**2005**	**2006**	**2007**	**2008**	**2009**
Bombardier Q200	3,588	3,286	3,394	904	0
Bombardier Q400	0	4	10	1,974	2,592
Total Operations	**3,588**	**3,290**	**3,404**	**2,878**	**2,592**

Source: FAA Enhanced Traffic Management System Counts (ETMSC)
Note: The Horizon Air fleet also includes the Bombardier CRJ700, although it is not currently utilized on scheduled operations to and from PUW.

As shown in Table 5, there were 2,592 operations by the Q400 in 2009, which exceeds the “substantial use threshold” of 500 annual itinerant operations. Because the Q400 is the only aircraft utilized at PUW by commercial air carrier operators, it is the aircraft within this key user group “that will require the longest runway length at MTOW.” Operating weights for the Q400 are presented in **Table 6**.

Table 6: Bombardier Q400 Operating Weights

Maximum Certificated Takeoff Weight (MTOW)	64,500 pounds
Maximum Certificated Landing Weight (MLW)	61,750 pounds
Operating Empty Weight (OEW)	37,887 pounds
Takeoff Weight at 90% Useful Load	61,839 pounds
Takeoff Weight at 60% Useful Load	53,855 pounds

Sources: Q400 Airport Planning Manual, 2009 Aviation Week & Space Technology Aerospace Sourcebook

The MTOW for the Q400 is 64,500 pounds, and the Q400 is considered a *Large Aircraft with a MTOW of more than 60,000 Pounds* under the AC 150/5325-4B procedure. As a result, the APM published by the aircraft manufacturer is to be consulted to determine runway length requirements.

Takeoff and landing performance charts were obtained from the Q400 APM, and are contained in **Appendix C** to this memorandum. The APM contains takeoff runway length requirement performance charts for three separate flap settings: 5 degrees, 10 degrees, and 15 degrees. Takeoff runway length requirements for the Q400 at PUW were determined for the airport elevation of 2,556 feet MSL and mean daily maximum temperature of the hottest month of 83°F, for three separate takeoff operating weights –

MTOW, takeoff weight at 90% useful load, and takeoff weight at 60% useful load – utilizing each of the flap setting performance charts contained in the APM. The results are presented in **Table 7**.

Table 7: Takeoff Runway Length Requirements for the Bombardier Q400			
Airport Elevation			2,556 feet MSL
Mean Maximum Daily Temperature of the Hottest Month			83° F
	Takeoff Runway Length Requirement at…		
Flap Setting	**MTOW**	**90% Useful Load**	**60% Useful Load**
Flaps 5°	10,000 feet	9,200 feet	6,600 feet
Flaps 10°	7,150 feet	6,700 feet	5,000 feet
Flaps 15°	6,700 feet	6,200 feet	4,600 feet

Source: Q400 Airport Planning Manual

Because they are shorter than the Q400 "payload break point" length as defined by AC 150/5325-4B, the current commercial air carrier routes at PUW are considered short haul routes. For short haul routes, AC 150/5325-4B requires that the operating takeoff weight be set to the actual operating takeoff weight for runway length requirement calculations. The actual operating takeoff weight for the Q400 varies by time of year, and by passenger and cargo load. For the purpose of this analysis, it is expected that the Q400 takes off with at least 60% useful load.

As shown in Table 7, the Q400 requires between 4,600 and 6,700 feet of runway length when taking off with 60% useful load at PUW, depending on the flap setting. The AC does not indicate which flap setting should be used for takeoff runway length requirement calculations. There is no allowable runway gradient adjustment for these takeoff lengths, because the Master Plan Study Phase I found that the optimal replacement runway alignment can be implemented with a zero effective runway gradient. As a result, no effective runway gradient adjustment is applied as part of this runway length analysis.

The Q400 APM contains un-factored landing distance performance charts for three separate flap settings: 10 degrees, 15 degrees, and 35 degrees. The charts do not specify an ambient temperature. Landing distances acquired from these charts are adjusted utilizing a landing runway length requirement chart and an operational factor of 1.67. Use of this operational factor is based on requirements in Federal Aviation Regulations (FAR) Part 121, *Operational Requirements: Domestic, Flag, and Supplemental Operations*, Section 195, which states that "no person operating a turbine engine powered transport category airplane may take off that airplane unless its weight on arrival, allowing for normal consumption of fuel and oil in flight (in accordance with the landing distance set forth in the Airplane Flight Manual for the elevation of the destination airport and the wind conditions anticipated there at the time of landing), would allow a full stop landing at the intended destination within 60 percent of the effective length of the runway."

AC 150/5325-4B requires the use of maximum certificated landing weight (MLW) for landing runway length requirements of *Large Aircraft with a MTOW of more than 60,000 Pounds*. Landing runway length requirements for the Q400 at PUW were determined for the airport elevation of 2,556 feet MSL at MLW, utilizing each of the flap setting performance charts contained in the APM. These lengths were then adjusted using the 1.67 operational factor. The results are presented in **Table 8**.

Table 8: Landing Runway Length Requirements for the Bombardier Q400	
Airport Elevation	2,556 feet MSL
Aircraft Weight	61,750 pounds (MLW)
Flap Setting	**Landing Runway Length Requirement**
Flaps 10°	5,150 feet
Flaps 15°	5,000 feet
Flaps 35°	4,600 feet

Source: Q400 Airport Planning Manual

AC 150/5325-4B provides that the landing runway length requirement is obtained from the landing chart for the highest flap setting. This results in an unadjusted landing runway length requirement of 4,600 feet for the Q400. The wet or slippery runway length adjustment is not applied in this analysis because the Q400 is not a jet aircraft.

Based on the preceding analysis, the takeoff runway length requirement for the Q400 at PUW is 6,600 feet, and the landing runway length requirement is 4,600 feet. Both of these lengths are less than PUW's existing runway length of 6,730 feet.

3.3 Part 121 Charter Operator Runway Length Requirements

Special consideration should be given to operations by Part 121 charter operators utilizing *Large Aircraft with a MTOW of more than 60,000 Pounds*. Aircraft utilized most frequently by these operators at PUW are the Airbus A319 and the Boeing 737-800. Operations by these aircraft are associated with charter flights conducted by commercial air carriers – such as Alaska Airlines and Frontier Airlines – for Washington State University (WSU) and University of Idaho (UI) athletic teams and their opponents. Annual operations by the Airbus A319 and Boeing 737-800 from 2005 through 2009 are presented in **Table 9**.

Table 9: Part 121 Charter Operations, 2005-2009

	Aircraft Operations by Year				
Aircraft	**2005**	**2006**	**2007**	**2008**	**2009**
Airbus A319	36	48	50	58	10
Boeing 737-800	0	12	0	4	32
Total Operations	**36**	**60**	**50**	**62**	**42**

Source: FAA Enhanced Traffic Management System Counts (ETMSC)

Both the Airbus A319 and the Boeing 737-800 have inadequate annual operations at PUW to exceed the "substantial use threshold" of 500 annual itinerant operations. However, according to PUW staff, the numbers of A319 and B737-800 operations shown in Table 9 represent only a small portion of the actual total operations required to accommodate athletic team movements to and from the WSU and UI campuses. Many operations are diverted to Spokane International Airport (GEG) or Lewiston-Nez Perce County Airport (LWS) due to inadequate runway length at PUW, as these operations typically require high useful load percentages. In addition, Pacific 10 Conference teams often require larger aircraft such as the Boeing 757 and Boeing 767, which cannot land at PUW due to inadequate runway length and non-standard airfield dimensions. Furthermore, football teams are large compared to other athletic squads, and often require two of these aircraft to accommodate their movements. Given the typical collegiate schedules of 13 football games and 30 basketball games for each university, approximately 224 operations would be required to accommodate movements to and from the WSU and UI campuses associated with these two sports. This estimate does not take into account potential fan charters and operations required by other athletic teams.

In December 2010, three Part 121 charter operators (Alaska Airlines, Frontier Airlines, and Allegiant Air) were contacted to assess their operational runway length requirements. A summary of this correspondence is contained in **Appendix B** to this memorandum.

Operating weights for the Airbus A319 and Boeing 737-800 are presented in **Table 10**.

Table 10: Airbus A319 and Boeing 737-800 Operating Weights

Weight Type	Airbus A319	Boeing 737-800
Maximum Certificated Takeoff Weight (MTOW)	166,500 pounds	174,200 pounds
Maximum Certificated Landing Weight (MLW)	134,500 pounds	146,300 pounds
Operating Empty Weight (OEW)	89,000 pounds	91,990 pounds
Takeoff Weight at 90% Useful Load	158,750 pounds	165,979 pounds
Takeoff Weight at 60% Useful Load	135,500 pounds	141,316 pounds

Sources: Airbus A319 Airport Planning Manual, Boeing 737 Airport Planning Manual, 2009 Aviation Week & Space Technology Aerospace Sourcebook

As shown in Table 10, the Airbus A319 and the Boeing 737-800 are *Large Aircraft with a MTOW of more than 60,000 Pounds*. As a result, the APM published by the aircraft manufacturer is to be consulted to determine runway length requirements for these aircraft. Takeoff and landing performance charts were obtained from APMs for the Airbus A319 and the Boeing 737-800, and are contained in **Appendix C** to this memorandum.

The Airbus A319 APM contains takeoff runway length requirement performance charts for two different engine types: CFM56 engines and V2500 engines. Takeoff runway length requirements for the A319 at PUW were determined for both types of engines, at the airport elevation of 2,556 feet MSL, for two separate takeoff operating weights: takeoff weight at 60% useful load and takeoff weight at 90% useful load. This analysis utilized the takeoff performance charts in the A319 APM that most closely approximate the PUW mean daily maximum temperature of the hottest month of 83°F, which are charts for standard day temperature (SDT) plus 15° Celsius (77°F). The results are presented in **Table 11**.

Table 11: Airbus A319 Takeoff Runway Length Requirements

Airport Elevation	2,556 feet MSL	
Temperature	77° F	
Engine Type	**Takeoff Length @ 60% Useful Load**	**Takeoff Length @ 90% Useful Load**
CFM56	4,200 feet	7,100 feet
V2500	4,200 feet	6,800 feet

Source: Airbus A319 Airport Planning Manual

At 60% useful load and 77°F, the Airbus A319 can take off within the existing 6,730-foot runway length at PUW, with 2,530 feet of runway length to spare. However, at 90% useful load and the same temperature, the A319 cannot take off from the existing runway because it requires between 70 and 370 additional feet of runway length, depending on engine type.

The A319 APM contains separate landing field length performance charts for CFM56 and V2500 engines, for a 35° flap setting and the SDT of 50°F. No landing performance charts are available for other flap settings or temperatures. AC 150/5325-4B requires the use of MLW for landing runway length requirements of *Large Aircraft with a MTOW of more than 60,000 Pounds*. Landing runway length requirements for the A319 at PUW were determined for both engine types at MLW, at the airport elevation of 2,556 feet MSL at MLW, at the SDT of 50°F, in both dry and wet runway conditions. The results are presented in **Table 12**.

Table 12: Airbus A319 Landing Runway Length Requirements		
Airport Elevation	2,556 feet MSL	
Temperature	50° F	
Aircraft Weight	134,500 pounds (MLW)	
Flap Setting	35°	
Engine Type	**Dry Landing Length**	**Wet Landing Length**
CFM56	4,650 feet	5,348 feet
V2500	4,800 feet	5,520 feet

Source: Airbus A319 Airport Planning Manual

As shown in Table 12, the Airbus A319 can land on the existing 6,730-foot runway length at PUW, at MLW, the SDT of 50°F, and a flap setting of 35°. Because landing field length performance charts are not available in the APM for higher temperatures, the landing performance of the A319 at mean daily maximum temperature of the hottest month is unknown.

The Boeing 737-800 APM contains takeoff runway length requirement performance charts for three different engine types: CFM56-7B24, CFM56-7B26, and CFM56-7B27. Takeoff runway length requirements for the Boeing 737-800 at PUW were determined for three types of engines, at the airport elevation of 2,556 feet MSL, and for takeoff weight at 60% useful load and takeoff weight at 90% useful load. This analysis utilized the takeoff performance charts in the Boeing 737-800 APM that most closely approximate the PUW mean daily maximum temperature of the hottest month of 83°F, which are charts for SDT plus 15° Celsius (77°F). The results are presented in **Table 13**.

Table 13: Boeing 737-800 Takeoff Runway Length Requirements		
Airport Elevation	2,556 feet MSL	
Temperature	77° F	
Engine Type	**Takeoff Length @ 60% Useful Load**	**Takeoff Length @ 90% Useful Load**
CFM56-7B24	6,400 feet	9,300 feet
CFM56-7B26	6,000 feet	8,300 feet
CFM56-7B27	5,800 feet	8,000 feet

Source: Boeing 737 Airport Planning Manual

At 60% useful load and 77°F, the Boeing 737-800 can take off within the existing 6,730-foot runway length at PUW, with between 330 and 930 feet of runway length to spare, depending on engine type. However, at 90% useful load and the same temperature, the Boeing 737-800 cannot take off within the existing 6,730-foot runway length because it requires between 1,270 and 2,570 additional feet of runway length.

The Boeing 737-800 APM contains landing runway length performance charts for three separate flap settings: 15 degrees, 30 degrees, and 40 degrees. The charts do not specify an engine type, and are only available for the SDT of 50°F. AC 150/5325-4B requires the use of MLW for landing runway length requirements of *Large Aircraft with a MTOW of more than 60,000 Pounds*. Landing runway length requirements for the Boeing 737-800 at PUW were determined for operations at the airport elevation of 2,556 feet MSL, at MLW, at the SDT of 50°F, in both dry and wet runway conditions. The results are presented in **Table 14**.

Table 14: Boeing 737-800 Landing Runway Length Requirements

Airport Elevation	2,556 feet MSL	
Temperature	50°F	
Aircraft Weight	146,300 pounds (MLW)	
Flap Setting	**Dry Landing Length**	**Wet Landing Length**
40°	5,800 feet	6,700 feet
30°	6,200 feet	7,100 feet
15°	6,600 feet	7,600 feet

Source: Boeing 737 Airport Planning Manual

As shown in Table 14, the Boeing 737-800 can land within the existing 6,730-foot runway length at PUW, at MLW, the SDT of 50°F, and a flap setting of 40°. Because landing field length performance charts are not available in the APM for higher temperatures, the landing performance of the Boeing 737-800 at mean daily maximum temperature of the hottest month is unknown.

Based on the preceding analysis, the takeoff runway length requirement for the Airbus A319 at PUW is between 6,800 and 7,100 feet at 90% useful load, and the takeoff runway length requirement for the Boeing 737-800 at PUW is between 8,000 and 9,300 feet at 90% useful load. These lengths are greater than the existing runway length of 6,730 feet at PUW. The landing runway length requirements for both the Airbus A319 and the Boeing 737-800 at the mean daily maximum temperature of the hottest month are unknown.

PUW Master Plan Study Phase II – Runway Length Requirements Technical Memorandum

Appendix D-1 / Part 121 Charter Operator Correspondence

Mead
&Hunt

Technical Memorandum

To: Kevin Mulcaster
Alan Campbell

From: Evan Barrett

Date: January 10, 2011

Subject: PUW Master Plan Study Phase II – Air Carrier Charter Correspondence Summary

Memorandum Purpose

In December 2010, inquiries were initiated with air charter staff at three commercial air carriers: Alaska Airlines, Frontier Airlines, and Allegiant Air. The purpose of these inquiries was to determine facility requirements associated with charter air carrier operations into and out of PUW, for inclusion in the Master Plan Study Phase II report. The following questions were posed to the air carrier charter staff:

- Who are your typical charter clients for trips to and from the Pullman-Moscow region?
- On average, how many takeoffs and landings does your airline conduct annually at PUW? With what type of aircraft?
- On average, how many charter flights does the airline have to divert to other airports that otherwise would land at PUW? What airports are flights diverted to, and what are the most common reasons for these diversions?
- Are the runway length and instrument approach procedures at PUW adequate for your airline's needs? How many annual operations would the airline conduct if facilities at PUW were ideal?
- Is there a runway length that the airline would consider ideal for its operations at PUW?

The following sections of this memorandum summarize air carrier responses to these inquiries.

Alaska Airlines

Three staff members at Alaska Airlines were contacted for input: the Network and Market Development Manager, the Director of Schedule Planning, and the Charter Administrator.

Typical Alaska Airlines charter clients for operations to and from the Pullman-Moscow region are Washington State University sports teams, and other inbound Pacific 10 Conference teams. In 2010, Alaska Airlines conducted 11 round-trip charter flights to and from PUW, all with the 157-seat Boeing 737-800. These round-trip flights were conducted to or from five different airports: Burbank, California (BUR); Eugene, Oregon (EUG); Phoenix, Arizona (PHX); Seattle, Washington (SEA); and San Jose, California (SJC).

The Director of Schedule Planning estimates that about 10% of charter flights to PUW are diverted to other airports. In these instances, airports in Lewiston, Idaho (LWS), and Spokane, Washington (GEG), are used as alternates. However, the Director indicates that their charter clients would rather depart from and/or arrive at PUW, because it is nearest to Washington State University. The number one cause for diversions are inadequate instrument approach procedure minimums, given prevailing weather conditions at the time of the diverted operations.

Alaska Airlines indicates that, since the most recent runway extension and subsequent upgrade of the aircraft rescue and firefighting facilities (ARFF) at PUW, PUW meets their minimum needs for runway length. However, Alaska Airlines considers an 8,500-foot length their ideal runway length at PUW, because this length would be required for the airline to bring in a full passenger load. The airline also indicates that standard Category I minimums (200-foot cloud ceiling and ½-mile visibility) would also be ideal for their operations.

Frontier Airlines

Three staff members at Frontier Airlines were contacted for input: the Charter Ground Operations Manager, a Flight Operations Engineer, and the Manager of Affiliate Planning.

Typical Frontier Airlines charter clients for operations to and from the Pullman-Moscow region are associated with college football events. On average, Frontier Airlines conducts two to four round-trip flights to and from PUW. The airline estimates that an average of one charter flight per year is diverted to LWS or GEG. Like Alaska Airlines, most diversions are due to inadequate approach procedure minimums. The Charter Ground Operations Manager specifically indicated that the cloud ceiling minimums are too high in these instances. Given internal Frontier Airlines alternate minimum operating policies and existing instrument approach procedure minimums at PUW, Frontier Airlines has to plan on landing with no less than a 1,000 foot cloud ceiling and 2 ½ statute mile visibility. Frontier Airlines is currently authorized to use only the VOR approach to Runway 5, and is not authorized to use the RNAV (GPS) approaches to Runway 5 and Runway 23.

The Flight Operations Engineer indicates that in order to travel a long distance to and from PUW (over 2 hours) when fully loaded, the current runway length at PUW requires an A319-112 with high thrust and increased weight capacity. The runway length requirements for their charter operations are heavily dependent on the load they are carrying, which is difficult to predict. The Flight Operations Engineer says that Frontier Airlines has had weight issues for operations with A319-111 aircraft from Denver International Airport (DEN) to destinations with runway lengths similar to Runway 5/23 at PUW (for example, Chicago-Midway International Airport (MDW) and LaGuardia Airport (LGA)).

Frontier Airlines indicates that the current runway length at PUW is adequate for their needs, as they currently fly to airports with similar runway lengths. However, staff contacts emphasized that operating weights and environmental conditions play a large role in the performance of their aircraft in specific situations.

Allegiant Air

Two staff members at Allegiant Air were contacted for input: the Manager of Charter Planning, and the Manager of Flight Dispatch.

Typical Allegiant Air charter clients for operations to and from the Pullman-Moscow region are University of Idaho and Washington State University sports teams, and other inbound collegiate sports teams. Although the airline has operated at PUW in the past, Allegiant Air does not currently operate at PUW. The airline recently ceased operations to PUW, and now insists to clients that they utilize LWS or GEG, for two reasons: because they cannot carry any weight out of PUW due to runway length, and the only instrument approach procedure they can use is the VOR approach to Runway 5. The Manager of Charter Planning estimates that they have between five and ten requests per year to use PUW.

The Manager of Dispatch at Allegiant indicates that the runway length at PUW is unusable by their fleet of Boeing 757 and McDonnell Douglas MD-80 series aircraft with any payload. His flight operations engineer analyzed the operating environment at PUW and found that, without removing or changing the obstructions to either end of Runway 5/23, the airline's ideal runway length would be 9,500 feet. However, a realignment of the runway would change the obstructions and alter this runway length analysis. The engineer also indicated that the slope of Runway 5/23 also requires additional runway length.

The Manager of Dispatch also indicates that operations to and from PUW are not viable due to the lack of a precision approach with lower minimums, in combination with the aeronautical impacts of terrain surrounding the airport. Without adding a precision approach with lower minimums, no runway length will be adequate for operations by the current Allegiant Air fleet at PUW.

Summary

The results of correspondence with air carrier charter staff are summarized in Table 1. Alaska Airlines, Frontier Airlines, and Allegiant Air all reported that charter flights to and from PUW are diverted to other airports due to inadequate facilities at PUW. Although Alaska Airlines and Frontier Airlines report that the existing runway length at PUW is adequate for their needs, they do indicate that they must carefully manage their operating weights and cannot operate fully loaded within the existing runway length. Allegiant Air no longer conducts operations at PUW due to inadequate runway length and approach procedures. All three airlines reported that the existing approach procedure minimums are too restrictive in many operational scenarios.

Table: PUW Air Carrier Charter Correspondence Summary

Air Carrier	Average Annual Round-Trip Flights	Average Annual Diverted Flights	Is Runway Length Adequate?	Ideal Runway Length	Are Approach Procedures Adequate?
Alaska Airlines	11	1 to 2	Yes	8,500 feet	No
Frontier Airlines	2 to 4	1	Yes	Not given	No
Allegiant Air	0	5 to 10	No	9,500 feet	No

From: Mike McQueen <Mike.McQueen@AlaskaAir.com>
Sent: Tuesday, December 28, 2010 4:53 PM
To: Evan Barrett
Cc: Clint Ostler
Subject: Re: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Clint is right, operationally for Horizon Air the weather coupled with the high landing minimums has a much greater impact on Alaska Air group. Alaska Airlines charters are a very small portion of the business. I have answered your questions from an Alaska Airlines standpoint, not Horizon Air.
Mike McQ

Clint Ostler on Tuesday, December 28, 2010 at 9:11 AM -0800 wrote:
>Hi Evan,
>
>This is a big concern for us on the scheduled side of the operation as
>well, which admittedly has a bigger impact than the smaller charter
>operations. I copied in Mike McQueen, Director of Schedule Planning
>for Alaska and Horizon to help answer some of your questions (or direct
>to the appropriate flight ops contact).
>
>Best Regards,
>
>Clint Ostler
>Manager - Network & Market Development
>Alaska Air Group
>(206) 392-5511
>
>Evan Barrett <Evan.Barrett@meadhunt.com> on Monday, December 27, 2010
>at 11:47 AM -0800 wrote:
>Mr. Ostler,
>
>I am contacting you to ask for your assistance related to some planning
>work we are conducting for Pullman-Moscow Regional Airport (PUW) in Pullman, WA.
>It has come to our attention that Alaska Airlines conducts charter
>flights for athletic teams associated with sporting events involving
>either Washington State University in Pullman, and/or University of
>Idaho in Moscow. However, the airport manager has indicated that many
>of these flights may be diverted to either Spokane (GEG) or Lewiston
>(LWS) due to inclement weather and/or inadequate facilities at PUW.
>
>The airport needs your help to identify the facility needs of Alaska Airlines.
> This will allow the airport to pursue appropriate future capital
>improvements – such as an extended runway or new instrument approach
>procedures. Please take a few moments to consider the following questions.
>
>1. Who are Alaska Airlines' typical charter clients for trips to and
>from the Pullman-Moscow region?
WSU sports teams as well as other Pac-10 inbound teams.
>
>

>2. On average, how many takeoffs and landings does Alaska Airlines
>conduct annually at PUW? With what type of aircraft?
Here are the charter departures for 2010 along with destinations, all with a
B737-800 with 157 seats.

Dept Sta	Arvl Sta	Total Departure
PUW	BUR	1
PUW	EUG	1
PUW	PHX	1
PUW	SEA	7
PUW	SJC	1
		11

>
>3. On average, how many charter flights does Alaska Airlines have to
>divert to other airports that otherwise would land at PUW? Where are
>the aircraft diverted to, and what are the most common reasons for
>these diversions?
I don't have actual stats on diversions, but would estimate about 10%. We generally use LWS or GEG as the alternate airport. The schools would rather depart/arrive in PUW because it is nearest to WSU. Below landing minimums due to weather is the number 1 cause for diversions.
>
>
>4. Are the runway length and instrument approach procedures at PUW
>adequate for Alaska Airlines' needs? How many annual operations would
>Alaska Airlines conduct if the facilities at PUW were ideal?
Since the last runway extension and subsequent upgrade of CFR, PUW meets our minimum needs. So no increase in operations.
>
>
>5. Is there a runway length that Alaska Airlines would consider ideal
>for its operations at PUW?
8500ft to carry a full passenger load with approach mins of 200-1/2.
>
>
>Let me know if you have any questions or comments. Thank you!
>
>R. Evan Barrett | Planner, Aviation Services Mead & Hunt, Inc | M & H
>Architecture, Inc | 7900 West 78th Street, Suite 370
>| Minneapolis, MN 55439
>Main: 952-941-5619 | Mobile: 612-597-4262 | Direct: 952-641-8820 [
>mailto:evan.barrett@meadhunt.com]evan.barrett@meadhunt.com | [
>http://www.meadhunt.com]www.meadhunt.com
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From: Carlson, Joshua G. <Joshua.Carlson@flyfrontier.com>
Sent: Tuesday, December 28, 2010 11:11 AM
To: Meyers, Michael
Cc: Evan Barrett
Subject: RE: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Hi Mike and Evan,
I have answered the remaining questions. Please let me know if you have any questions and if needed I can run a full airport analysis if it looks like we will be operating in and out of PUW.

Thank you!

Joshua G. Carlson
SOC Shift Manager
Flight Operations Engineer
317-471-2670 x1 SOC Desk
317-471-2523 FE Desk

FRONTIER AIRLINES
8900 Purdue Rd. Suite 401
Indianapolis, IN 46268
317-471-2670 x1 Office Phone

Have you checked your TFR's today?
http://tfr.faa.gov/tfr2/list.html

From: Meyers, Michael
Sent: Monday, December 27, 2010 3:48 PM
To: Carlson, Joshua G.
Cc: 'Evan.Barrett@meadhunt.com'
Subject: FW: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Josh,
Can you answer some of the questions like (3-4-5) below please? Please see my notes below and then send it to Evan Barrett

Thanks
Mike

From: Evan Barrett [mailto:Evan.Barrett@meadhunt.com]
Sent: Monday, December 27, 2010 12:52 PM
To: Meyers, Michael
Subject: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Mr. Meyers,

I am contacting you to ask for your assistance related to some planning work we are conducting for Pullman-Moscow Regional Airport (PUW) in Pullman, WA. It has come to our attention that Frontier Airlines conducts charter flights for athletic teams associated with sporting events involving either Washington State University in Pullman, and/or University of Idaho in Moscow. However, the airport manager has indicated that many of these flights may be diverted to either Spokane (GEG) or Lewiston (LWS) due to inclement weather and/or inadequate facilities at PUW.

The airport needs your help to identify the facility needs of Frontier Airlines. This will allow the airport to pursue appropriate future capital improvements – such as an extended runway or new instrument approach procedures. Please take a few moments to consider the following questions.

1. Who are Frontier Airlines' typical charter clients for trips to and from the Pullman-Moscow region?***[Meyers, Michael]*** football charters

2. On average, how many takeoffs and landings does Frontier Airlines conduct annually at PUW? With what type of aircraft?***[Meyers, Michael]*** 2-4 per year

3. On average, how many charter flights does Frontier Airlines have to divert to other airports that otherwise would land at PUW? Where are the aircraft diverted to, and what are the most common reasons for these diversions?***[Meyers, Michael]*** 1 per year. Due to low ceiling. **[Carlson, Joshua]** Agreed. Most diversions are due to weather.

4. Are the runway length and instrument approach procedures at PUW adequate for Frontier Airlines' needs? How many annual operations would Frontier Airlines conduct if the facilities at PUW were ideal? **[Carlson, Joshua]** The runway length being below 7,000 ft would most likely require a A319-112 with the high thrust and increased weight capacity if the aircraft were to be fully loaded and traveling a long distance (over 2 hours) away from PUW. This all depends on the load. Just using MDW and LGA as example of similar runways, using the 319-111 we have had weight issues out of these airports back to DEN. This is all based on load and environmental conditions. The VOR approach requires a 600ft. ceiling and 1 ½ sm visibility for destination planning. If we were using PUW as an alternate we would have to plan to land with no less than a 1000ft ceiling and 2 ½ sm per our alternate minimum rules (ops specs). Once we did change the alternate to our destination in an actual diversion, we would be bound by the destination minimums. Frontier is currently not authorized to conduct the two GPS/RNAV approaches installed at PUW. Once we gain that approval, these will help us with flying to lower minimums.

5. Is there a runway length that Frontier Airlines would consider ideal for its operations at PUW? **[Carlson, Joshua]** The current runway length is adequate as we fly to airports with similar length. The load and environmental conditions will play a large role in how the aircraft performs. I would recommend, depending on those conditions that we use a 319-112 when flying out of PUW with payload.

Let me know if you have any questions or comments. Thank you!

R. Evan Barrett | Planner, Aviation Services
Mead & Hunt, Inc | M & H Architecture, Inc | 7900 West 78th Street, Suite 370 | Minneapolis, MN 55439
Main: 952-941-5619 | Mobile: 612-597-4262 | Direct: 952-641-8820
evan.barrett@meadhunt.com | www.meadhunt.com

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---

From: Robert.Neal@allegiantair.com
Sent: Tuesday, December 28, 2010 12:59 PM
To: Evan Barrett
Subject: Re: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Hi Evan,

I am requesting some information from our Dispatch team in order to properly answer your questions. In the meantime, here is the information I have at hand:

1. Typical charter clients are U Idaho or Washington State University. Often times we have requests to bring other teams into PUW for events at either University of Idaho or Washington State.

2. Currently, we conduct no annual operations, as we ask customers to use LWS or GEG.

3. There really aren't any diversions because we don't agree to operate to PUW any longer. We insist that charter groups use LWS or GEG. We have about 5-10 requests per year to use PUW.

Once I have the other questions answered, I'll forward more information on to you.

Thank you for your patience.

Best,

Robert Neal
Manager, Charter Planning
Allegiant Travel Company
8360 S. Durango Drive
Las Vegas, NV 89113
Direct: 702.851.7384
Fax: 702.719.8120
robert.neal@allegiantair.com
www.allegiant.com

▾ Evan Barrett ---12/27/2010 11:54:07 AM---Mr. Neal, I am contacting you to ask for your assistance related to some planning work we are conduc

From: Evan Barrett <Evan.Barrett@meadhunt.com>
To: "robert.neal@allegiantair.com" <robert.neal@allegiantair.com>
Date: 12/27/2010 11:54 AM
Subject: Charter Flights to Pullman-Moscow Regional Airport (PUW)

Mr. Neal,

I am contacting you to ask for your assistance related to some planning work we are conducting for Pullman-Moscow Regional Airport (PUW) in Pullman, WA. It has come to our attention that Allegiant Air conducts charter flights for athletic teams associated with sporting events involving either Washington State University in Pullman, and/or University of Idaho in Moscow. However, the airport manager has indicated that many of these flights may be diverted to either Spokane (GEG) or Lewiston (LWS) due to inclement weather and/or inadequate facilities at PUW.

The airport needs your help to identify the facility needs of Allegiant Air. This will allow the airport to pursue appropriate future capital improvements – such as an extended runway or new instrument approach procedures. Please take a few moments to consider the following questions.

1. Who are Allegiant Air's typical charter clients for trips to and from the Pullman-Moscow region?
2. On average, how many takeoffs and landings does Allegiant Air conduct annually at PUW? With what type of aircraft?
3. On average, how many charter flights does Allegiant Air have to divert to other airports that otherwise would land at PUW? Where are the aircraft diverted to, and what are the most common reasons for these diversions?
4. Are the runway length and instrument approach procedures at PUW adequate for Allegiant Air's needs? How many annual operations would Allegiant Air conduct if the facilities at PUW were ideal?
5. Is there a runway length that Allegiant Air would consider ideal for its operations at PUW?

Let me know if you have any questions or comments. Thank you!

R. Evan Barrett | Planner, Aviation Services
Mead & Hunt, Inc | M & H Architecture, Inc | 7900 West 78th Street, Suite 370 | Minneapolis, MN 55439
Main: 952-941-5619 | Mobile: 612-597-4262 | Direct: 952-641-8820
evan.barrett@meadhunt.com | www.meadhunt.com

Evan Barrett

From: Tom.Donaldson@allegiantair.com
Sent: Tuesday, December 28, 2010 4:37 PM
To: Evan Barrett
Cc: Robert.Neal@allegiantair.com; casey.hanrahan@allegiantair.com
Subject: RE: PUW Airport

Evan,

I had my engineer run the numbers. Without removing or changing the obstructions due to not knowing which end of the runway you would extend we would require 9500'.

If you realign the runway that would change the obstructions and alter the numbers, basically an unknown at this point. You should also consider reducing the slope as well.

Tom Donaldson, Manager of Dispatch
Allegiant Travel Company
8360 S. Durango Drive, Las Vegas, NV 89113
Direct: 702.853.4628 | Fax: 702.914.9582
Cell: 702.306.4696
tom.donaldson@allegiantair.com | www.allegiant.com

Evan Barrett ---12/28/2010 01:23:05 PM---Tom, Your consideration of my questions is greatly appreciated.

From: Evan Barrett <Evan.Barrett@meadhunt.com>
To: "tom.donaldson@allegiantair.com" <tom.donaldson@allegiantair.com>
Cc: "Robert.Neal@allegiantair.com" <Robert.Neal@allegiantair.com>
Date: 12/28/2010 01:23 PM
Subject: RE: PUW Airport

Tom,

Your consideration of my questions is greatly appreciated.

The Airport is currently planning for a new runway alignment that will allow for precision approach minimums (200 ft and ½ mile). When the runway is realigned and the precision approach is in place, what length would be ideal to support your aircraft?

R. Evan Barrett | Planner, Aviation Services
Mead & Hunt, Inc | M & H Architecture, Inc | 7900 West 78th Street, Suite 370 | Minneapolis, MN 55439
Main: 952-941-5619 | Mobile: 612-597-4262 | Direct: 952-641-8820
evan.barrett@meadhunt.com | www.meadhunt.com

From: Robert.Neal@allegiantair.com [mailto:Robert.Neal@allegiantair.com]
Sent: Tuesday, December 28, 2010 1:58 PM

To: Evan Barrett
Subject: Fw: PUW Airport

Evan,

Please see answers below from Tom Donaldson, our Manager of Dispatch.

Thanks!

Robert Neal
Manager, Charter Planning
Allegiant Travel Company
8360 S. Durango Drive
Las Vegas, NV 89113
Direct: 702.851.7384
Fax: 702.719.8120
robert.neal@allegiantair.com
www.allegiant.com

----- Forwarded by Robert Neal/allegiantair on 12/28/2010 11:56 AM -----

From: Tom Donaldson/allegiantair
To: Robert Neal/allegiantair@allegiantair
Cc: Casey Hanrahan/allegiantair@allegiantair
Date: 12/28/2010 11:51 AM
Subject: Re: PUW Airport

BJ,

Nothing has changed since 2009 when we went through this exercise. We cannot carry any weight out of PUW and there is only a VOR approach that we can use.

Question answers;

1)What is the most common reason Allegiant would decide against using PUW airport?

- Unusable runway length to carry payload & only a non-precision approach (high minimums) with consideration to surrounding terrain.

2)Are the runway length and instrument approach procedures at PUW adequate for Allegiant's needs?

- No

3)Is there are runway length that Allegiant Air would consider ideal for it's operations?

- Not without adding a precision approach.

Tom Donaldson, Manager of Dispatch
Allegiant Travel Company
8360 S. Durango Drive, Las Vegas, NV 89113
Direct: 702.853.4628 | Fax: 702.914.9582
Cell: 702.306.4696

tom.donaldson@allegiantair.com | www.allegiant.com

Robert Neal---12/28/2010 10:54:42 AM---Case/Tom, Pullman Regional Airport is asking the following questions as they are working to expand

From: Robert Neal/allegiantair
To: Casey Hanrahan/allegiantair@allegiantair, Tom Donaldson/allegiantair@allegiantair
Date: 12/28/2010 10:54 AM
Subject: PUW Airport

Case/Tom,

Pullman Regional Airport is asking the following questions as they are working to expand the runway, or other necessary facilities in order to become a candidate for Allegiant charter operations. Can you assist with the information below?

1. What is the most common reason Allegiant would decide against using PUW airport?

2. Are the runway length and instrument approach procedures at PUW adequate for Allegiant's needs?

3. Is there are runway length that Allegiant Air would consider ideal for it's operations?

Thank you for your help.

-BJ

Robert Neal
Manager, Charter Planning
Allegiant Travel Company
8360 S. Durango Drive
Las Vegas, NV 89113
Direct: 702.851.7384
Fax: 702.719.8120
robert.neal@allegiantair.com
www.allegiant.com

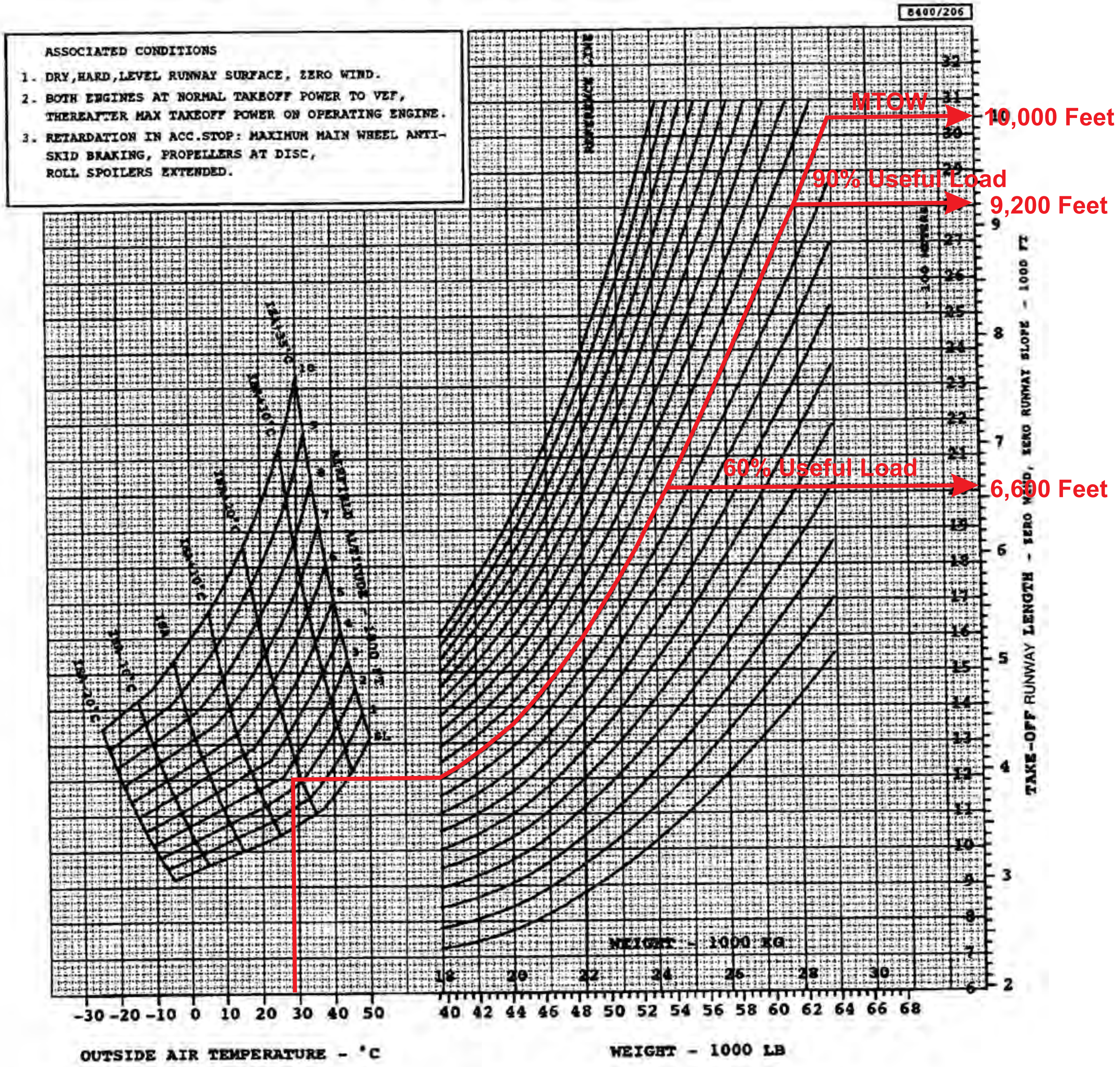
Appendix D-2 / Performance Charts for the Bombardier Q400, the Airbus A319, and the Boeing 737-800

Exhibit C-1: Bombardier Q400 Takeoff Length Requirements (Flaps 5)

Q400 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL

TAKE-OFF FIELD LENGTH - FLAP 5°



ASSOCIATED CONDITIONS

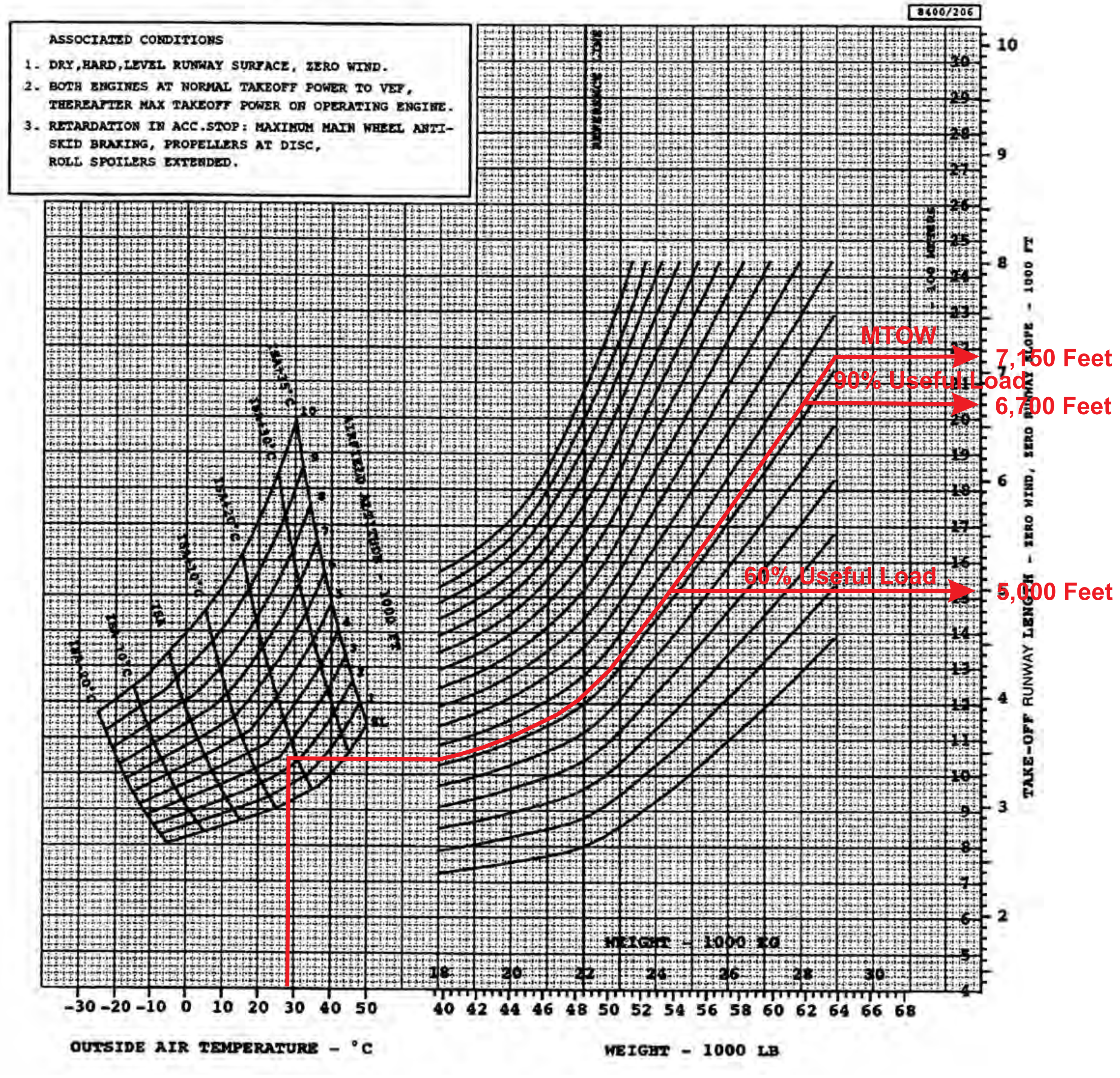
1. DRY,HARD,LEVEL RUNWAY SURFACE, ZERO WIND.
2. BOTH ENGINES AT NORMAL TAKEOFF POWER TO VEF, THEREAFTER MAX TAKEOFF POWER ON OPERATING ENGINE.
3. RETARDATION IN ACC.STOP: MAXIMUM MAIN WHEEL ANTI-SKID BRAKING, PROPELLERS AT DISC, ROLL SPOILERS EXTENDED.

Exhibit C-2: Bombardier Q400 Takeoff Length Requirements (Flaps 10)

Q400 The Quiet One

AIRPORT PLANNING MANUAL

TAKE-OFF FIELD LENGTH - FLAP 10°



ASSOCIATED CONDITIONS

1. DRY, HARD, LEVEL RUNWAY SURFACE, ZERO WIND.
2. BOTH ENGINES AT NORMAL TAKEOFF POWER TO VEF, THEREAFTER MAX TAKEOFF POWER ON OPERATING ENGINE.
3. RETARDATION IN ACC.STOP: MAXIMUM MAIN WHEEL ANTI-SKID BRAKING, PROPELLERS AT DISC, ROLL SPOILERS EXTENDED.

Exhibit C-3: Bombardier Q400 Takeoff Length Requirements (Flaps 15)

Q400 The Quiet One

AIRPORT PLANNING MANUAL

TAKE-OFF FIELD LENGTH - FLAP 15°

ASSOCIATED CONDITIONS

1. DRY, HARD, LEVEL RUNWAY SURFACE, ZERO WIND.
2. BOTH ENGINES AT NORMAL TAKEOFF POWER TO VEF, THEREAFTER MAX TAKEOFF POWER ON OPERATING ENGINE.
3. RETARDATION IN ACC.STOP: MAXIMUM MAIN WHEEL ANTI-SKID BRAKING, PROPELLERS AT DISC, ROLL SPOILERS EXTENDED.

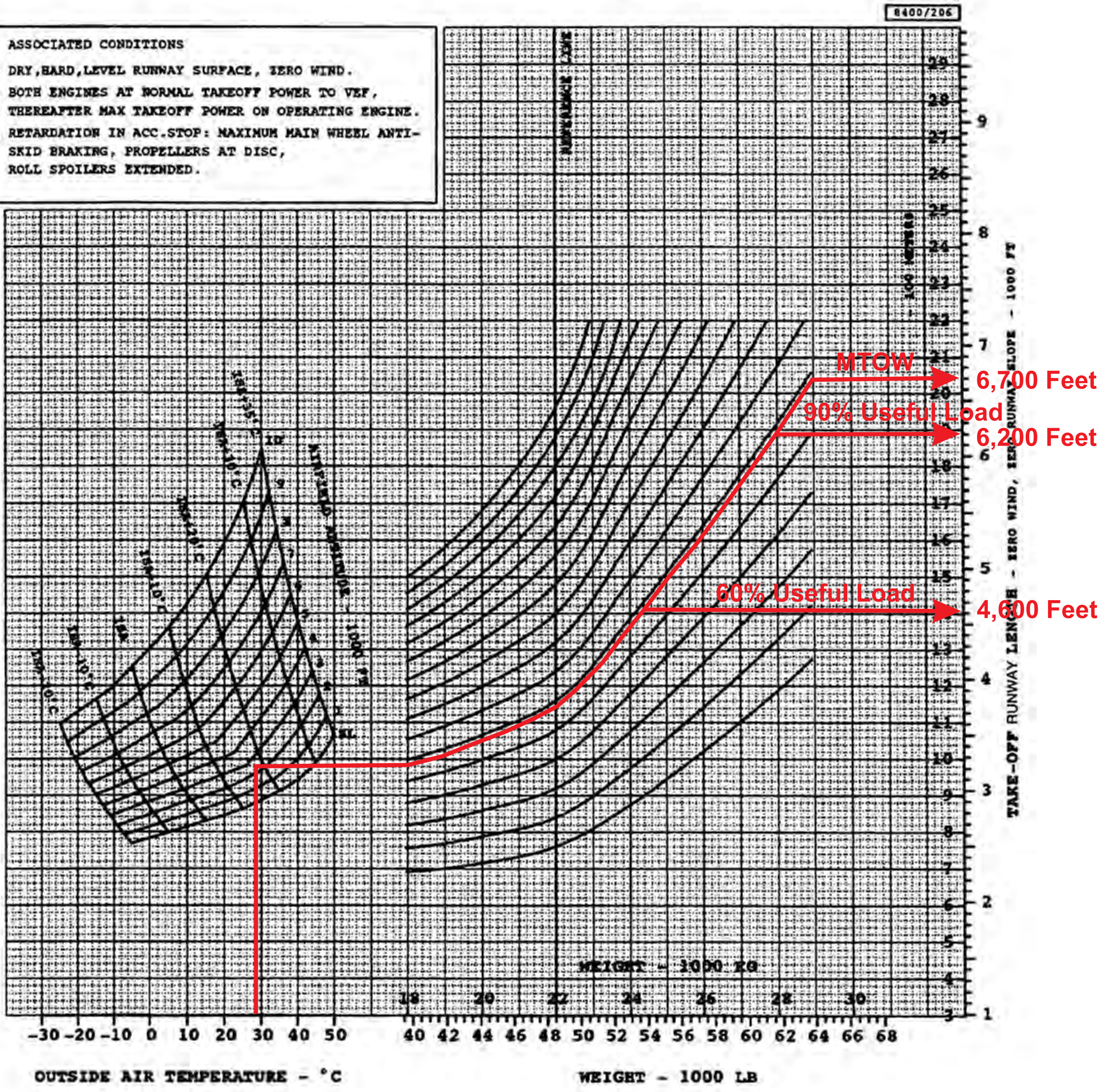


Exhibit C-4: Bombardier Q400 Unfactored Landing Distance (Flaps 10)

Q400 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL

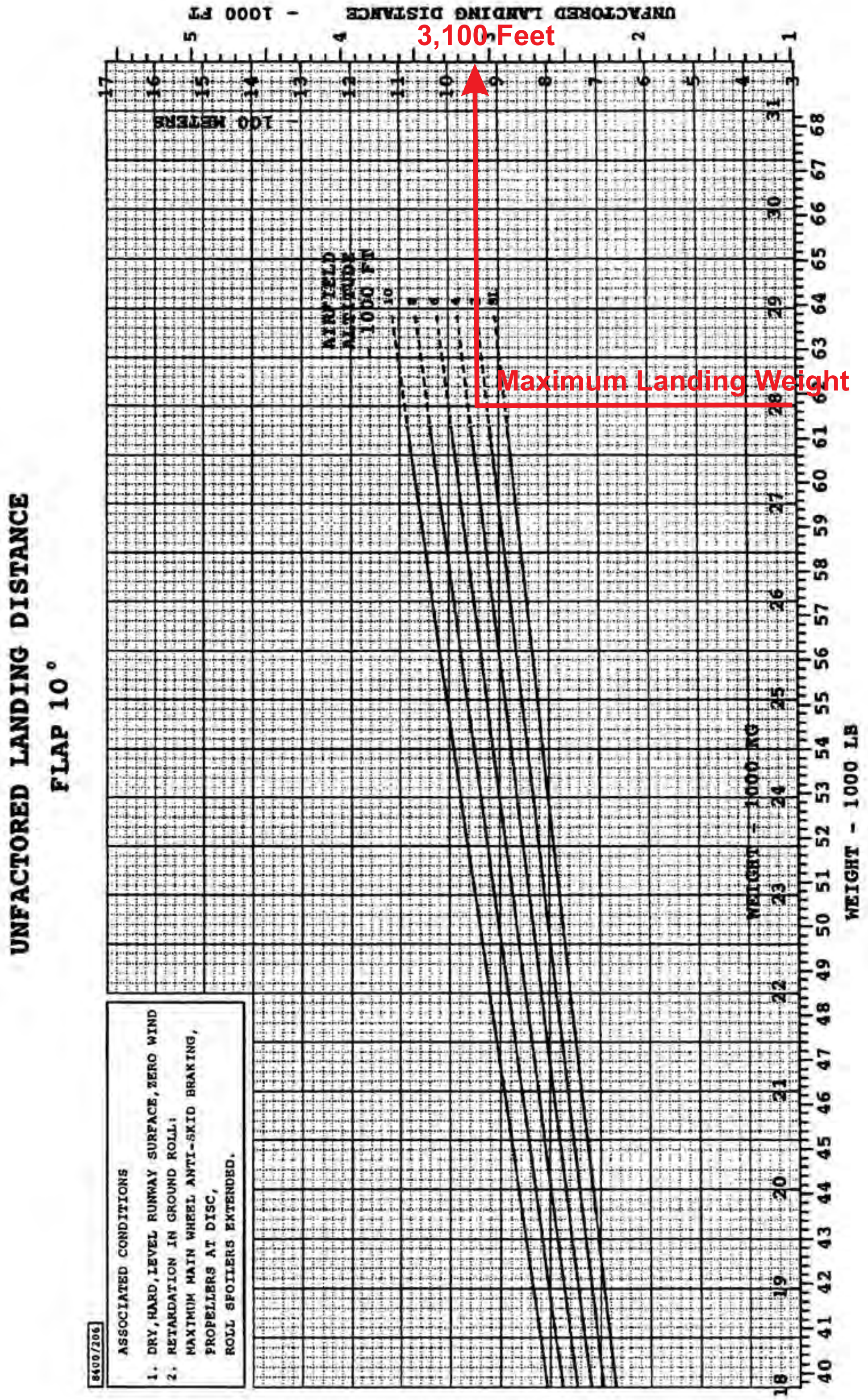
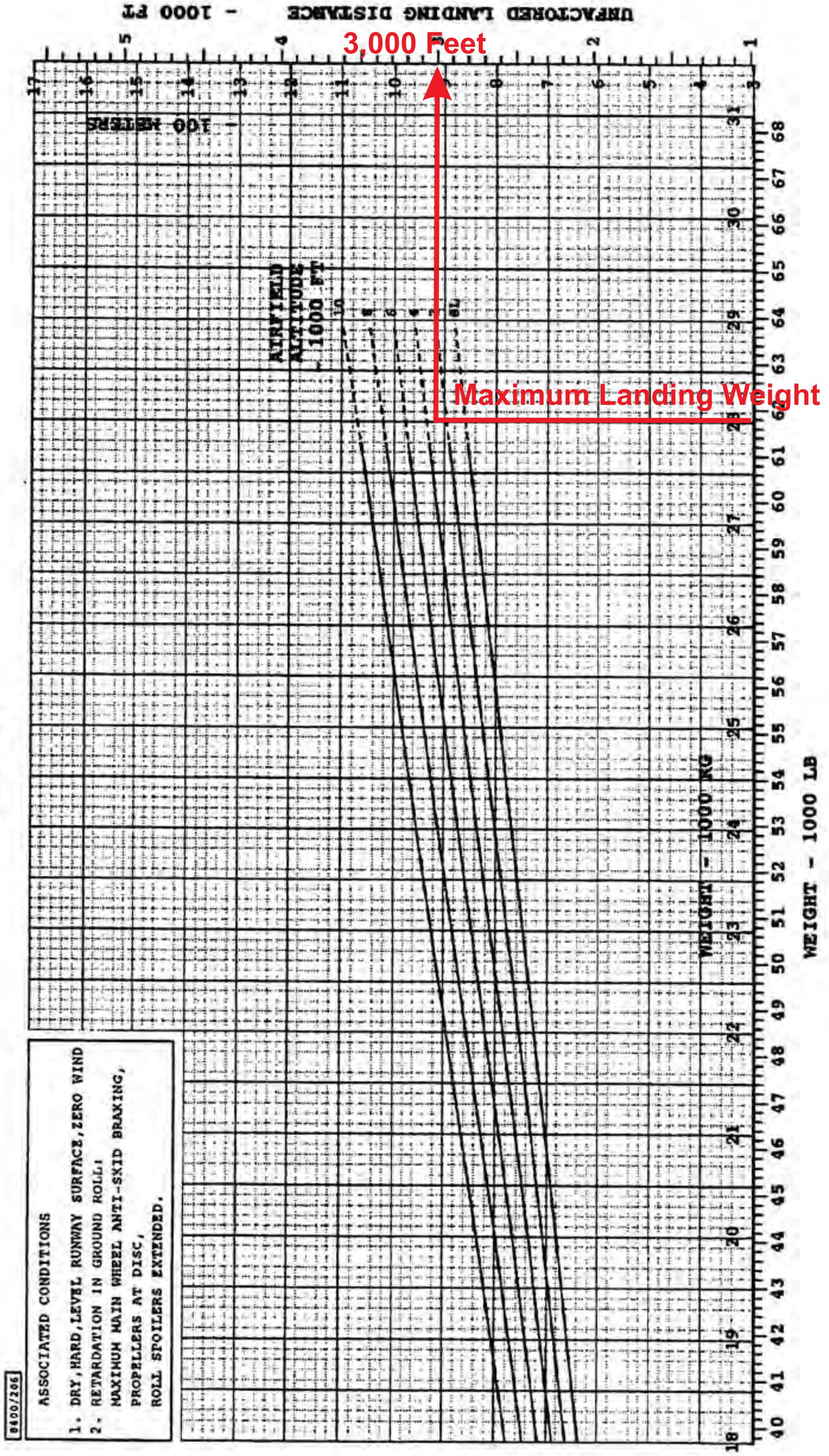


Exhibit C-5: Bombardier Q400 Unfactored Landing Distance (Flaps 15)

Q400 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL



UNFACTORED LANDING DISTANCE
FLAP 15°

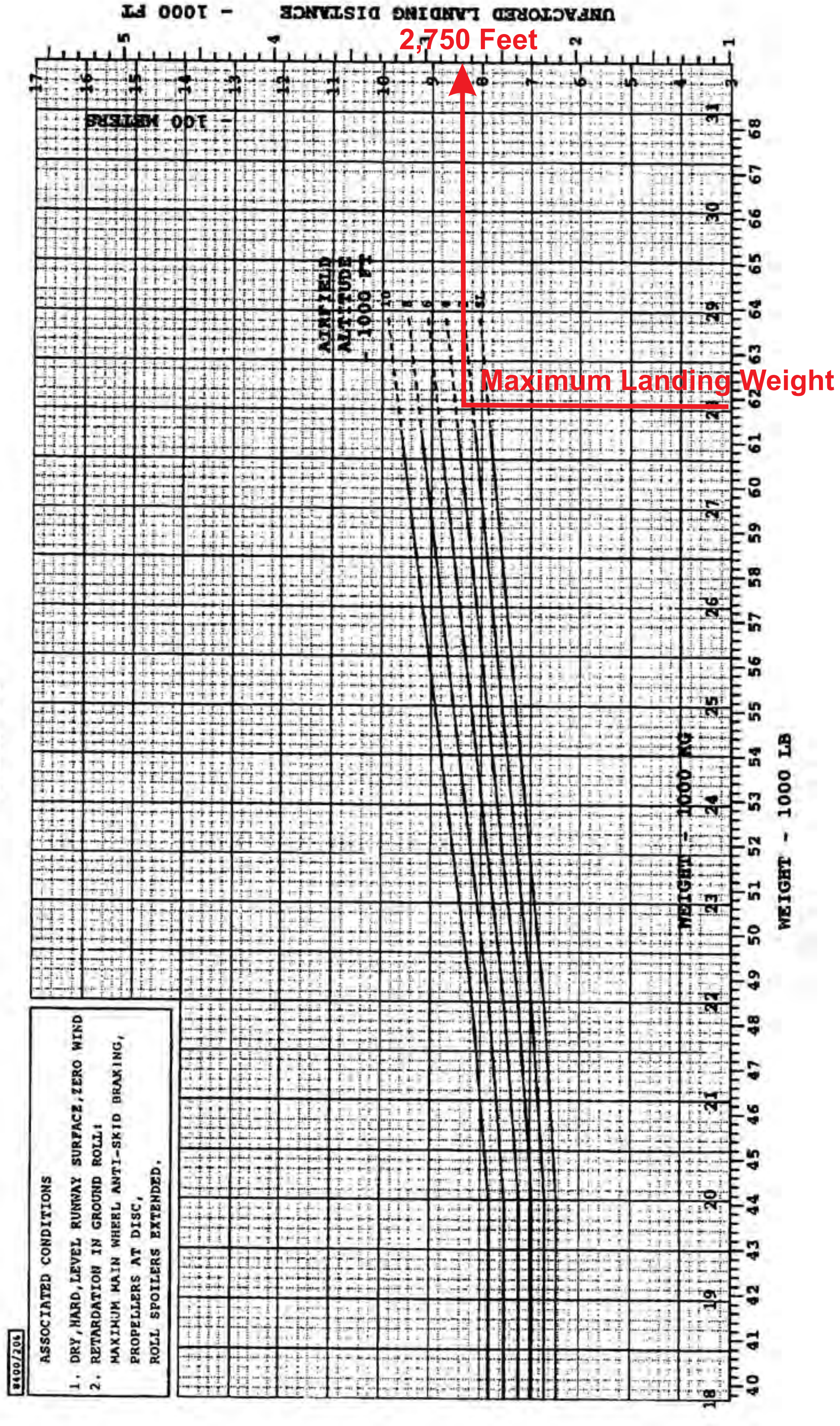
ASSOCIATED CONDITIONS

1. DRY, HARD, LEVEL RUNWAY SURFACE, ZERO WIND
2. RETARDATION IN GROUND ROLL: MAXIMUM MAIN WHEEL ANTI-SKID BRAKING, PROPELLERS AT DISC, ROLL SPOILERS EXTENDED.

Exhibit C-6: Bombardier Q400 Unfactored Landing Distance (Flaps 35)

Q400 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL



UNFACTORED LANDING DISTANCE
FLAP 35°

Q400/206

ASSOCIATED CONDITIONS

1. DRY, HARD, LEVEL RUNWAY SURFACE, ZERO WIND
2. RETARDATION IN GROUND ROLL:
MAXIMUM MAIN WHEEL ANTI-SKID BRAKING,
PROPELLERS AT DISC,
ROLL SPOILERS EXTENDED.

Exhibit C-7: Bombardier Q400 Landing Length Requirements

Q400 DASH 8
The Quiet One

AIRPORT PLANNING MANUAL

LANDING RUNWAY LENGTH REQUIRED

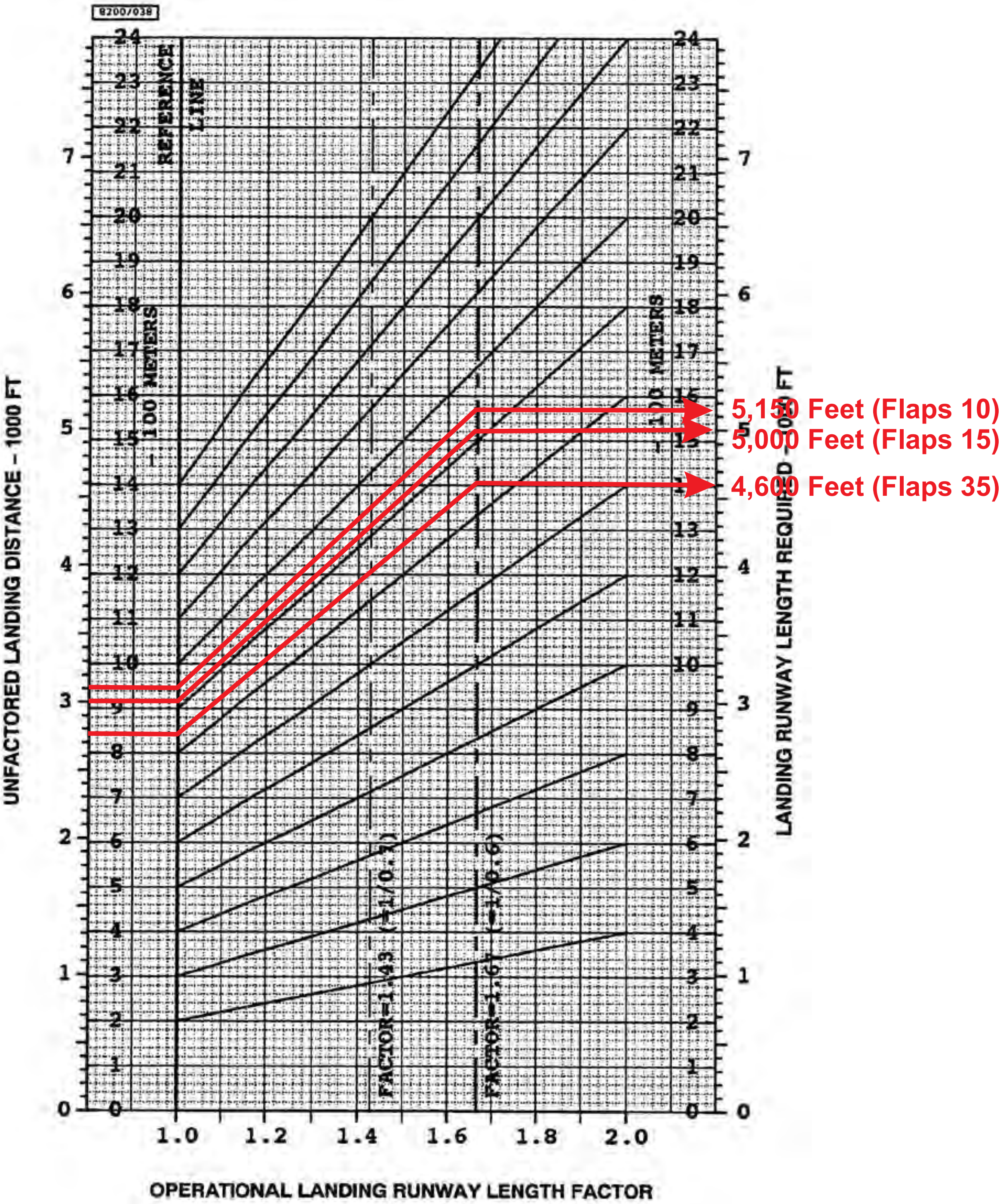
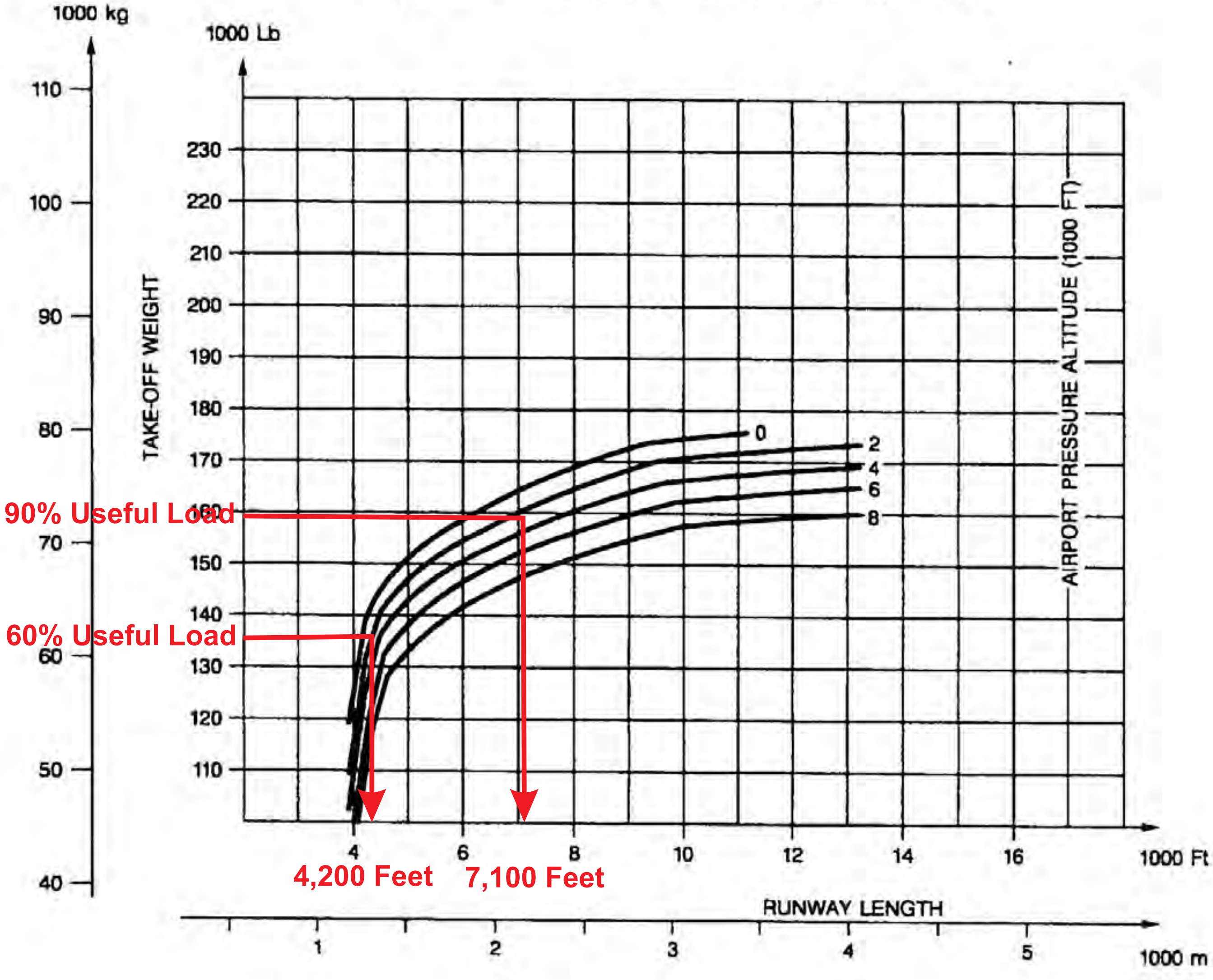


Exhibit C-8: Airbus A319 Takeoff Length Requirements (CFM56 Engines)

A319

AIRPLANE CHARACTERISTICS

NOTE : THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT



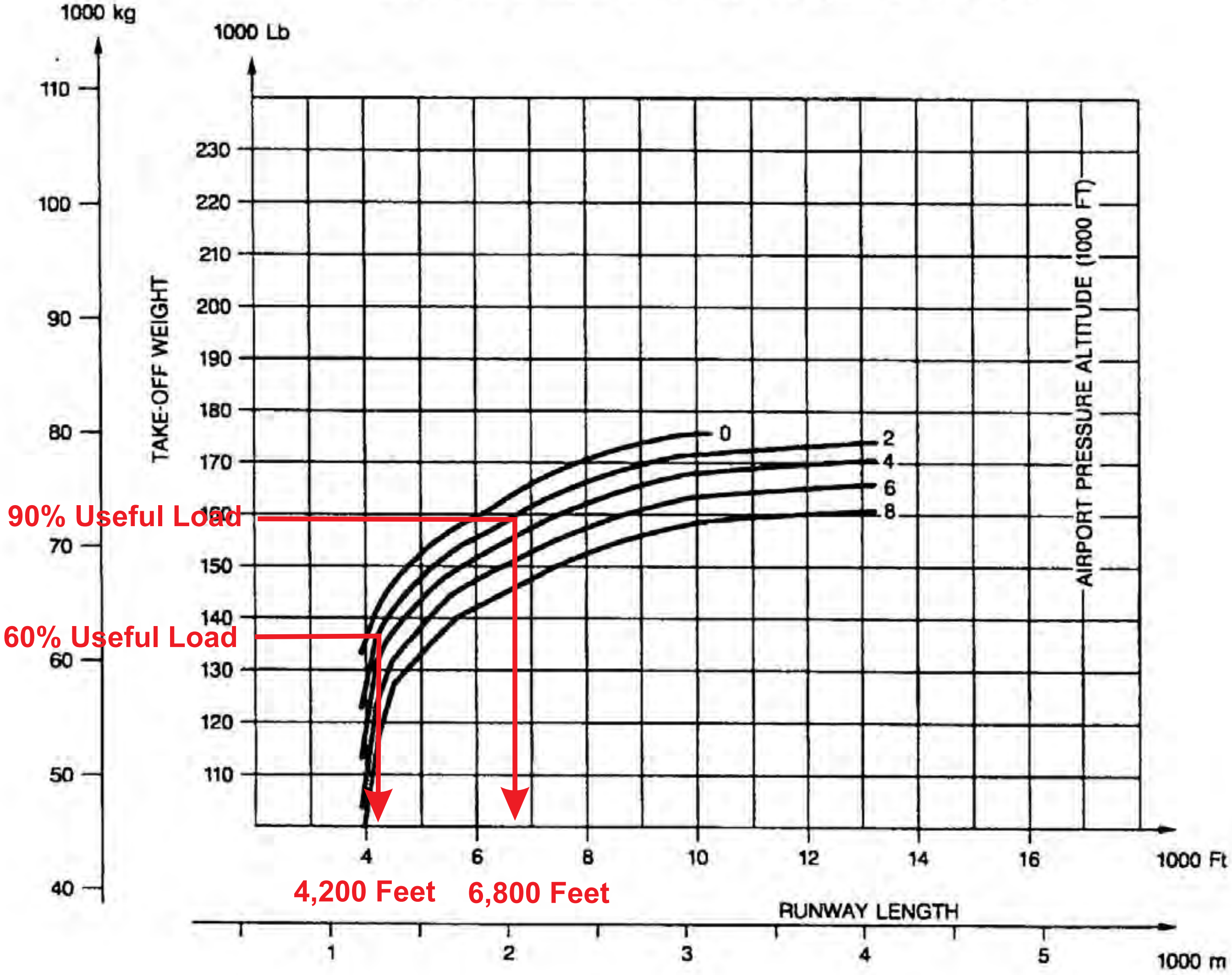
F.A.R./J.A.R. Take-off Weight Limitation
ISA +15°C (27°F)
CFM56 Engines

Exhibit C-9: Airbus A319 Takeoff Length Requirements (V2500 Engines)

A319

AIRPLANE CHARACTERISTICS

NOTE : THESE CURVES ARE GIVEN FOR INFORMATION ONLY
THE APPROVED VALUES ARE STATED IN THE "OPERATING MANUALS" SPECIFIC TO THE AIRLINE OPERATING THE AIRCRAFT

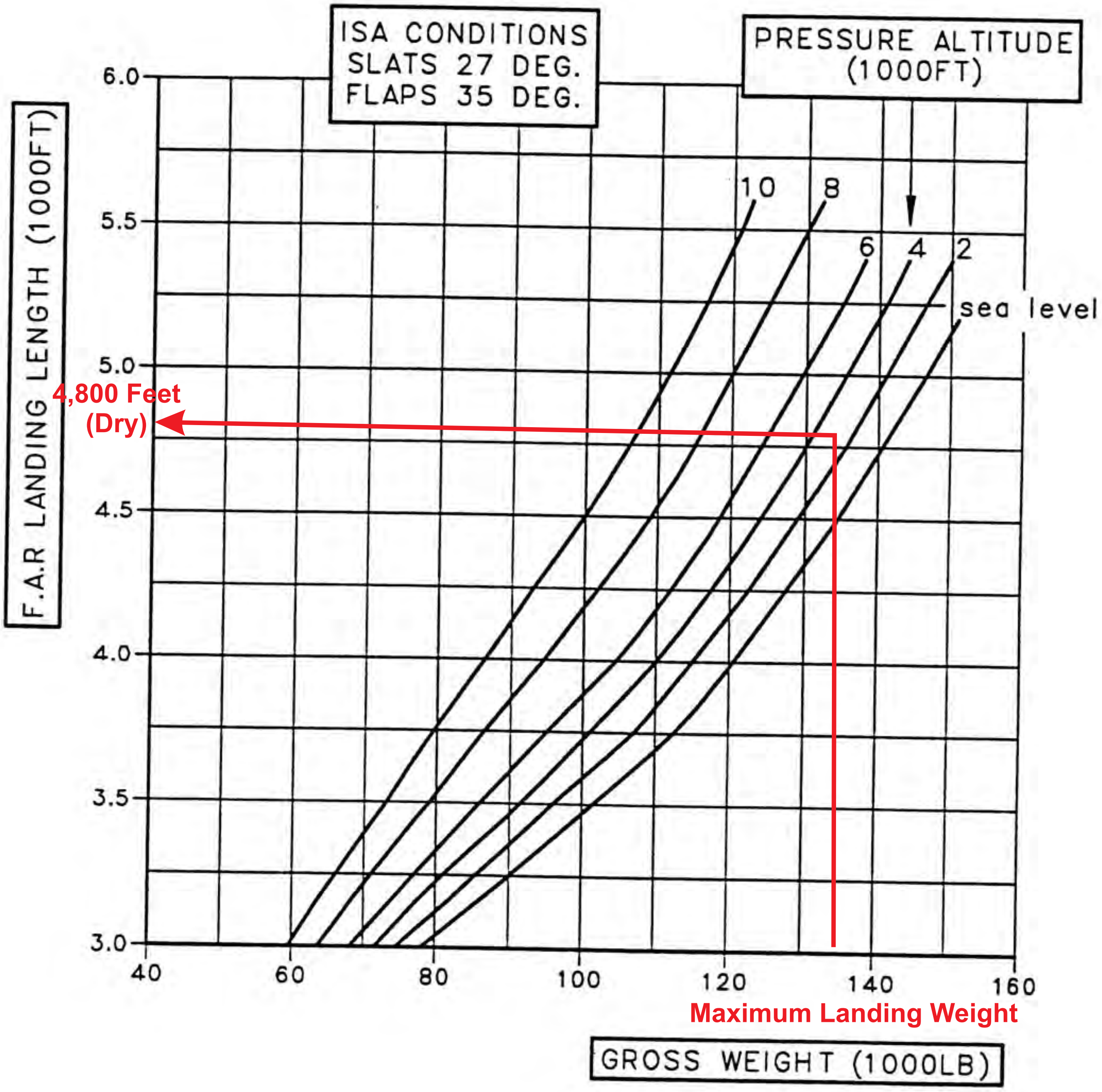


F.A.R./J.A.R. Take-off Weight Limitation
ISA +15°C (27°F)
V2500 Engines

Exhibit C-10: Airbus A319 Landing Length Requirements (CFM56 Engines)

A319

AIRPLANE CHARACTERISTICS

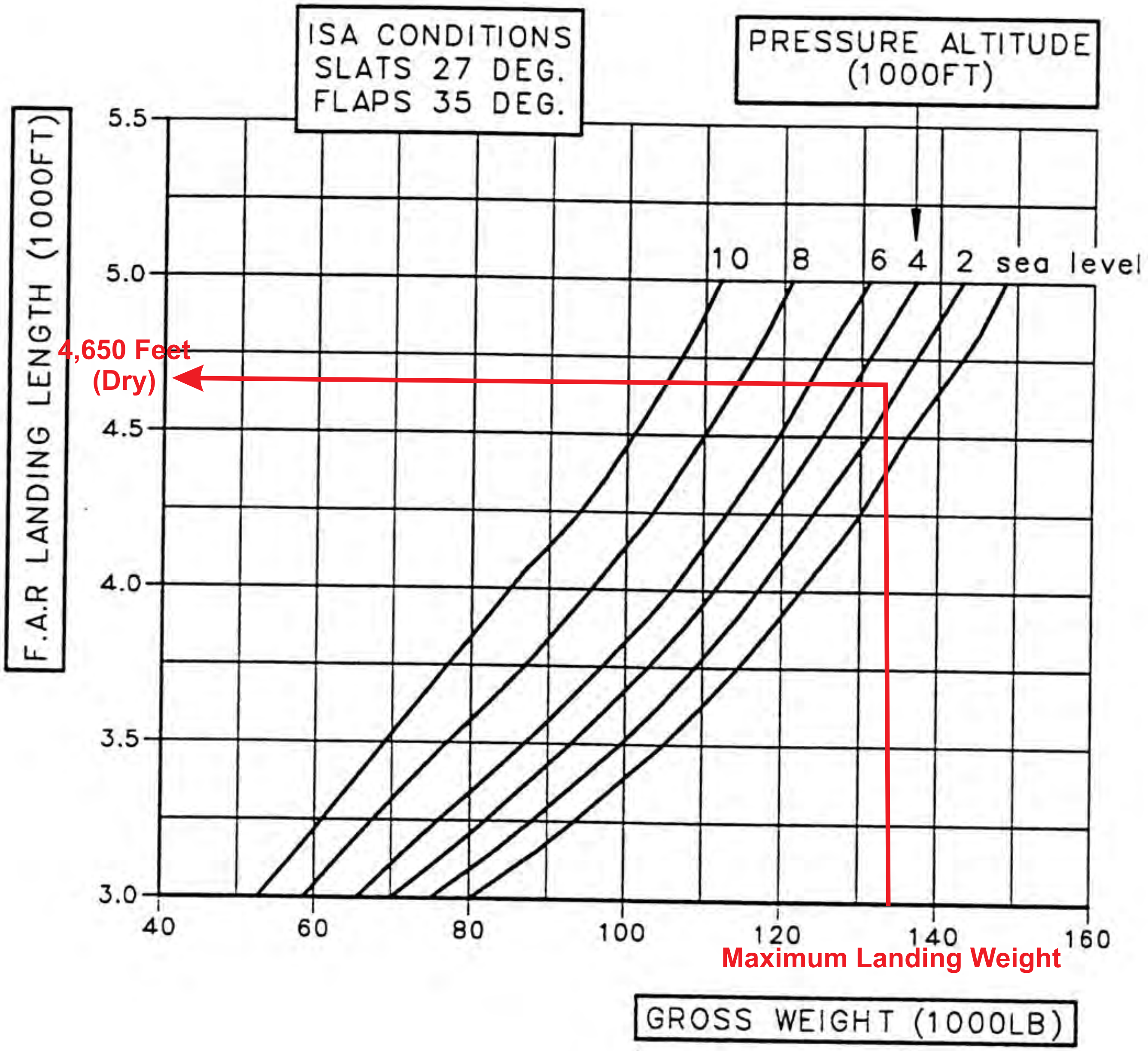


3.4 F.A.R./J.A.R. LANDING FIELD LENGTH
3.4.1 CFM56-5A ENGINES

Exhibit C-11: Airbus A319 Landing Length Requirements (V2500 Engines)

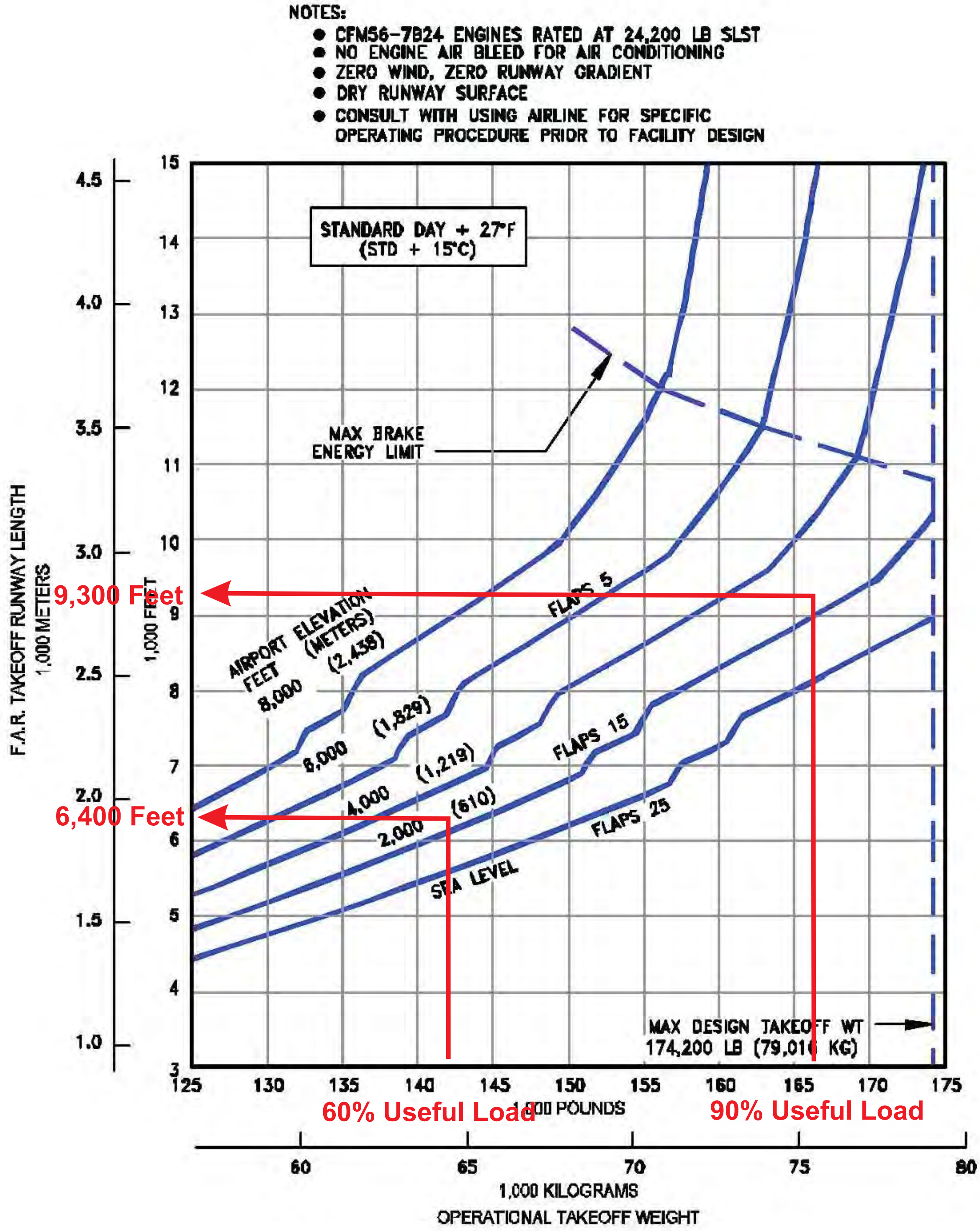
A319

AIRPLANE CHARACTERISTICS



3.4 F.A.R./J.A.R. LANDING FIELD LENGTH
3.4.1 V2500 ENGINES

Exhibit C-12: Boeing 737-800 Takeoff Length Requirements (CFM56-7B24 Engines)



NOTES:
- CFM56-7B24 ENGINES RATED AT 24,200 LB SLST
- NO ENGINE AIR BLEED FOR AIR CONDITIONING
- ZERO WIND, ZERO RUNWAY GRADIENT
- DRY RUNWAY SURFACE
- CONSULT WITH USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

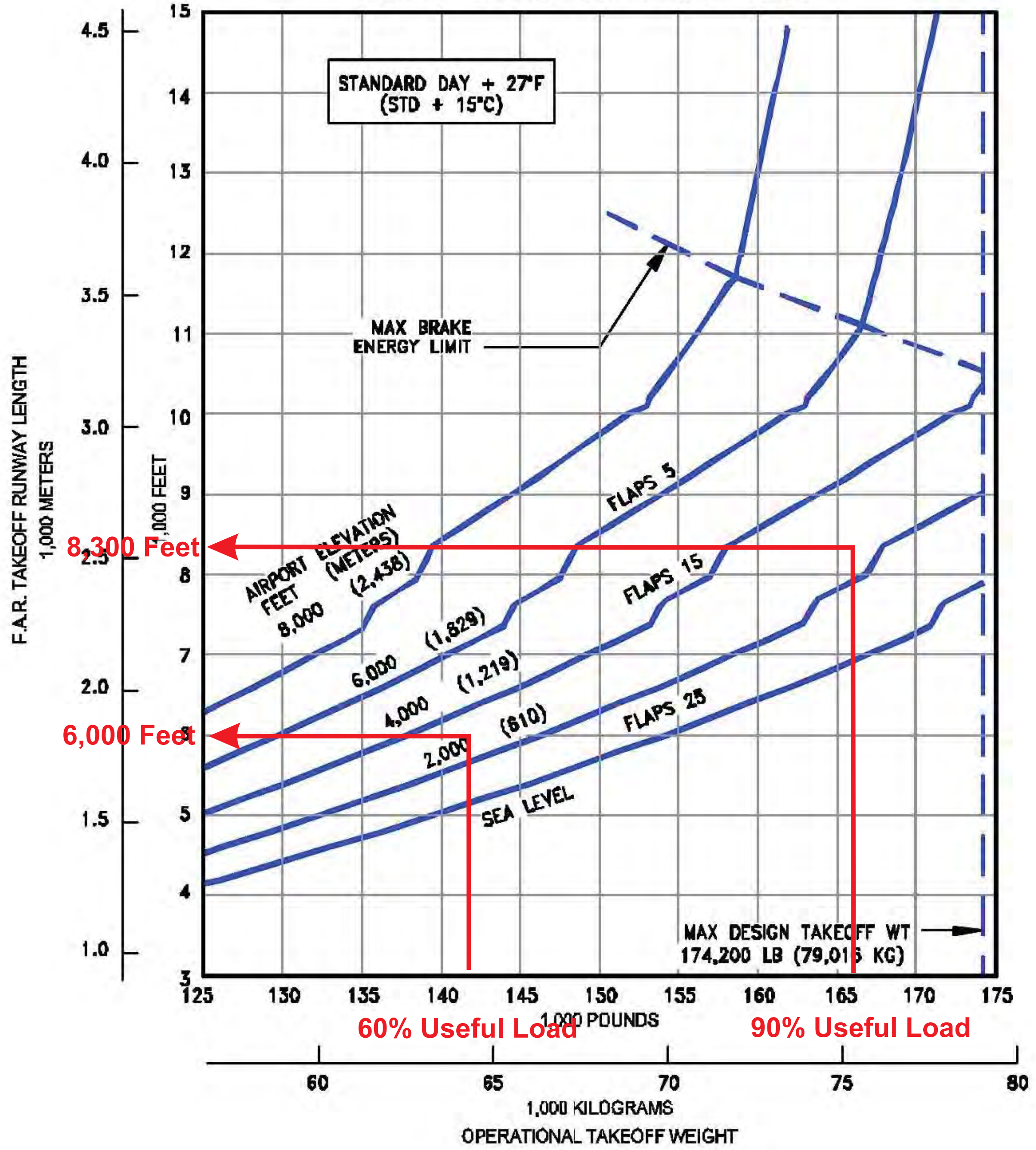
3.3.84 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS

STANDARD DAY +27°F (STD + 15°C), DRY RUNWAY

MODEL 737-800 WITH WINGLETS CFM56-7B24 ENGINES AT 24,200 LB SLST)

Exhibit C-13: Boeing 737-800 Takeoff Length Requirements (CFM56-7B26 Engines)

NOTES:
- CFM56-7B26 ENGINES RATED AT 26,300 LB SLST
- NO ENGINE AIR BLEED FOR AIR CONDITIONING
- ZERO WIND, ZERO RUNWAY GRADIENT
- DRY RUNWAY SURFACE
- CONSULT WITH USING AIRLINE FOR SPECIFIC OPERATING PROCEDURE PRIOR TO FACILITY DESIGN

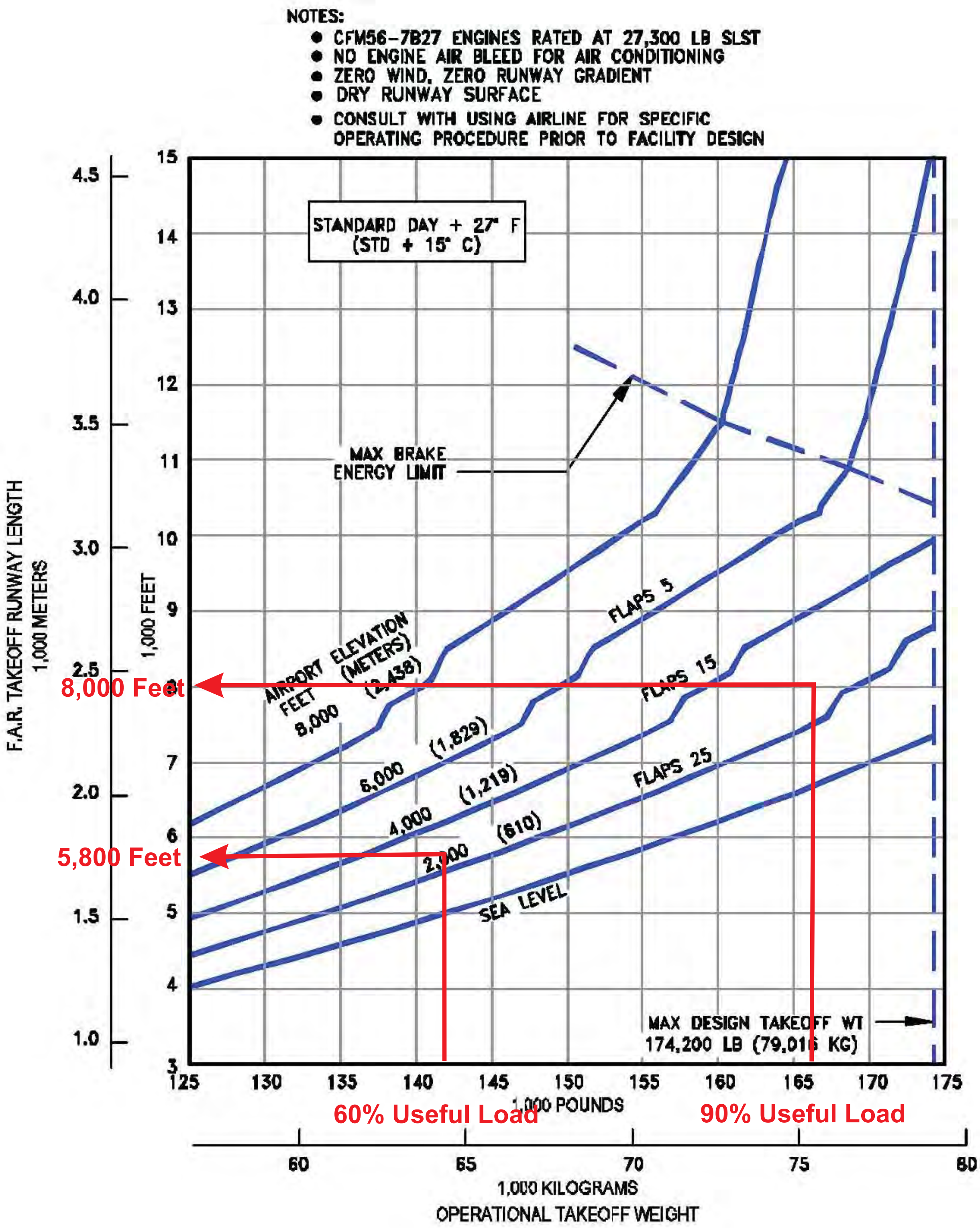


3.3.80 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS

STANDARD DAY +27°F (STD + 15°C), DRY RUNWAY

MODEL 737-800 WITH WINGLETS (CFM56-7B26 ENGINES AT 26,300 LB SLST)

Exhibit C-14: Boeing 737-800 Takeoff Length Requirements (CFM56-7B27 Engines)

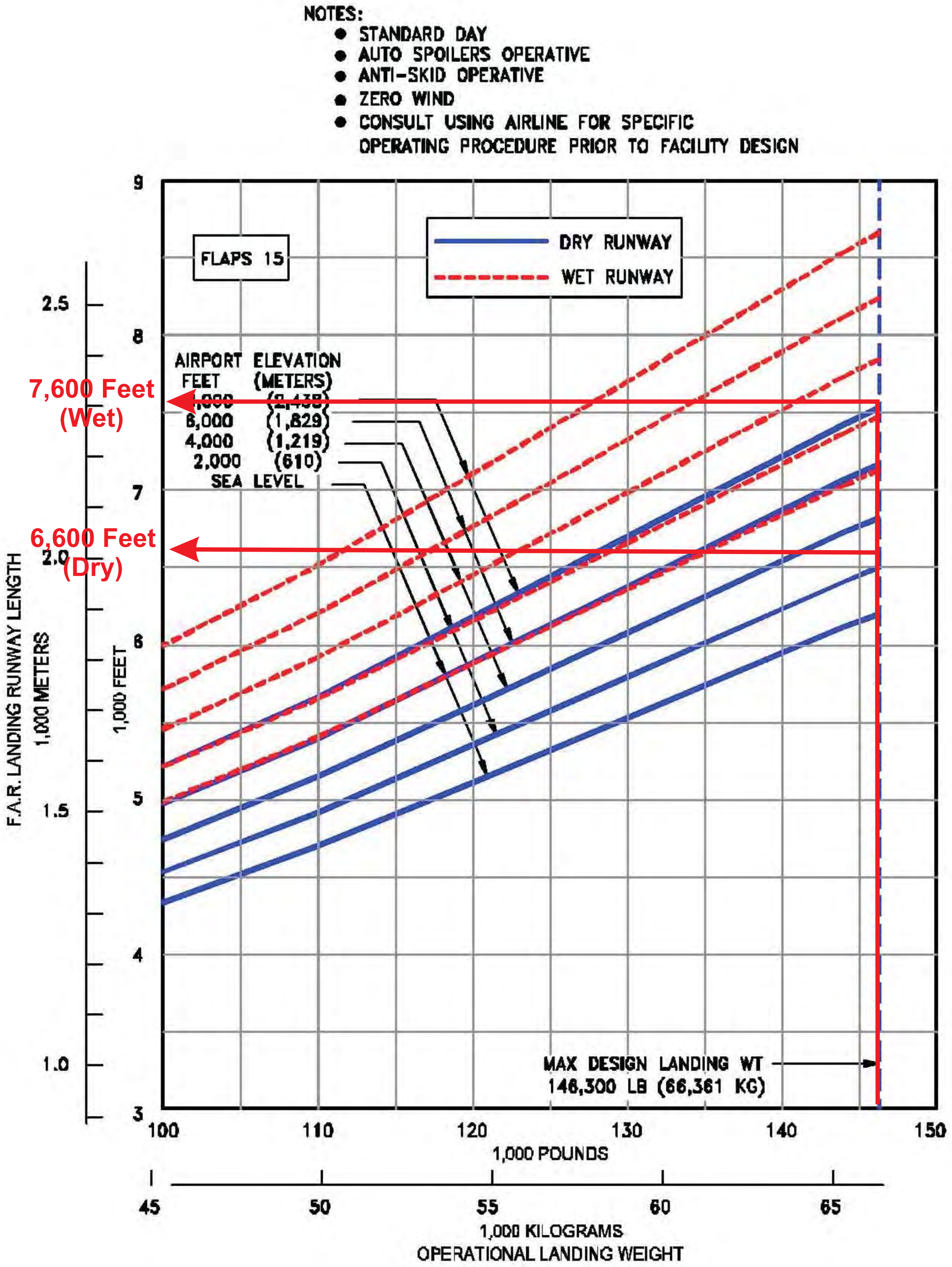


3.3.88 F.A.R. TAKEOFF RUNWAY LENGTH REQUIREMENTS

STANDARD DAY +27°F (STD + 15°C), DRY RUNWAY

MODEL 737-800 WITH WINGLETS (CFM56-7B27 ENGINES AT 27,300 LB SLST)

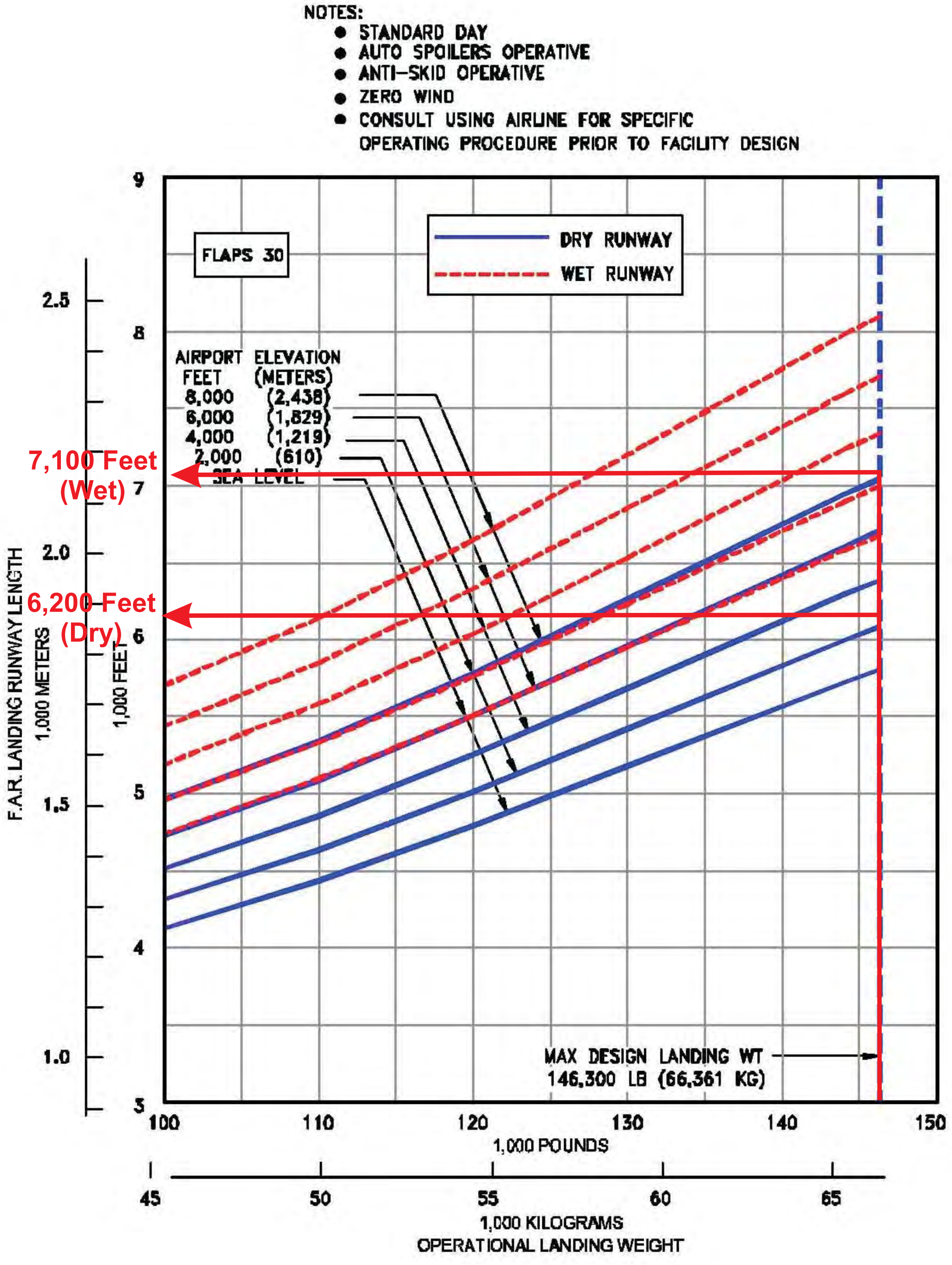
Exhibit C-15: Boeing 737-800 Landing Length Requirements (Flaps 15)



3.4.35 **F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 15**

MODEL 737-800 WITH WINGLETS

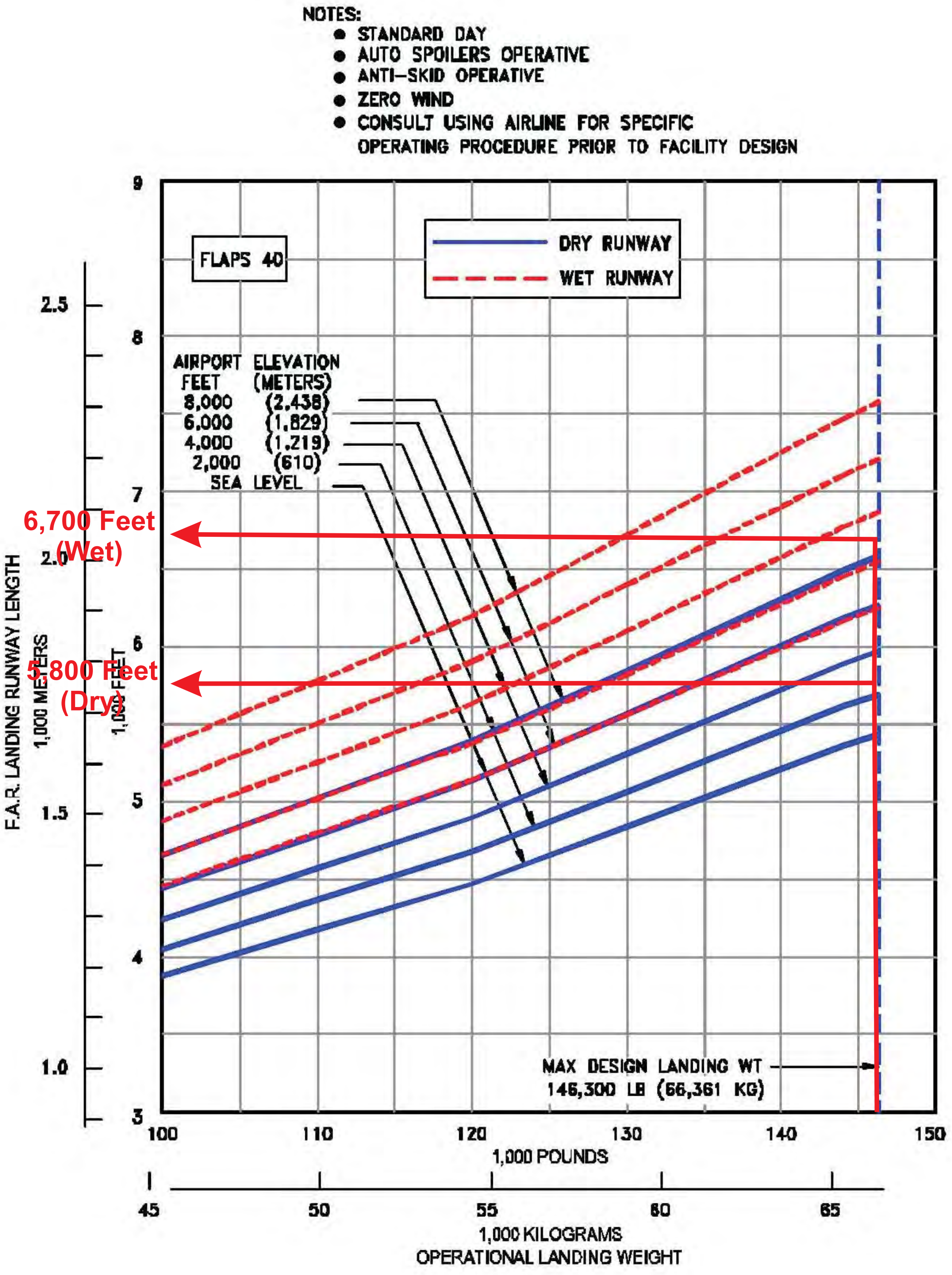
Exhibit C-16: Boeing 737-800 Landing Length Requirements (Flaps 30)



3.4.34 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 30

MODEL 737-800 WITH WINGLETS

Exhibit C-17: Boeing 737-800 Landing Length Requirements (Flaps 40)



3.4.33 F.A.R. LANDING RUNWAY LENGTH REQUIREMENTS - FLAPS 40

MODEL 737-800 WITH WINGLETS

Appendix D-3 / AC 150/5325-4B Five-Step Procedure for Runway Length Requirements

Appendix D

AC 150/5325-4B Five-Step Procedure for Runway Length Requirements

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, states that the goal of the AC is “to construct an available runway length for new runways or extensions to existing runways that is suitable for the forecasted critical design aircraft.” AC 150/5325-4B contains a five step procedure for determining the runway length requirements of different categories of critical design aircraft. The following sections describe each of step in the procedure.

Step One: Identify Critical Design Aircraft

According to AC 150/5325-4B, the critical design aircraft is “the listing of aircraft (or a single aircraft) that results in the longest recommend runway length.” For federally-funded runway projects, AC 150/5325-4B establishes a required “substantial use threshold” of 500 or more annual itinerant operations by an individual aircraft, or a category of aircraft with similar operating characteristics (takeoffs and landings count as separate operations). These aircraft must “make regular use of the proposed runway for an established planning period of at least five years” (the phrase “regular use” is quantified by the phrase “substantial use”).

According to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, the critical design aircraft “may be a single aircraft, ***or a composite of the most demanding characteristics of several aircraft*** (emphasis added).” According to FAA Order 5100.38C, *Airport Improvement Program Handbook*, “***in some cases, there may be more than one critical aircraft*** (emphasis added). For instance, pavement strength and layout are frequently dependent upon different aircraft.”

Step Two: Identify Aircraft that Require the Longest Runway Lengths

In order to determine the method for establishing the required runway length, the airport designer must identify the aircraft that will require the longest runway lengths at maximum certificated takeoff weight (MTOW).

Step Three: Determine Method for Establishing the Required Runway Length

All key users at PUW utilize large aircraft, as defined by AC 150/5325-4B. Large aircraft are defined as those with a MTOW of more than 12,500 pounds. AC 150/5325-4B provides separate runway length determination methods for two categories of large aircraft: *Large Aircraft with a Maximum Certificated Takeoff Weight (MTOW) of more than 60,000 Pounds*, and *Large Aircraft with a MTOW up to and including 60,000 Pounds*.

For *Large Aircraft with a MTOW of more than 60,000 Pounds*, runway length requirements are determined utilizing takeoff and landing performance charts contained in airport planning manuals (APMs) published by aircraft manufacturers for specific aircraft. For *Large Aircraft with a MTOW up to and including 60,000 Pounds*, APMs for specific aircraft are not required, and runway length requirements are determined for aircraft groupings having similar operating characteristics, utilizing performance charts contained in AC 150/5325-4B.

Step Four: Select Unadjusted Required Runway Length

Unadjusted required runway lengths are selected from the charts identified under Step Three. These lengths are selected based on typical useful loads, airport elevation, and mean daily maximum temperature of the hottest month. According to the January 2011 FAA Airport/Facility Directory, the airport elevation at PUW is 2,556 feet above mean sea level (MSL). According to the 1999 Airport Layout Plan, the mean daily maximum temperature of the hottest month at PUW (July) is 83°F.

Step Five: Apply Necessary Adjustments

The performance charts contained in AC 150/5325-4B and aircraft manufacturer APMs, and utilized in Step Four, assume zero wind, a zero effective runway gradient, and a dry runway surface. Allowable adjustments to the lengths selected in Step Four include those for non-zero effective runway gradients for takeoff operations, and for wet or slippery runway conditions for jet aircraft landing operations. There is no allowable adjustment for wind. The final required runway length is “the longest resulting length after any adjustments for all the critical design aircraft under evaluation.”

Appendix D-4 / January 2011 Public Workshop Exhibits

Pullman-Moscow Regional Airport
MASTER PLAN UPDATE—Phase II

Operational Restriction: Runway Length

Aircraft Runway Length Requirements

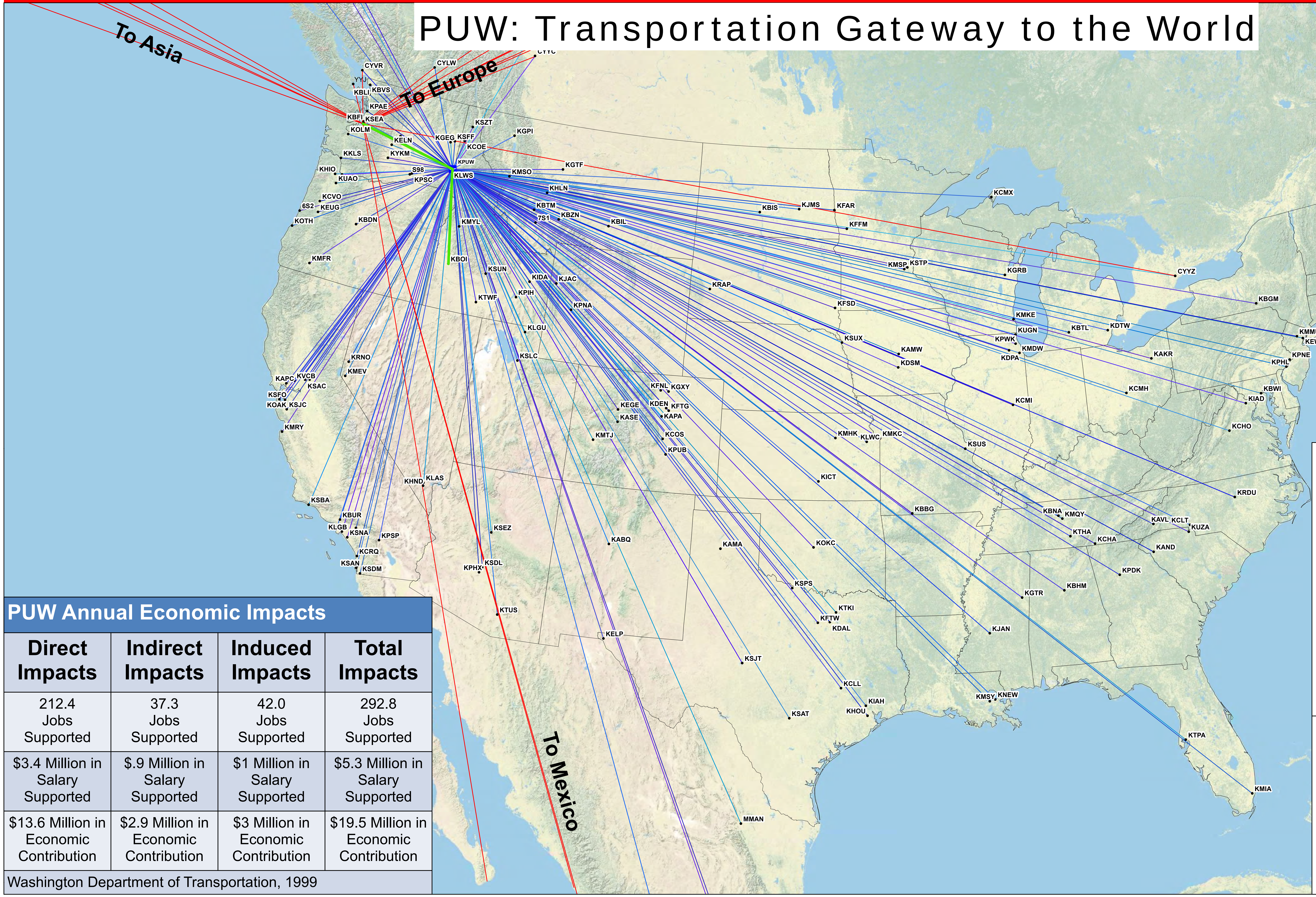
Aircraft	Runway Length*
Bombardier CRJ900LR	8,650 FT
Cessna Citation X	7,232 FT
Boeing 737-800 (BBJ)	7,200 FT
Airbus A319	6,500 FT
Bombardier Q400	6,100 FT
Beechcraft King Air 350	3,527 FT

* Takeoff length requirements in wet conditions at maximum takeoff weight

Source: Phase I, Table 3B

Pullman-Moscow Regional Airport
MASTER PLAN UPDATE—Phase II

PUW: Transportation Gateway to the World



Legend

Direct Commercial Flights 🟩

1-Stop International Flights 🟥

General Aviation Flights 🟦

PUW Annual Economic Impacts

Direct Impacts	Indirect Impacts	Induced Impacts	Total Impacts
212.4 Jobs Supported	37.3 Jobs Supported	42.0 Jobs Supported	292.8 Jobs Supported
$3.4 Million in Salary Supported	$.9 Million in Salary Supported	$1 Million in Salary Supported	$5.3 Million in Salary Supported
$13.6 Million in Economic Contribution	$2.9 Million in Economic Contribution	$3 Million in Economic Contribution	$19.5 Million in Economic Contribution

Washington Department of Transportation, 1999

National Plan of Integrated Airport Systems (NPIAS)

Pullman-Moscow Regional Airport is considered a "Commercial Service Nonhub Primary" airport by NPIAS. This means that PUW accounts for less than 0.05 of all commercial enplanements, but has over 10,000 annual enplanements.

N

0 250 500

Miles

Flight Data Source: Flightaware, Port of Seattle
Basemap Source: US National Park Service

U.S. Department
of Transportation

**Federal Aviation
Administration**

Seattle Airports District Office
1601 Lind Avenue, S. W., Ste 250
Renton, Washington 98055-4056

March 1, 2011

Robb Parish
Airport Manager
3200 Airport Complex N
Pullman, WA 99163

Approval of Activity Forecasts: Pullman-Moscow Regional Airport
AIP Number 3-53-5301-29/34

Dear Mr. Parish:

I have reviewed the Forecast chapter for the Pullman-Moscow Regional Airport submitted by Mead and Hunt.

I find adequate justification exists for the figures cited in the Forecasts of Aviation Activity and hereby approve the Forecast Summary. The chapter appears to be well-done and I believe that you and your Consultant are off to a good start for the rest of the Master Planning process.

If you have any questions, please feel free to contact me at: 425-227-1654 or by e-mail at: deepeka.parashar@faa.gov.

Sincerely,

Deepa Parashar
Airport Planner, Washington

cc: Kevin Mulcaster, Mead & Hunt (email)

U.S. Department
of Transportation

**Federal Aviation
Administration**

Seattle Airports District Office
1601 Lind Avenue, S. W., Ste 250
Renton, Washington 98055-4056

March 1, 2011

Robb Parish
Airport Manager
3200 Airport Complex N
Pullman, WA 99163

Approval of Runway Length: Pullman-Moscow Regional Airport
AIP Number 3-53-5301-29/34

Dear Mr. Parish:

I have reviewed the Runway Length Analysis provided for Pullman-Moscow Regional Airport submitted by Mead and Hunt in a February 1, 2011 memo.

I find adequate justification exists for a 7,100 foot runway (5/23) length. This letter constitutes official approval to proceed with that length should you chose to in selecting your preferred alternative.

If you have any questions, please feel free to contact me at: 425-227-1654 or by e-mail at: deepeka.parashar@faa.gov.

Sincerely,

Deepa Parashar
Airport Planner, Washington

cc: Kevin Mulcaster, Mead & Hunt (email)

Federal Aviation Administration

Memorandum

Date: October 3, 2011
To: Pullman Master Plan Appendix & Site File
From: Deepa Parashar, Washington State Planner
Prepared by: Deepa Parashar, Washington State Planner
Subject: Transitional Surface

The Seattle Airports District Office (ADO) approves a 4:1 transitional surface at Pullman-Moscow Regional Airport.

The terrain and airspace at Pullman was evaluated in detail during Phase 1 of the Master Planning project. It was determined that the 4:1 transitional surface versus a 7:1 transitional surface, will have no impact on approach and departure procedures. This determination was air spaced during Phase 1, and had no adverse effect. The analysis is based on existing topography data and no survey data. This will be revalidated during design when survey data is available.

TECHNICAL MEMORANDUM

PULLMAN-MOSCOW REGIONAL AIRPORT MASTER PLAN UPDATE, PHASE 2

AIRSIDE ALTERNATIVES CONSTRUCTION FEASIBILITY ANALYSIS

MAY 23, 2011

INTRODUCTION

The purpose of this analysis is to evaluate the construction feasibility of the airside alternatives identified for improvements at Moscow-Pullman Regional airport. Four alternatives have been developed for runway and airfield configurations, as identified below. These alternatives have been analyzed in detail to answer one primary question: can the planned improvements be built? This analysis included evaluating the technical aspects of the project, along with cost implications and impacts to airport operations.

This analysis was completed using the following available information:

- Phase 1 Master Plan Report, prepared by Mead&Hunt and Toothman-Orton Engineering Co. (now T-O Engineers).
- Associated technical data used to prepare the Phase 1 report, including:
    - AutoCAD drawings of the airport and surrounding areas.
    - Topographical information from an aerial survey completed for Phase 1, along with topographical information from USGS maps and other sources, outside of the original survey area.
    - Analyses, reports and cost estimates used in preparation of the Phase 1 report.
- Geotechnical report prepared as part of 'Phase 1B' of this Master Plan effort. This report was prepared by GeoEngineers and was completed in order to verify several key assumptions made during Phase 1about the soils and terrain in the area of the airport. The primary purposes of the geotechnical investigation were to identify existing soil types and locate any bedrock and groundwater that would impact construction on the site.
- Wetland delineation report prepared by JUB Engineers in October 2009. This report delineated and identified wetlands that will be impacted by the proposed alternatives.

The analysis completed for this study was much more detailed than is normally completed for an Airport Master Plan. This level of effort was deemed necessary in this case, to determine if there are any fatal flaws in the feasibility of any of the alternatives due to technical construction issues, costs or phasing. While a very detailed analysis was completed, it must be noted that this analysis was not an engineering design and there are some limitations on the analysis that must be studied further during the subsequent environmental analysis and final design of the project. These limitations include:

- Survey information was gathered from several sources, none of which are to the accuracy requirements of airfield design. The aerial survey completed for Phase 1 was completed to an accuracy of ± one (1) foot, which, while very accurate for planning purposes, is not adequate for design. As mentioned above, topographic information from USGS and other sources was also used, which is even less accurate than the aerial survey data. A full topographic survey of the entire project area will be required before design. Due to the large project area, differences in elevation could have a significant impact on final cost estimates and actual construction costs.
- The geotechnical investigation completed for this analysis was limited to the minimum information needed to identify important site conditions which may impact or impose limitations on the project, but additional geotechnical investigation will be required for design. Future investigation could reveal additional bedrock or groundwater impacts that could change the approach to the project, though major impacts are not anticipated.
- The wetland delineation is adequate for this analysis, but another delineation will likely be necessary later in the process, to determine if any changes to the wetlands have taken place. Additionally, a number of assumptions related to wetland mitigation were required during this analysis. There are no identified wetland banks or other mitigation areas near the airport at this time. Further investigation will be necessary as the project becomes reality to locate actual mitigation sites.
- Additional unknowns may arise between now and construction of the project that could impact the project, such as changes in use of the existing airport, FAA guidance, environmental regulations, etc. These could have an impact on the project as well.

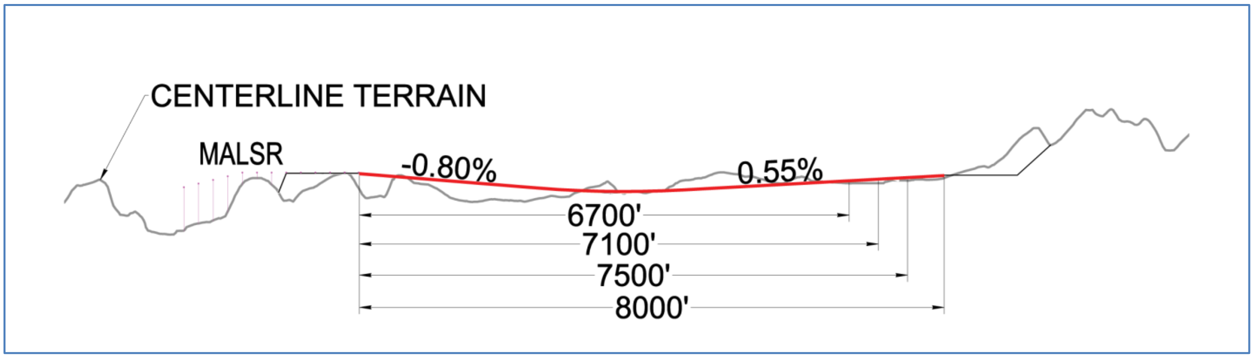
While these limitations to the analysis are real and must be stated, the analysis based on current information reveals that there are no fatal flaws in the proposed alternatives. Refinement to the limitations in the available data could result in changes in cost and construction timing, but no changes that would lead to a fatal flaw condition are anticipated.

IDENTIFICATION OF ALTERNATIVES

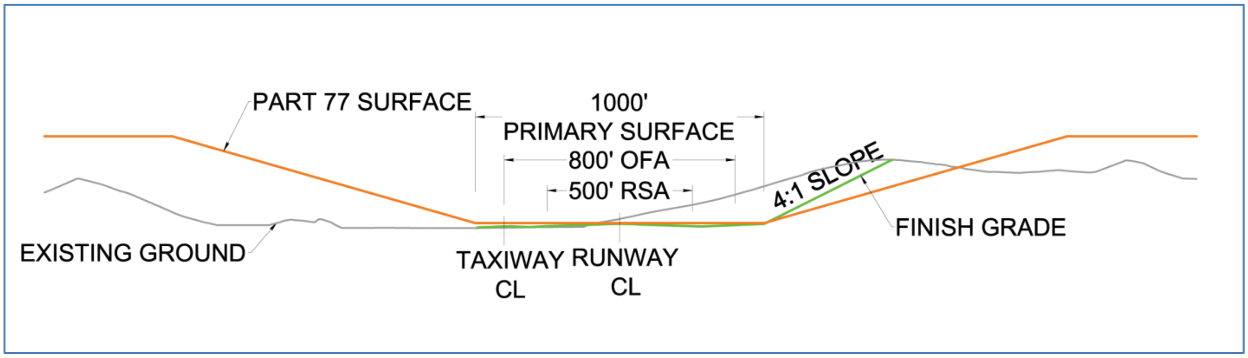
Multiple runway configurations were analyzed as part of Phase 1 of this Master Plan Study. The recommended alternative from Phase 1 was a runway alignment identified in that report as 'Alternative 2C'. This alignment shifts the runway south and rotates the west end of the runway farther south, away from the existing runway alignment. Four alternatives were identified for analysis as part of Phase 2, all based on the runway alignment from Alternative 2C in Phase 1. The differences between alternatives are all related to runway length and configuration of the east runway end.

All four alternatives have a number of common features. Most significantly, all use the same location and elevation for the west end of the runway. This location was chosen based on the approach analysis completed as part of Phase 1 and, for purposes of this analysis, the location was fixed for all subsequent evaluation. The general configuration of the airfield complex, including the parallel taxiway and connecting taxiways is the same for all options, with the exception of the east end of the runway.

In addition to these commonalities, the general runway profile and grading of the airfield are consistent between all options. The runway profile is similar across all options, with the exception of added length for the longer alternatives. The general runway profile is shown below:



Transverse grading is also consistent, with the basic section shown below.



The four runway alternatives are described as follows:

1. **Alternative 1: 6,700' Runway**. This alternative matches the existing runway length and is considered the 'Baseline' alternative, for purposes of analysis.
2. **Alternative 2: 7,100' Runway.** This is the recommended runway length, based on the requirements of the forecast fleet mix. Entering the analysis, this was considered the 'Preferred' alternative.
3. **Alternative 3: 8,000' Runway.** Labeled the 'Ultimate' alternative, this runway length is the ultimate length desired by the airport and was evaluated to determine the impacts of ultimately extending to this length.

4. **Alternative 4: 8,000' Runway with 500' Displaced Threshold on East End.** Initial analysis of an 8,000' runway revealed significant earthwork necessary to clear the Obstacle Clearance Surface for the east end. This alternative reduces those grading requirements, while still providing 8,000' of takeoff distance, for takeoffs to the west.

CRITERIA

A number of criteria were used to develop this analysis. These criteria are found in FAA guidance, primarily, and are summarized in the following table.

Item	Criteria	
AC 150/5300-13, Airport Design		
Runway		
Width	100'	
Shoulder Width	20'	
RSA Width	500'	
RSA Length Beyond Runway End	1,000'	
ROFA Width	800'	
ROFA Length Beyond Runway End	1,000'	
Transverse Grade, Runway Surface	1%-1.5%	
Transverse Grade, Shoulder Surface	1.5%-5%	
Transverse Grade, RSA Surface	1.5%-3%	
Longitudinal Grade	1.5% Max.	
Longitudinal Grade, First/Last ¼ of Runway Length	0.8% Max.	
Maximum Grade Change	1.5% Max.	
Vertical Curve Length	1,000'/1% Min.	
Taxiway		
Width	50'	
Shoulder Width	20'	
TSA Width	118'	
TOFA Width	186'	
Transverse Slope	1.0%-1.5% (1.5%)	
Longitudinal Grade	1.5% Max.	
Maximum Grade Change	3% Max.	
Vertical Curve Length	100'/1% Min.	
AC 150/5300-13, Appendix 2 (Runway End Siting)	West	East
Runway Type	9	6
Slope/OCS	34:1	20:1
Dimensional Standards (Ref. Figure A2-1)		
A	200'	200'
B	400'	400'
C	1,900'	1,900'
D	10,000'	10,000'
E	0'	0'
FAR Part 77/TERPS		
Part 77 Primary Surface Width	1,000'	
Part 77 Transitional Slope (Terrain Only)	7:1 (4:1 used for analysis)	
Part 77 Approach Surface	50:1	34:1
TERPS Departure Surface	40:1	

The criteria used in analysis match the applicable criteria in nearly all areas. One exception to this is transverse grading within the area of the Part 77 Transitional Surface south of the proposed runway. Grading in this area was analyzed with a 4:1 slope, instead of the 7:1 transitional slope required by Part 77. This was done to control the costs of the project. Grading to full 7:1 standards nearly doubles the amount of excavation required to grade the terrain south of the runway, adding up to $8 million or more to the project. As Part 77 does not refer to grading, it was determined that this alteration was acceptable for this project. Evaluation of obstructions in all locations was performed with full Part 77 compliance in mind.

Another aspect of the proposed design that does not meet criteria is the transverse grading of the parallel taxiway. AC 150/5300-13, Chapter 5 requires runways and taxiways be constructed with a crowned section, with the cross slopes shown in the table above. For this project, it was determined that a “shed” section, sloped from one edge of the taxiway to the other was beneficial, because this section allowed the runway profile to be raised approximately two feet. This approach reduces the excess cut generated by the project by approximately 700,000 cubic yards, with an associated savings of over $2 million.

CONSIDERATIONS

Several overarching considerations were considered in all aspects of the evaluation, which are described in the following paragraphs. These considerations have the largest impact on construction feasibility and are the areas where fatal flaws could be found.

The first major consideration is technical feasibility. This includes the various technical aspects of constructing a project of this size and scope. The purpose was not to solve each technical problem, but rather to identify the issues and determine if each problem is *solvable* and what the impacts to the cost and schedule of the project will be. Some of the many specific examples of technical issues include:

- Cut and fill construction: Will cut banks be stable and will the cut materials be suitable for construction of large fills required?
- Bedrock: Is there bedrock within the limits of proposed cuts that could drive costs and schedule?
- Groundwater: Is there groundwater within the limits of proposed cuts that will need to be drained, both during construction and after the work is completed?
- Drainage: The project will impact existing storm drainage, both in terms of induced drainage from construction and natural drainage that will be altered or impeded. How will this be dealt with and what impacts will that have on costs and schedule?

The second major consideration is operational. One of the major goals of the airport and communities is to complete the project with minimum impact to operation of the existing airport. This impacts the approach to various elements of the project, especially construction phasing. These impacts to construction phasing may require a project approach that is more costly or takes longer to complete.

Weather will have a significant impact on construction of this project and is the next major consideration. Pullman's typical summer weather is excellent for construction: warm and dry. Unfortunately, typical weather at this location during the rest of the year is much wetter and colder. Based on available geotechnical information, the soils across the site are consistent and not suitable for construction in wet weather. For this reason, it is assumed that construction will be limited to approximately three months of the year, with schedules and costs are impacted accordingly. Of course, work will be possible for longer periods during some years, but three month construction seasons are assumed, so that estimates are conservative.

The final major consideration is funding. This is a massive project that will require a significant amount of funding. It is unlikely that the full amount of funding will be available in one year; therefore the project will most likely need to be phased over several years, to match available funding.

Throughout the analysis, the various elements of the project have been evaluated relative to these considerations. The phasing and cost assumptions presented take each of the considerations into account.

CONSTRUCTION ISSUES

There are many issues related to the construction of a project of this size and scope. Many of the major issues were analyzed as part of this study, in order to assess the overall feasibility of the project and to accurately estimate probable construction costs. The goal of this analysis was not to solve each problem, but rather to ensure that a feasible solution exists and what the ramifications might be to the overall project. Various construction issues are discussed in the following sections.

LAND ACQUISITION

A significant amount of land acquisition will be necessary to construct the proposed improvements. Required land acquisition areas can be described in four areas:

1. **West Approach**: Significant fill is necessary on the west end of the airport to construct the runway to the desired elevation. This fill (and the runway itself) will require purchase of approximately 74 acres, primarily from Washington State University. Portions of this land may be leased back to the university for continued use in agricultural research. In addition to land that will be purchased fee simple, an avigation easement over Washington State University property west of Airport Road, for protection of the Runway Protection Zone for that runway end will be required. It should be noted that WSU is undecided on the sale of all of the property east of Airport Road and west of the new runway end. All or portions of this area may need to be acquired through avigation easement, instead of fee simple purchase.
2. **East Approach:** Significant cut is necessary on this end of the runway, and approximately 29 acres are required in order to protect the RPZ and complete

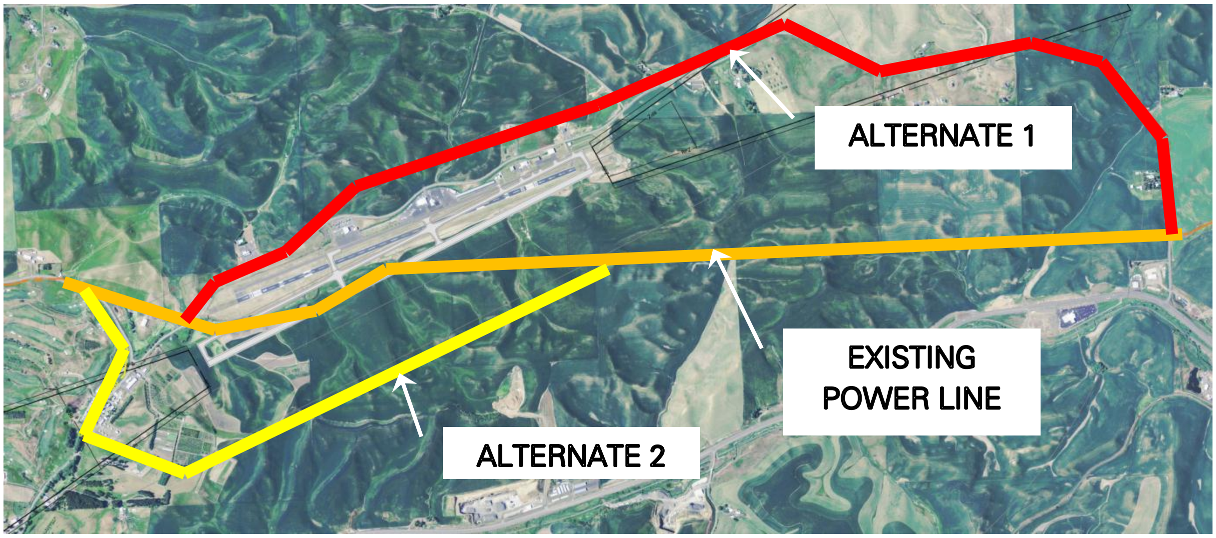
approach grading. This land will require fee simple purchase from private landowner(s).

3. **South Grading:** Approximately 108 acres are necessary in order to complete the side slope grading for the new runway. This land is currently used for agriculture, and the possibility to lease the land to farmers after construction is complete is possible in most of this area. This land will also require fee simple purchase from private landowner(s).
4. **South Cut Disposal:** As discussed elsewhere in this memo, an extremely large quantity of excess cut material will need to be disposed of on or near airport property. Disposal areas that are within short haul distances and that allow the use of off-road construction equipment greatly reduce the overall cost of the project. Two areas on the south side of the airport have been identified as potential soil disposal locations, with a total area of 36 acres. These areas were chosen because the topography in both locations will permit disposal of large amounts of material within close proximity to the cut areas. Purchase of this land may not be required. Instead, temporary easements to dispose of material in these locations could be obtained. It may prove more cost effective to purchase the land, however and cost estimates reflect fee simple purchase.

POWER LINE RELOCATION

A major electrical distribution line owned by Avista Corporation currently runs in a general SE-NW direction across the hills south of the airport and then crosses under the existing Runway 5 approach before continuing northwest. This line must be relocated in the vicinity of the airport in order to accommodate the new runway and associated grading. During coordination meetings regarding this effort, Avista expressed their desire to avoid lighting and marking the line as much as possible, due to added maintenance and operations costs for the utility. Additionally, it was determined that installing the line underground was not an option, due to safety concerns and the extremely high cost of installing this type of line underground.

Several alternatives were evaluated by the study team and reviewed by Avista. Of these options, two potential alignments have been identified, as shown in the figure below. Both alternatives come with significant cost. One alternative would connect with the existing power line southeast of the airport, then generally following Airport Road north past the east end of the airport and then west along the north edge of airport property. The second alternative connects with the existing line on the hills south of the airport, heads west and then crosses to the north, under the western approach to the new runway. The relative elevation of the western runway end and the existing terrain will permit construction of the power line in this location without conflicting with the approach surface for that runway end. However, if on-ground NAVAIDs (ILS) are required, the power line in this location could conflict with the performance of the ILS Glide Slope signal. This will need to be evaluated further during design of the project.



GRADING

This project is primarily a large earthmoving or grading project, creating a very large pad on which the proposed airfield will be constructed. Cuts of over 80 feet deep will be made in the hills south and east of the existing airfield and fills to depths in excess of 50 feet will be constructed on the west end of the new runway to build up that area to the elevation required for the western approach.

The quantities of earthwork are massive, as summarized in the following table (all values are given in millions of cubic yards):

Alternative	Cut	Fill	Excess Cut
1 (6,700' Runway)	4.4	2.8	1.6
2 (7,100' Runway)	4.8	2.8	2.0
3 (8,000' Runway	6.9	3.1	3.8
4 (8,000' Runway with Displaced Threshold)	6.5	3.1	3.4

As can be seen in the table, a significant amount of cut will be made, beyond what is needed to construct the airfield to the design grades. This excess material must be disposed of in some cost effective manner. If possible, on site locations are preferred, as the cost for disposal will be much lower. For on-site locations, off-road construction equipment can be used (e.g., scrapers and bulldozers). Use of this equipment is much more efficient than loading the material in trucks and hauling over public roads to an off-site disposal landfill or other location.

Several sites were evaluated as possible locations to dispose of the excess material, and three have been identified:

1. **West Approach Disposal:** Depending on the final configuration of the WSU facilities west of the proposed runway, a significant amount of material could be disposed of in

this area. This disposal area has a number of benefits, including being located on property that needs to be acquired for other reasons. Fill in this area will also make installation of the approach lighting simpler and less costly.

2. **Southwest Disposal Area:** This area is located south of the west end of the proposed runway, outside of the proposed grading limits for the project. A natural depression exists in the agricultural land at this location, which could be filled and restored for agricultural use. The land could either be purchased, or it may be possible to purchase an easement in order to dispose of material in this location. Approximately 2.6 million cubic yards could be disposed of in this area.
3. **Southeast Disposal Area:** South of the east end of the proposed runway, this location is ideal for the extremely large cut quantities that are required in order to construct the east end of the runway and associated safety area. As with the Southwest Area, a natural depression exists here that is within a relatively short haul distance from the adjacent cut area. This area could hold up to 1.8 million cubic yards of excess cut.

Using all or portions of these areas, it is estimated that all of the excess cut material can be disposed of using off-road equipment, which is reflected in the cost and time estimates for the project.

Beyond disposal of the excess cut, other potential problems with the grading portions of the project include the presence of groundwater or bedrock within the cut limits. Preliminary geotechnical information was collected during "Phase 1B" of this study, and this investigation revealed minimal impact to the project, if any. More extensive investigation will be required during design to verify this, and an allowance for potential costs is reflected in the estimate.

PAVEMENT CONSTRUCTION

Preliminary pavement section designs were prepared for the proposed airfield construction in accordance with FAA Advisory Circular 150/5320-6E, *Airport Pavement Design and Evaluation*. Designs were prepared for both flexible pavement (hot mix asphalt, 'HMA') and rigid pavement (Portland cement concrete, 'PCC'), and then a life cycle cost analysis was completed to determine the option with the best economic benefit.

The aircraft fleet presented in Tables 2 and 3 of the November 19, 2010 Mead & Hunt, Inc. memo titled *PUW Master Plan Study Phase II – Runway Length Requirements* was utilized for this analysis. Several of the aircraft in the forecasted fleet weigh in excess of 100,000 pounds, therefore a stabilized base and subbase are required.

Due to local climate and soil conditions, pavements were designed for frost. Based on the limited geotechnical data available, it appears the native soil composition is very consistent. With the consistency and soil type, the pavement was designed using the Limited Subgrade Frost Penetration (LSFP) design method, as described in AC 150/5320-6E. This design method results in a pavement section that protects the underlying soils from frost by constructing a section to 65% of the frost depth, using frost free materials. For this location, the frost depth is assumed to be 48-inches based on information from local agencies; therefore the total LSFP pavement section thickness is 31 inches.

Due to the frost conditions and soil types at the site, subsurface drainage will be necessary in the pavement section, to remove trapped moisture. A system to accomplish this is included in the cost estimates for the project.

Flexible Pavement

Using FAARFIELD design software and the criteria outlined in Chapter 3 of AC 150/5320-6E, the LSFP design flexible pavement section is as follows:

HOT MIX ASPHALT	P-401	5″
STABILIZED BASE COURSE	P-401 (ASSUMED)	5″
SUBBASE COURSE	P-208	21″
NATIVE SUBGRADE	P-152	

Rigid Pavement

Again using FAARFIELD design software and the criteria outlined in Chapter 3 of AC 150/5320-6E, the LSFP design rigid pavement section is as follows:

PORTLAND CEMENT CONCRETE	P-501	14″
SUBBASE COURSE	P-154	18″
NATIVE SUBGRADE	P-152	

Economic Analysis

An economic analysis was performed to compare the life-cycle costs of the flexible and rigid pavements in the construction of the future runway, parallel taxiway and connecting taxiways. This analysis was performed using the present worth method and the procedure outlined in Appendix 1 of AC 150/5320-6E.

A 33-year life cycle was assumed, based on the average life of PCC pavements in the FAA Northwest Mountain Region. Maintenance requirements for each of the pavement sections were evaluated and prices estimated. The present worth life cycle costs are $93.93 for flexible pavement and $89.17 for rigid pavement, a difference of approximately 5%. According to the FAA Advisory Circular, if the two alternative present worth values are within 10 percent of each other, the difference is considered insignificant.

The final decision regarding which material is used will need to be made during design, based on a number of factors. Not the least of these factors is the availability of initial construction funds. The initial construction cost for HMA is $76.67 per square yard, compared with $85.55 per square yard for PCC, a difference of approximately 11.5%. Though the initial cost for PCC is considerably more, the life cycle cost will save over $700,000, due to the long life and relatively low maintenance cost of PCC.

In addition to financial considerations, other factors may influence the final decision of which pavement material to use. One significant example is construction timing. As discussed in the phasing section below, operational phasing of the project will be complicated and it may be more desirable to use HMA pavement in some areas where faster construction is required, such as the connecting taxiways. Other factors that will weigh in this decision are maintenance considerations, such as airport manpower and budget and the operational impacts of repeated maintenance projects during the life of the pavement.

These issues (and others) will need to be addressed during design of the project. For purposes of cost estimating in this analysis, the PCC pavement section was used, due to the lower life cycle cost. This will provide adequate funds in the overall project budget for either option.

DRAINAGE

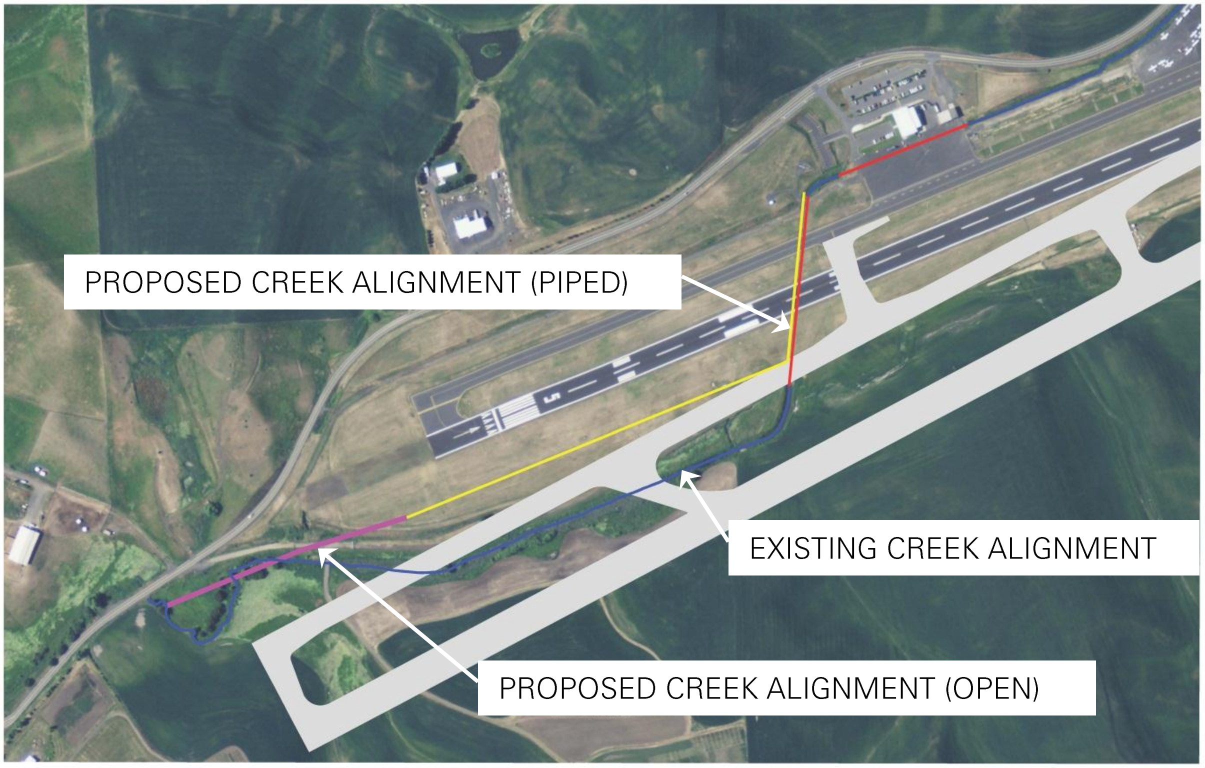
Construction of the new runway will alter drainage in the valley the airport is located in and significant analysis was completed on the drainage impacts of the project. These impacts include alteration of existing watersheds and streams, stormwater runoff from new and existing airport pavement and wetland mitigation. These impacts are discussed below.

STREAM AND WATERSHED ALTERATION

One existing stream, known as Airport Creek, runs in a southwesterly direction parallel to Airport Road on the north side of airport property before crossing the existing runway just west of the airport terminal. After crossing the runway, Airport Creek continues in a westerly direction until leaving airport property and crossing Airport Road, eventually flowing into Paradise Creek south of the airport.

In an effort to minimize runway and taxiway crossings, accommodate future landside development and allow for construction of the future airfield complex, a portion of Airport

Creek will need to be re-routed. A proposed alignment of this relocation is shown in the figure below. This alignment will pipe a portion of the creek to accommodate landside development, and then flow with a new alignment to the west before leaving the airport.



The Airport Creek drainage area totals over 2,100 acres of predominately rolling, rural farmland. Over half of this drainage area feeds Airport Creek from the north and will not be affected by the airport development. However, nearly 1,000 acres draining from the south of the future runway will be affected. Significant analysis of this area was completed, as the location of the future runway will impede natural drainage of this entire area. The overall drainage management approach will need to account for this drainage area.

STORMWATER RUNOFF

The existing airport complex constitutes the major developed area within the Airport Creek drainage upstream of the location where the creek crosses Airport Road west of the airport. Construction of the new airfield will add over 80 acres of impervious area. The increased runoff from this additional 80 acres will need to be mitigated in a way that concurrently treats the runoff of pollutants while reducing overall discharge from airport property to pre-development flows. As the existing airport is located within Pullman city limits, it is assumed that the stormwater management will fall under city standards. To date, the City of Pullman references the Eastern Washington Stormwater Manual and National Pollutant Discharge Elimination System (NPDES) for stormwater design and implementation.

Flat-bottomed grassy swales located adjacent to the runway and parallel taxiway will be the most efficient and cost effective means to accomplish the required stormwater management. Properly maintained grassy swales are an accepted Best Management Practice for treatment of runoff from pavement. Swales with flat bottoms provide storage as well as increasing time of concentration, thereby decreasing initial runoff from the site. The largest swales will be required on the south side of the future runway where runoff from half of the runway as well as from the land south of the airfield will converge. Adequate space will be available between the edge of the Runway Safety Area and the limits of grading for the FAR Part 77 Primary Surface for construction of these swales.

A storm sewer system will be required to route stormwater overflow from swales. This system will include inlets on either side of the runway, with collection piping routed across the runway and parallel taxiway flowing northwest to tie into the re-routed section of Airport Creek. The inlets should be spaced in a manner to maximize time of concentration and treatment of runoff from the grassy swales, while considering the consolidation of runoff along swale bottoms. Limiting water depth so that it will not hinder growth of swale grass, the FAA requirement of no standing water within the RSA and preventing impoundment of water which could attract wildlife near the airfield all will need to be considered to determine proper inlet spacing.

In addition to the stormwater management practices previously mentioned, a separate detention basin may be required in the northwest corner of airport property near the north side development and parallel taxiway. This basin would daylight the storm sewer system so that runoff from airport was not injected directly into Airport Creek. The basin would provide additional treatment but its main purpose would be retention of runoff, increased time of concentration and a barrier between airport runoff and Airport Creek, thereby reducing overall discharge from site. This basin would be designed with either an overflow pipe or spillway that would then direct flow towards Airport Creek.

WETLANDS

In 2009, J-U-B Engineers, Inc. completed a wetland delineation report on the Pullman-Moscow Regional Airport property for use with the master plan update. The United States Army Corps of Engineers (USACE) verified the jurisdictional limits of waters of the U.S. in the "Project Study Area" identified in the delineation report. The delineation is valid for five years from the approval date. Additional wetland investigation and determination will likely be required during the environmental and design phases of the project.

Multiple wetland areas were identified on and surrounding the airport within the anticipated impact area of the runway realignment project, totaling 14.7 acres of impact. This area of impact includes riverine, depressional, and sloped wetlands of varying quality. In addition to this area, the report also identifies what should be expected to be deemed wetlands if the project grading limits impact these areas. The current project limits extend into these areas outside of the previous study, which will require mitigation as well. In addition to the areas directly impacted by the runway realignment project, the USACE stated additional wetland disturbance has occurred along airport creek in recent years, but mitigation for these disturbances has been delayed in anticipation of the upcoming runway project. The amount of additional disturbance is unknown at this time, but this quantity must be accounted for in the total area of mitigation required.

Project discussions with the USACE and the Washington State Department of Ecology (DOE) regarding possible wetland mitigation requirements and recommendations for this project concluded that the wetlands disturbed shall be replaced both in function and value in the mitigation areas. Because each wetland mitigation project is assessed on a case-by-case basis, no replacement ratio was provided at this stage of the analysis. Both agencies recommend mitigating within the Paradise Creek drainage and prefer the sites to be as close to the impact area as feasible.

The USACE and DOE recommended coordinating the mitigation efforts with local groups such as Washington State University, Washington Department of Fish and Wildlife, and other local conservation districts that may have similar mitigation projects that the airport could assist with to complete their replacement requirements. No "wetland banks" are available for use in this region, thus it is assumed that land must be purchased and prepared by the airport to accomplish the mitigation requirements. All wetland mitigation must be complete and approved by the appropriate authorities prior to disturbing any existing wetlands – this could have a significant impact on the overall project schedule.

PROJECT PHASING

Due to the size and scope of the project, phasing of the various elements will be complicated. As discussed previously, the project must be phased to accommodate a number of factors, including the mitigation requirements, limited construction season, funding constraints, the desire to maintain operations on the airport with minimal closures and considerations for safety to airport users. Of course, many elements of the construction must be completed sequentially (e.g., earthwork must be completed before paving). This phasing discussion is general in nature -- a more detailed plan will need to be developed in design.

A general sequence of the major elements of the project was analyzed as part of this study effort. Five phases have been identified and are discussed below.

Phase 1 (Environmental)

The first step in the project once the Master Plan is complete will be to complete an environmental study, in accordance with National Environmental Policy Act (NEPA) requirements. At this time, it is assumed that an Environmental Assessment (EA) will accomplish this, and that an Environmental Impact Statement (EIS) will not be required. Environmental clearance must be received prior to any work related to land acquisition, wetland mitigation or construction related to the project. Potentially, preliminary design in order to complete the EA could possibly be completed. The EA is anticipated to take 18-24 months to complete. Should an EIS be required, the timeframe for completion could be three years or even more. This is an important decision that must be made near the completion of the Master Plan study as there are significant procedural differences between the EA and EIS.

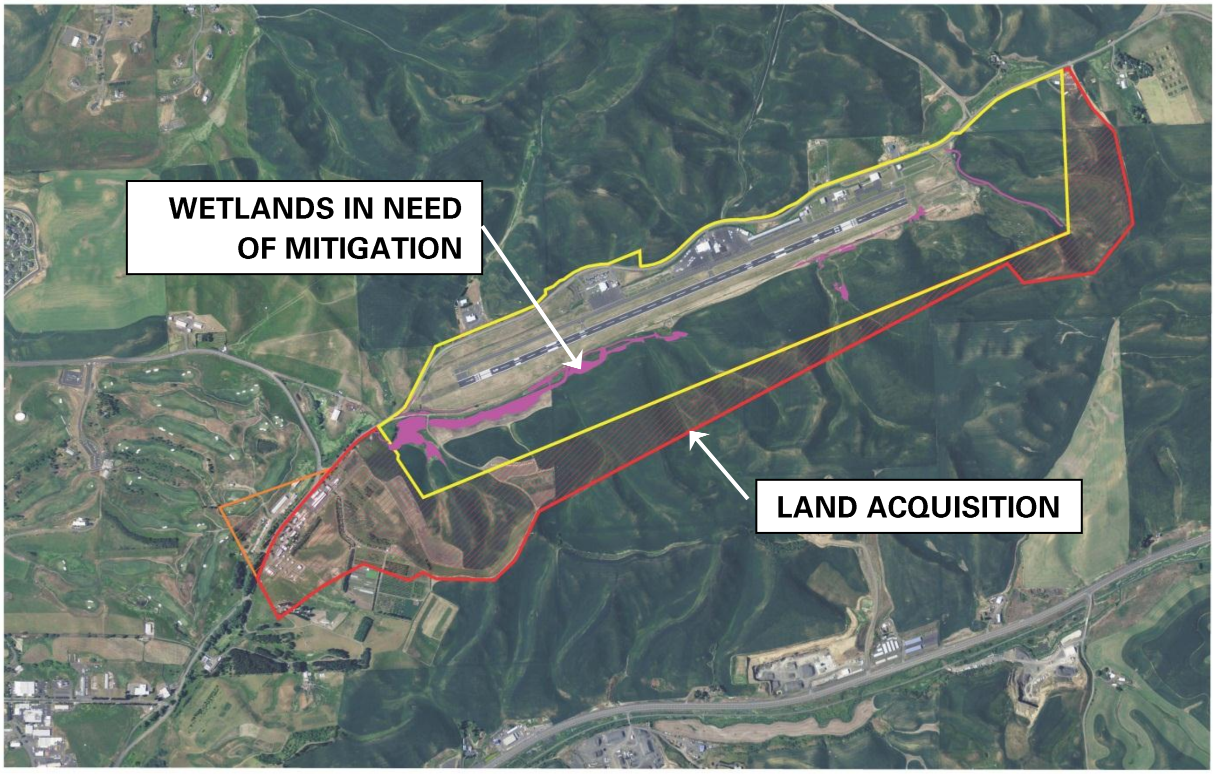
Assuming the Master Plan process is completed in late summer 2011 and the airport secures an environmental consultant shortly thereafter, the EA could begin in early 2012. With a duration of 18 months, the EA would be complete approximately June of 2013.

Phase 2 (Design, Land Acquisition, Wetland Mitigation, Power Line Relocation)

Once the EA is complete and approved, design may begin in earnest. Design will likely continue through subsequent phases, developing individual projects for each year's construction.

The land and easement acquisition process will include appraisals, negotiations, purchase agreements and facility relocations in the WSU area. The future runway approach and departure surfaces on the east end of the runway will impact some existing facilities on the airport as well, which may need to be relocated. After land is purchased, construction of fence can begin to delineate the property line and secure the airfield. This could also be delayed in some areas, if desired or necessary.

Wetland mitigation will require extensive agency coordination and permitting, followed by land acquisition (if a wetland bank is not available) and construction of wetland improvements. Coordination with the Unites States Army Corps of Engineers and the Washington Department of Ecology will be necessary during the environmental process to determine mitigation techniques and additional requirements regarding the wetlands. The existing wetlands located within the construction limits cannot be disturbed until the entire mitigation process is complete and approved by appropriate authorities. For this reason, delays in the wetland process could cause significant delays in the overall project.



At the same time, Avista Utilities will need to begin design of the power line relocation, followed by construction of the new line and removal of the existing. This process will include purchase of utility easements, access road construction, tower installation, and line installation. The new transmission line must be in place and fully functional prior to removal of any existing utilities within the construction limits. As most of this process will be under the control of an outside party, the potential for delays here is significant. If work on design of the new line is not able to begin until after the EA is complete, it is unlikely that construction work will be completed during that same year.

Assuming completion of Phase 1 in mid-2013, Phase 2 will likely last into 2014, as it is unlikely that construction of the wetland mitigation and power line will be completed in the 2013 construction season. Work anticipated in Phase 2 is shown on the figure below.

Phase 3 (Initial Site Preparation)

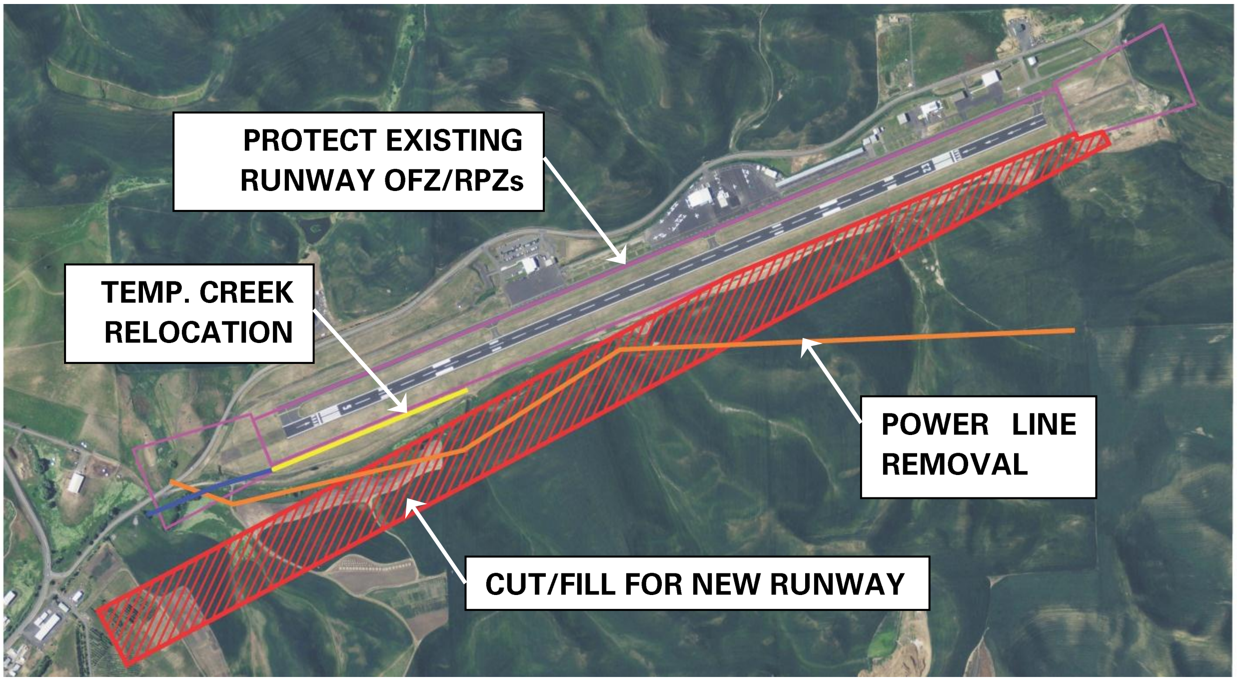
Once the wetland mitigation and land acquisition are complete, work may begin to prepare the site for the new runway. Significant earthwork may begin at this time at the eastern end of the project, away from the creek and the power line. A very large amount of cut is required at this end, which can be disposed of nearby without impacting the other areas of the project.

Work may also begin to relocate Airport Creek. In order to accommodate earthwork construction at the west end of the project, while maintaining the operation of the existing runway, a portion of the creek must be diverted into a new culvert installed parallel to the existing runway OFZ until it daylights to the west, outside of the earthwork areas. The remaining portion of the new creek alignment will flow over land until it intersects the Airport Road crossing. Once the existing runway is no longer needed, the creek will be relocated again to its final location.

Upon completion of the initial Airport Creek relocation, earth moving activities on the west end can begin. The initial focus for cut and fill in this area during this phase will be the area inside the RSA of the new runway, so that the runway can be paved early in the subsequent phase. It is anticipated that areas with large amounts of fill material will settle as much as 4-inches. Allowing 9-months for this settlement to occur will help create a more stable subgrade by the time base course and paving take place. Portions of the storm water management system will need to be installed at the same time (all elements within the proposed RSA).

Prior to winter shutdown on the construction site each year, thorough temporary erosion control measures will be required on all disturbed areas. This will involve straw wattle installation, hydroseed, and stabilization mat installation on all disturbed regions.

The following figure illustrates the work anticipated in Phase 3.



Phase 4 (Initial Pavement Construction, Continued Earthwork)

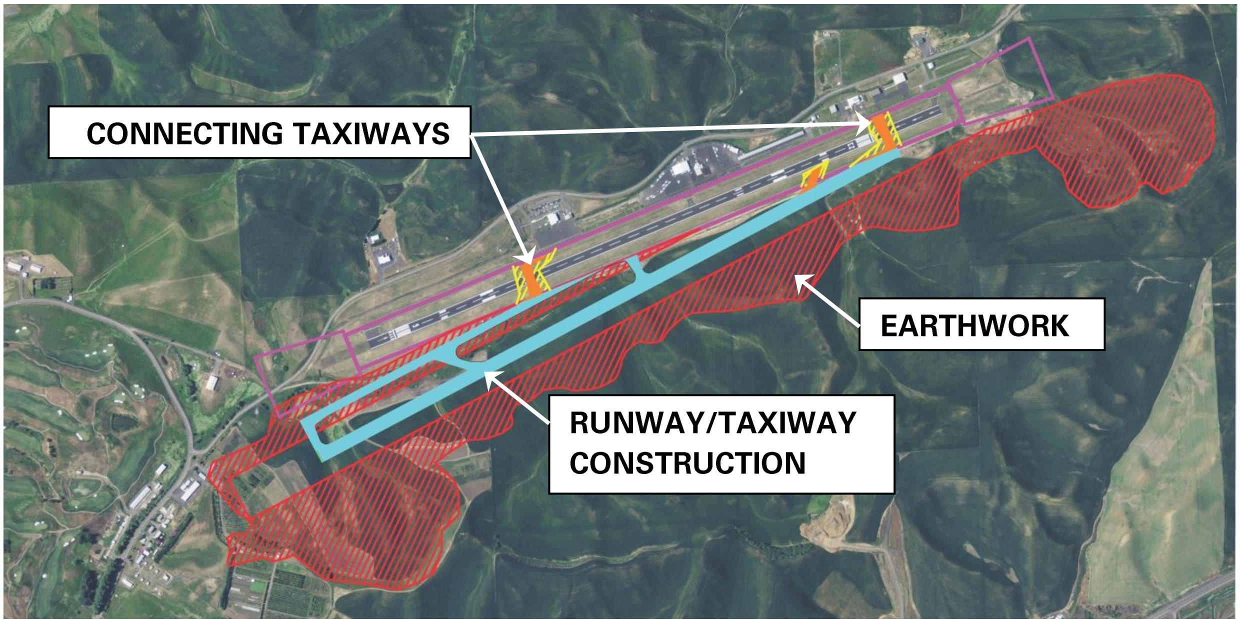
Phase 4 involves construction of the pavement section, lighting and signage items, regulator vault buildings, MALSR, stormwater management system piping, and miscellaneous grading of the realigned runway and parallel taxiway outside of the existing runway OFZ. The existing runway will remain operational during Phase 4 with the exception of one closure to construct access points to existing facilities. The goal of this phase is to complete the majority of the runway work so it can be open for use at the end of the construction season.

The majority of the work will be concentrated again within the new runway RSA and the intersection of the existing runway OFZ. Once the fill is to grade, the new pavement section can be constructed while additional grading outside of the RSA will continue to progress with disposal areas located along the length of the project to the south. Necessary runway and taxiway lighting and signage will be installed as well as subsurface edge drains and other related items. The new regulator vault building and related electrical items will be installed. The MALSR system will be installed off the west end and additional fill will be placed accordingly for installation of this item. All vertical guidance systems and the ASOS relocation will be completed during this phase as well. It is expected the MALSR and vertical guidance construction will require a majority of the construction season to complete.

One runway closure of the existing runway will be required to prepare and construct connecting taxiways to allow aircraft to access the existing terminal apron as well as for an exit/entry taxiway on the east end of the new runway. All connecting taxiways will be constructed, at a minimum, to the RSA of the new runway to avoid future runway closures in Phase 5. During this closure, the new runway and taxiway lighting and signage will be connected to the lighting system in order to be active by the completion of Phase 4. A temporarily relocated threshold on the east end will be necessary to allow for work to be completed in Phase 5.

Similar to Phase 3, temporary erosion control measures will be required on all disturbed areas during this phase as well as previous phases that may need additional support prior to winter shutdown. Periodic inspections and remediation will be necessary throughout the winter shutdown period.

Upon completion of Phase 4, the realigned runway and portions of the parallel taxiway will be paved and open for use. During the winter shutdown, the full 7,100-ft runway will be available. The runway and a portion of the taxiway will be open and operational.



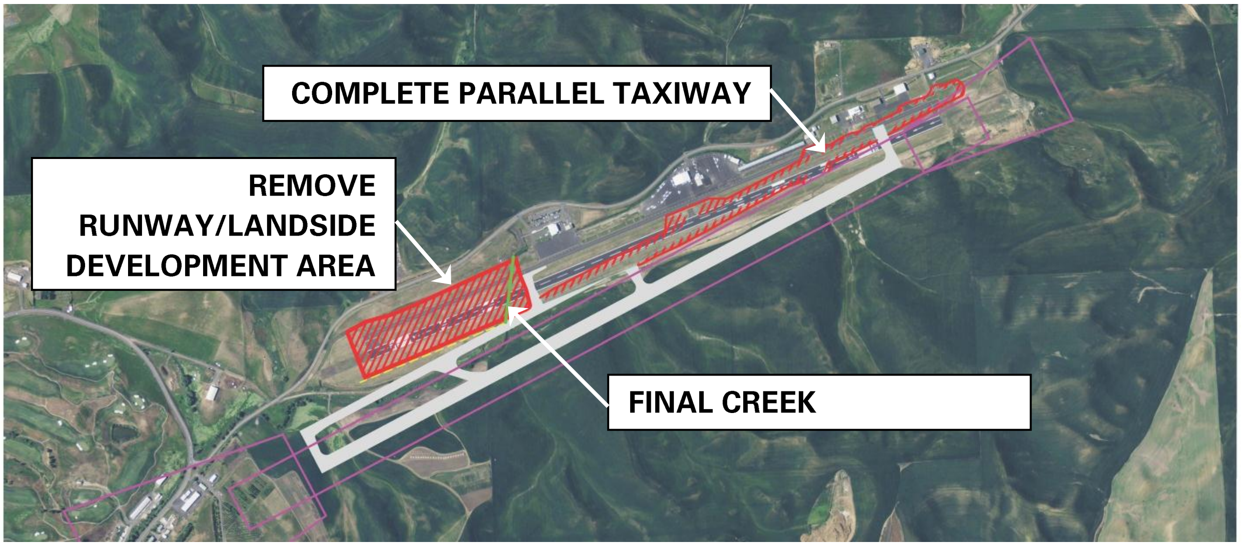
Phase 5 (Parallel Taxiway)

Phase 5 will complete the remaining work outside of the new runway RSA. The realigned runway will be open for operation. If grading on the east is not yet complete, a temporarily relocated threshold could be utilized on that runway end to allow work to take place while the runway is open.

Part two of the Airport Creek relocation will commence, beginning at the existing creek crossing under the runway and converging with the previously installed portion in Phase 3. The existing pipe will be removed and a new culvert installed. This will complete the creek relocation and allow for additional fill material to be disposed in this area.

Additional grading will be required to complete the taxiway construction and place embankment in the disposal area north of the existing Runway 5 end. This additional material will help prepare the site for future development and will limit the amount of offsite disposal of the excavated material. It is anticipated that placing this additional embankment will be a night operation, possibly requiring temporary runway closures. The construction traffic will be required to cross the west threshold to access this site or utilize an access road further west.

Demolition of the asphalt and utilities along the existing runway will begin as well as preparation of the remaining portion of the new parallel taxiway. The existing runway asphalt will be rotomilled and placed along the new parallel taxiway shoulders. The remaining taxiway lighting, signage, and subsurface edge drains will be installed. The connecting taxiways constructed in Phase 4 may require additional grading modifications to account for the final taxiway design. This will be completed while the remaining portion of the taxiway is constructed. During the construction of the remainder of the parallel taxiway and connecting taxiways on the east end of the project, many existing hangars will be without direct access to their facilities. These aircraft can be temporarily accommodated on the public apron until construction is complete in this area.



ESTIMATED CONSTRUCTION COSTS

Construction costs for the project have been estimated based on the completed analysis and cost data gathered from similar projects in the region of the airport. The purpose of these estimates is budgetary and, due to the large number of variables (unknowns about final design, oil prices, inflation, etc.), the estimates will need to be continually revised during design and development of the project. The estimates have been prepared conservatively, to take into account the large number of unknowns. Overall project construction costs by category are summarized in the following table.

Cost Category	Alternatives			
	1	2	3	4
Land Acquisition/Fencing	$2,810,000	$2,810,000	$2,810,000	$2,810,000
Wetlands/Stream Relocation	$2,200,000	$2,200,000	$2,200,000	$2,200,000
Power Line Relocation	$2,000,000	$2,000,000	$2,000,000	$2,000,000
Mobilization, Etc.	$5,970,000	$6,180,000	$6,790,000	$6,590,000
Site Prep/Earthwork	$16,150,000	$18,180,000	$25,230,000	$23,350,000
Pavement	$14,190,000	$14,630,000	$15,610,000	$15,390,000
Drainage	$1,670,000	$1,760,000	$1,970,000	$1,970,000
Airfield Lighting	$1,150,000	$1,170,000	$1,210,000	$1,210,000
NAVAIDs/ASOS	$2,350,000	$2,350,000	$2,350,000	$2,350,000
Subtotal	**$48,490,000**	**$51,280,000**	**$60,170,000**	**$57,870,000**
Contingency (15%)	$7,273,500	$7,692,000	$9,025,500	$8,680,500
Total, Construction	**$55,763,500**	**$58,972,000**	**$69,195,500**	**$66,550,500**
Engineering/Environmental (20%)	$11,152,700	$11,794,400	$13,839,100	$13,310,100
TOTAL	**$66,916,200**	**$70,766,400**	**$83,034,600**	**$79,860,600**

It should be noted that these costs include estimated airside construction costs, developed through the analysis described in this memo. A budgetary allowance is provided for engineering and environmental services that will be required to complete the project. Actual fees will be determined after the project is more closely defined. Costs for landside improvement are not included, as these will be addressed in the landside alternatives analysis.

Another way of looking at the costs is by phase, in order to see the anticipated costs for each year of construction. (Note that Phase 1, EA is not included, as no construction will take place that year.) These costs are summarized in the following table:

Phase	Alternatives			
	1	2	3	4
Phase 2	$6,020,000	$6,020,000	$6,020,000	$6,020,000
Phase 3	$9,500,000	$10,570,000	$14,370,000	$13,320,000
Phase 4	$25,370,000	$27,040,000	$32,000,000	$30,750,000
Phase 5	$7,600,000	$7,650,000	$7,780,000	$7,780,000
Subtotal	**$48,490,000**	**$51,280,000**	**$60,170,000**	**$57,870,000**
Contingency (15%)	$7,230,000	$7,692,000	$9,025,500	$8,680,500
Total	**$55,370,000**	**$58,972,000**	**$69,195,500**	**$66,550,500**

It should also be noted that phasing may be influenced by the availability of federal funds and, as a result, phases may need to be further divided into smaller elements (e.g., Phase 4).

CONCLUSION

All four of the alternatives analyzed are feasible, from a construction standpoint. The differences between the four alternatives are simply cost and time to construct. Alternatives 3 and 4 are obviously more costly, and also can be expected to take one additional construction season to complete, due to the increased amount of cut required for these options.

The decision between the options should be made based on available funding and the operational demand.

REPORT
GEOTECHNICAL ENGINEERING STUDY
PROPOSED RUNWAY REALIGNMENT
PULLMAN-MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

DECEMBER 21, 2007

FOR
TOOTHMAN-ORTON ENGINEERING COMPANY

GEOENGINEERS

File No. 16649-001-00

GeoEngineers

December 21, 2007

Toothman-Orton Engineering Company
9777 Chinden Boulevard
Boise, Idaho 83714-2008

Attention: Dave Mitchell, PE
Project Manager

This letter transmits three copies of our "Report, Geotechnical Engineering Study, Proposed Runway Realignment, Pullman-Moscow Regional Airport," Pullman, Washington.

Our services were completed in general accordance with our revised proposal dated October 10, 2007. Written authorization for our study was executed on October 22, 2007.

We appreciate the opportunity to provide these services. Please contact the undersigned should you have any questions or require additional information.

Respectfully submitted,

GeoEngineers, Inc.

James B Harakas

James B. Harakas, PE, LEG
Senior Principal

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Report
Geotechnical Engineering Study
Proposed Runway Realignment
Pullman-Moscow Regional Airport
Pullman, Washington
File No. 16649-001-00

December 21, 2007

Prepared for:

Toothman-Orton Engineering Company
9777 Chinden Boulevard
Boise, Idaho 83714-2008

Attention: Dave Mitchell, PE
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GEOTECHNICAL ENGINEERING STUDY
PROPOSED RUNWAY REALIGNMENT
PULLMAN-MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON
FOR
TOOTHMAN-ORTON ENGINEERING COMPANY

INTRODUCTION

This report presents the results of our geotechnical engineering study in support of your preparation of a master plan and construction cost estimates for an alternate realignment of Runway 5-23 at the Pullman-Moscow Regional Airport in Pullman, Washington. The proposed realignment for Runway 5-23 will be located south of existing Runway 5-23, approximately as shown on the Vicinity Map, Figure 1.

We understand proposed Runway 5-23 includes a length in the range of 6,700 to 8,000 feet and width of approximately 100 feet. Conceptual plans indicate the new alignment and proposed grades will require a relatively large amount of earthwork, on the order of 7,700,000 cubic yards. The majority of the grading that will be required to establish proposed final elevations will be in cut. Excavation to depths in the range of about 20 to 75 feet is envisioned. A relatively small volume of fill, on the order of 3,100,00 cubic yards, will be required to raise grades in the topographically low area at the west end of the proposed Runway. Fill thickness in that area will range from 20 to 60 feet. Consequently, roughly 4,600,000 cubic yards of material will be disposed off site.

We further understand that grading the adjacent hills south of the proposed runway to slopes of either 4H:1V (horizontal to vertical) or 7H:1V will require some cuts down to about 75 feet below current site grades. Furthermore, portions of an approximate ½-mile-long wetland at the southwest portion of the airport will be filled in order to raise grade for the proposed alignment. The location of the proposed realignment for Runway 5-23 relative to existing site features is shown on the Site Plan, Figure 2.

SCOPE OF SERVICES

The purpose of our geotechnical engineering study was to provide recommendations for site preparation and earthwork, and design and construction of proposed improvements based on subsurface exploration, laboratory testing and engineering analyses. Our specific scope of services included:

1. Review of our files for information that might be pertinent and available for use in developing our recommendations for the subject project.
2. Geologic reconnaissance to assess siting issues such as unstable slopes, springs or other geologic hazards proximate to the proposed alignment that might impact long-term performance of the proposed cut slopes.
3. Exploration of soil and groundwater conditions underlying the site by drilling 11 borings in the proposed cut areas and four borings in the proposed fill areas at the west third of the proposed runway.
4. Laboratory testing to assess pertinent physical and engineering properties of soil and rock encountered relative to the proposed construction.

5. An evaluation of the challenges associated with developing the site with a particular focus on the significant site excavation and grading. We also assess the presence or absence of groundwater and provide recommendations to mitigate groundwater, if present within excavation limits.
6. An evaluation of the suitability of on-site soil for use as structural fill beneath the proposed runway alignment and beneath future development areas of the project.
7. Recommendations for allowable cut slope inclinations based on a qualitative assessment, and quantitative data of soil and rock conditions developed as described above.
8. Recommendations for site preparation including an evaluation of the potential for runway fill settlement resulting from compressible soil consolidation in areas of significant fill. We also include recommendations for mitigating such settlement.

SITE CONDITIONS

GENERAL

Soil and groundwater conditions at the site were explored on October 24 through 26 and 29 through 31, 2007 by drilling 15 borings (B-1 through B-15) at the approximate locations shown on Figure 2. The borings were advanced to depths in the range of about 15 to 75 feet below existing site grade.

Representative soil samples and rock cores from the explorations were returned to our laboratory for review and testing. Detailed descriptions of our site exploration and laboratory testing programs along with exploration logs and laboratory test results are presented in Appendix A.

SURFACE CONDITIONS

The site of the proposed Runway realignment is located generally south of existing Runway 5-23. The existing Runway is situated near the base of a shallow valley, with surrounding rolling hills which are used for agricultural purposes. The hills extend up from the valley floor at moderate inclinations to the south and across Airport Road to the north. Generally, existing Runway 5-23 is level, with a wide shoulder that grades down slightly to the south. The valley bottom is between the base of the hills and the runway shoulder.

A stream flows through the valley, and is piped under the existing airport facilities at an angle to the runway, discharging between the airport and the base of the hills near the west end of the existing runway. An access road, which extends south into the agricultural lands, is located in the southwest portion of the site. Also, a high-voltage overhead power line with associated utility poles traverses the project as shown on Figure 2.

Surface vegetation varied across the site. Thick wetland grasses and plants are located around and near the stream. Grass and landscaping is present within the existing airport facilities. Up-turned grain stubble characterizes the agricultural portions of the site.

Just north of boring B-15, we observed an old cut slope constructed for runway clearances. Based on discussion with airport personnel, we understand that excess material from the cut slope was placed near boring B-14. Near boring B-3 we also observed a seasonal runoff channel, which was dry at the time of our reconnaissance.

SUBSURFACE CONDITIONS

Soil Conditions

General

We encountered generally variable subsurface conditions across the site. For the purposes of this report, we characterized the soil and rock into four general units based on engineering properties including: 1) topsoil; 2) silt and clay; 3) clayey gravel; and 4) basalt rock.

Topsoil

At the locations of our borings, we encountered topsoil extending from the ground surface to depths in the range of about ½ to 2 feet below site grade. The topsoil generally consisted of soft silt with organic matter and variable sand content. For the purposes of this report, we generally define topsoil as a fine-grained soil with an appreciable amount (generally more than about 15 percent by volume) of organic matter based on visual examination. We characterized the topsoil unit as having low strength and permeability, and high compressibility and susceptibility to changes in moisture content.

Silt and Clay (CL, ML or CL-ML)

At the locations of each boring, we encountered silt, clay or silty clay, which extended to the depths explored for most borings, and to depths in the range of about 11½ to 13½ feet at the locations of borings B-6 and B-3, respectively. The in-place silt/clay was generally medium stiff to hard. Gradation analyses on representative samples indicate the silt/clay unit has a fines (silt- and clay-sized soil particles passing the U.S. No. 200 sieve) content in the range of about 75 to 95 percent. Laboratory analyses indicate the silt/clay unit has an in-place dry unit weight in the range of about 82 to 109 pounds per cubic foot (pcf) with an average of about 97 pcf. Atterberg limits testing performed on representative samples indicate the silt/clay has a liquid limit in the range of about 34 to 40, a plasticity index in the range about of 12 to 19 and an in-place moisture content in the range of about 12 to 37 percent. We characterized the in-place silt/clay unit as having moderate strength, low permeability, moderate compressibility and high susceptibility to changes in moisture content.

Clayey Gravel (GC)

Below the clay unit, at the locations of borings B-3 and B-6, we encountered very dense clayey fine gravel with sand. The thickness of the clayey gravel unit was in the range of about 1½ to 2 feet. We characterized the clayey gravel as having high strength, low compressibility and permeability, and moderate to high susceptibility to changes in moisture content.

Basalt Rock

At the locations of borings B-3 and B-6, below the silt/clay and clayey gravel units, we encountered fractured basalt rock which extended to the depths explored. Continuous rock cores were attempted at these locations with recovery ranging from about 80 to 100 percent in boring B-3, and about 57 to 83 percent in boring B-6. The estimated Rock Quality Designation (RQD) ranged from 22 to 50 percent in boring B-3, and 0 to 13 percent in boring B-6 with an average RQD on the order of 26 and 5 percent, respectively. The RQD is the ratio of the number of inches of recovered drill core in excess of 4 inches to the length of total core drilled. We characterized the in-place basalt unit as having high strength, and low compressibility and permeability.

Groundwater Conditions

We encountered groundwater at the locations of borings B-3, B-14, and B-15. The depth to groundwater varied from about 14 feet at the location of boring B-3 to about 44 feet at the locations of borings B-14 and B-15. However, based on our experience in the general site vicinity and publicly available regional geologic information, it is our opinion that groundwater could be within a few feet of the ground surface in the low-lying portions of the site. Furthermore, we believe the groundwater table will fluctuate seasonally and during extended periods of wet weather depending on factors such as precipitation, irrigation or other means of recharge.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on the results of our site exploration, laboratory testing and engineering analyses, we believe the proposed improvements may be designed and constructed generally as envisioned. However, site soils are highly susceptible to changes in moisture content. Accordingly, construction during wet weather will be difficult. Furthermore, where existing grades are near proposed grades, some soft, wet soil could be present at proposed final subgrade elevation. Overexcavation and replacement might be required in these areas.

In some areas of the site, primarily at the west end of the proposed Runway, the existing silt/clay is soft and compressible. Initial fill placement might require use of geogrid reinforcing. The weight of the new embankment also will induce consolidation of the silt/clay and settlement of the embankment. The following sections of this report present our specific conclusions and recommendations for site preparation, groundwater mitigation, soil consolidation, and other geotechnical aspects of the project.

GEOLOGIC HAZARDS

Because we did not observe evidence of recent slope instability or erosion during our site reconnaissance, it is our opinion that development of sloping portions of the site is not likely to initiate unstable slopes or significant erosion. However, our opinion of these potential hazards is based on the assumption that the recommendations in our report will be considered during design, and proper construction means and methods will be used.

Based on conceptual plans, the groundwater we encountered at the locations of borings B-14 and B-15 (proposed cut areas at the east end of the project) will be intercepted by the cut slopes during construction. Also, the dry drainage channel observed near boring B-3 (proposed fill area at the west end of project) will likely have surface water flowing in it during the spring and times of significant precipitation. Accordingly, our recommendations for mitigation of groundwater and surface water provided in a subsequent section of this report should be included in design and implemented during construction.

SITE PREPARATION AND EARTHWORK

General

Site preparation and earthwork should be completed in general accordance with Federal Aviation Administration (FAA) Specification Items P-151 and P-152. As noted previously, conceptual plans indicate proposed cuts down to about 75 feet and fills up to about 60 feet. Because the proposed earthwork at this site is significantly variable, we have characterized the site preparation into three general conditions, specifically: areas of significant cut; areas of significant fill; and transitional areas where proposed grades are near existing grades.

Initial Preparation

Areas of Significant Cut

Initial site preparation and earthwork operations in areas of significant cut will include: clearing, stripping, and grubbing; followed by grading and/or excavation to establish proposed subgrade elevations; and excavation for proposed utilities. We recommend that all proposed embankment areas be cleared of surface and subsurface deleterious and organic matter, and roots greater than ½ inch diameter be thoroughly grubbed and removed.

The topsoil we encountered at the locations of our explorations generally is similar in gradation to the underlying silt and clay. However, the organic matter content of the topsoil generally exceeds about 15 percent (by volume). We recommend that the topsoil be stripped from areas where excavation will be required and removed from the site. Alternatively, it may be stockpiled and reused to enhance growth of vegetation in cut areas after final grades have been established. We estimate stripping depths required to remove topsoil could range from about 6 to 24 inches below site grade. However, greater stripping depths might be required to remove localized zones of thicker topsoil that could be present in areas of the site that were not explored. Actual stripping depths should be determined based on field observations at the time of construction.

The organic content, and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and for agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for concluding that topsoil from the subject site is suitable for use in landscaping or for agricultural purposes, nor for estimating the volume of topsoil that could be available for such purposes.

Areas of Significant Fill

We identified soft, wet soil in the topographic low area at the west end of the proposed Runway. In this area, where more than 10 feet of fill will be required to achieve proposed grades, we recommend that the grass and other vegetation be cut and the resulting organic debris removed from within the proposed embankment limits. The sod mat and topsoil should remain in place. Lightweight equipment might be necessary to accomplish the mowing and vegetation removal. It also might be necessary to place geogrid reinforcing over soft, wet areas to enable subsequent fill placement. We recommend Tensar BX 1100 or equal be used for this purpose. The initial lift of fill should be about 12 to 18 inches thick and lightly compacted to provide a working surface for subsequent lifts of fill.

Transitional Areas of Cut/Fill

We recommend initial site preparation and earthwork operations in transitional areas of the site where proposed grades are within 10 feet of existing grades be the same as outlined above in the **Areas of Significant Cut** portion of this report. However, where existing grades are near proposed grades, some soft, wet soil could be present at proposed final embankment subgrade elevation. Overexcavation and replacement might be required in these areas. It also might be necessary to place geogrid reinforcing over soft, wet areas to enable subsequent fill placement. We recommend Tensar BX 1100 or equal be used for this purpose. The initial lift of fill should be about 12 to 18 inches thick and lightly compacted to provide a working surface for subsequent lifts of fill.

Grading and Excavations

Conceptual plans indicate excavation to runway subgrade will require cuts to a maximum depth of about 75 feet below current site grades in some areas. In our opinion, site soil can be excavated using conventional excavating equipment such as backhoes, excavators or dozers. As noted previously, the site soils are highly moisture sensitive, and will be difficult to work or compact if moisture contents are greater or less than the optimum moisture content by about 2 to 4 percentage points. Accordingly, earthwork during wet weather should be avoided, if possible. We also recommend that excavators or backhoes with smooth buckets be used when excavating to establish final grades in order to minimize soil disturbance.

Fill placed on slopes steeper than 5H:1V should be keyed into proofrolled native soil by cutting horizontal benches. The benches should be 1½ times the width of the equipment used for grading and about 4 feet high. Each bench should be sloped to drain toward the uphill portion of the slope.

If earthwork activities cause excessive subgrade disturbance replacement with structural fill might be necessary. Disturbance to a greater depth should be expected if site preparation work is conducted during periods of wet weather when the moisture content of the site soil could exceed optimum. All excavations should be backfilled with structural fill, as defined in a following section of this report.

Fill Embankment Settlement

We understand that embankment fill up to about 60 feet high is planned at the west end of the proposed runway alignment. As noted previously, raising grade to establish final runway subgrade will result in consolidation of the underlying compressible silt/clay deposits, which, in turn, will result in post-construction settlement of the proposed embankment. The magnitude of such settlement will depend on the height of new fill, compressibility characteristics specific to the silt/clay and thickness of this compressible deposit where present below the proposed embankment fill.

Based on results of our site exploration and laboratory testing, we estimate that primary consolidation settlement as a result of raising grades could range from 1 to 4 inches, for fill heights ranging from about 20 to 60 feet above existing ground surface elevations, respectively. We estimate the majority of the settlement resulting from embankment fill placement should be complete within about 4 to 6 weeks after fill placement without a surcharge fill. Most of this estimated settlement should be built out before pavement construction ensues. Such settlement could adversely affect utilities if they are installed before settlement is complete. Accordingly, we recommend settlement monitoring to determine when consolidation settlement is essentially complete. We recommend that pavement construction and utility installation not begin until results of settlement monitoring indicate that initial consolidation settlement is essentially complete.

Mitigation of the above estimated settlements can be achieved by either delaying pavement construction for a period of time after new site grades are established, or by placing excess fill (surcharge) above the proposed embankment finished grade to accelerate the rate of consolidation. The purpose of a surcharge fill is to induce settlement beneath the proposed embankment before construction of utilities and pavements. Typically, settlement is monitored by taking survey readings on several markers located within the surcharge fill areas.

We recommend that GeoEngineers be retained to evaluate site settlement after earthwork operations are complete and to advise when construction can commence. If the construction schedule will be adversely impacted by delaying utility installation and/or pavement construction for a period of about a month, and use of a surcharge to accelerate consolidation settlement at the west end of the proposed Runway is considered viable, we should be consulted to determine the height of surcharge that will be required.

Regardless of whether or not surcharging is implemented, we recommend that settlement markers be installed at the west end of the proposed Runway where fill height will exceed 15 feet. The markers should be installed with the bases at site grade after initial site preparation is completed and before placing structural fill that will be required to achieve proposed subgrade elevations. The markers should extend through the embankment structural fill. We will provide the number and location of settlement markers in consultation with the civil engineer before site work commences. A typical detail of a settlement marker is provided in Settlement Marker Schematic, Figure 3.

Elevation survey of the top of each settlement marker should be completed immediately after installation and before placing fill. Elevations should be resurveyed daily during embankment fill placement and then weekly or biweekly until the data indicate that settlement is essentially complete. Elevation survey data should be promptly provided to GeoEngineers for review and evaluation during the settlement monitoring period.

Subgrade Preparation

The exposed subgrade should be evaluated after mass grading is complete and before placement of structural fill and/or subbase. We recommend proofrolling with large construction equipment during dry weather and if access for this equipment is practical. Proofrolling consists of two to three passes of a minimum 10-ton vibratory roller or fully loaded dump truck to identify soft, loose or pumping areas within the working subgrade. Probing should be used to evaluate the subgrade during periods of wet weather or if access is not feasible for compaction equipment.

Loose, wet or soft areas noted during proofrolling or probing should be excavated to firm bearing or a depth of 2 feet, whichever is less, and replaced with structural fill compacted as recommended in a following section. Additional structural fill required to establish proposed subgrade elevations may be placed on proofrolled soil as recommended above and in a following section.

Upon completion of mass grading and embankment construction, soil exposed should consist of silt and clay. We recommend the uppermost 24 inches of embankment subgrade fill consist of select imported granular fill generally conforming to criteria presented below in the **Structural Fill** section of this report.

Because there is a significant difference between the gradation of the site soil and proposed imported fill, it is our opinion that there is a high potential for migration of the silt/clay into the overlying imported structural fill or subbase layer. Such migration causes contamination of the lower portion of the gravel base and reduces the supporting capability of the runway surfacing. For this reason, we recommend that a woven road stabilization geotextile fabric with a grab tensile strength (ASTM D4632) of 200 pounds (e.g., Mirafi 500X, Layfield LP200, or Amoco 2002) be placed between the prepared subgrade soil surface and overlying imported structural fill or subbase to provide separation and reduce potential for compromise of the material integrity. It is our experience that the use of the geotextile fabric is worth the expense because of the improved performance and protection provided.

Groundwater and Surface Water Considerations

As noted previously, we anticipate that excavations may extend below the groundwater table in some areas of the site. The contractor should be prepared to manage groundwater in the event a discontinuous zone of confined groundwater is encountered during construction operations or if slow seepage occurs in excavations within the silt/clay unit. Site excavations should be provided with appropriate ditches and sumps to discharge excess water within excavation limits to a suitable location and keep the exposed areas as dry as possible. Also, some local ponding of water from precipitation could occur in excavations during construction. Some additional pumping from sumps might be necessary during wet weather.

The on-site native silt and clay soil is very moisture sensitive, and will be troublesome to work with at or below groundwater elevation. Soft saturated soils at working subgrade elevations will need to be overexcavated to a depth of 2 feet, keyed into proofrolled native soil by cutting horizontal benches and backfilled with structural fill as outlined below. In order to minimize subgrade disturbance, final excavations should be completed with a smooth-edge bucket.

For excavations that extend below the water table, as an initial step in backfilling, we recommend placing a layer of quarry spalls in a single lift to an elevation approximately 1 foot above the groundwater level at the time of construction. The quarry spall material should generally conform to criteria presented below in the **Structural Fill** section of this report and be thoroughly compacted to a firm and unyielding condition with a minimum of eight to 10 passes of a 10-ton or greater static-weight, vibratory roller. After compaction of the quarry spall material, we recommend that a geotextile conforming to Washington State Department of Transportation (WSDOT) Standard Specification 9-33 for “Separation” be placed between the quarry spalls and overlying structural fill. Structural fill placed to establish final embankment subgrade should meet the criteria presented below in the **Structural Fill** section of this report.

Excavation and earthwork activities within the vicinity of the existing stream will require diversion or relocation of the stream before mass earthwork. Also, any subsurface water flows encountered during construction will need to be diverted during excavation and backfilling activities.

STRUCTURAL FILL

General

We recommend fill beneath proposed pavements and in embankments and utility trenches be placed as structural fill. The suitability of soil for use as structural fill depends on the soil gradation and moisture content at the time of construction. As the amount of fines increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult to achieve. Structural fill material requirements vary depending upon its use as described below.

Use of On-Site Soil

The topsoil is unsuitable for reuse as structural fill. The site soils have a high fines content and will be very difficult to work if moisture contents are more than about 2 percentage points above or below optimum. Accordingly, we suggest that the on-site soil be reused as embankment structural fill beneath the proposed runway alignment and beneath future development areas of the project only during extended periods of dry weather. If the on-site soil becomes wet, removal and replacement might be required. Also, silt/clay encountered below the water table will be saturated, and therefore unsuitable for reuse as structural fill. For these reasons, we recommend that project planning include the provision for importing select structural fill if construction takes place during sustained periods of wet weather.

An experienced geotechnical engineer should determine the suitability of any on-site material encountered during earthwork activities for reuse as structural fill. The on-site soil used for structural fill also should be free of debris, organic material, frozen soil or particles greater than 6 inches in dimension.

Imported Structural Fill

Depending on the intended use, imported structural fill should meet the following specifications:

1. Structural fill placed to backfill utility trenches outside of pavement limits should meet the criteria described in Section 9-03.15 of the 2008 Washington State Department of Transportation (WSDOT) Standard Specifications.
2. Imported general structural fill placed within runway embankment limits should consist of a well graded sand or sand and gravel mixture with less than about 10 percent fines. Imported structural fill also should be free of organic material, frozen soil or particles larger than 6 inches in maximum dimension. (Although the on-site existing silt/clay and silty gravel have a fines content in excess of 10 percent, these soil units may be used for embankment structural fill during extended periods of dry weather.) "Select Borrow" as described in Section 9-03.14(2) of the most current version of WSDOT Standard Specifications generally meets these requirements. Select Borrow will be suitable for use as structural fill during dry weather conditions only. If structural fill is placed during wet weather, the structural fill should consist of a well-graded sand or sand and gravel mixture with less than about 5 percent fines.
3. Structural fill for use as runway subbase should meet the criteria in FAA Specification P-154.
4. Imported structural fill placed as quarry spalls below the groundwater table should conform to WSDOT Standard Specification 9-13.6 for "Quarry Spalls".

Fill Placement and Compaction Criteria

In accordance with FAA Specification Item P-152, embankment structural fill should be placed in loose lifts not exceeding 8 inches in thickness and mechanically compacted to a firm, non-yielding condition as outlined below. Each lift should be conditioned to the proper moisture content and compacted to the specified density before placing subsequent lifts. We recommend structural fill be compacted to the following criteria:

1. Structural fill placed within the upper portions of proposed subgrade in runway pavement areas should be compacted as specified in the cohesive soils column of Table 3-2 of FAA Advisory Circular 150/5320-6D. A pavement design section was not part of our scope for this portion of the project.
2. In accordance with Specification Item P-152 for flexible pavements over cohesive soils, embankment fill placed at a greater depth below pavement subgrade than those outlined in Table 3-2 should be compacted to at least 90 percent of the maximum dry density (MDD) based on the American Society for Testing and Materials (ASTM) D1557 laboratory test procedure.
3. Non-structural fill, such as fill placed in landscaped areas, should be compacted to at least 85 percent of the MDD estimated in accordance with ASTM D1557 or to the degree required for trafficability of construction equipment. In areas intended for future development, a higher degree of compaction should be considered to reduce the settlement potential of the fill soil.

We recommend that a representative of GeoEngineers be on site during earthwork operations to observe site preparation and fill placement. Soil conditions should be evaluated by in-place density tests, visual evaluation, probing and proofrolling of the structural fill and recompacted on-site soil as it is prepared to check for compliance with the contract documents and recommendations in this report.

CUT AND FILL SLOPES

Temporary cut slopes might be necessary during grading, utility installation and excavation operations. The contractor is responsible for construction site safety and should monitor slopes during earthwork in accordance with applicable Washington Industrial Safety and Health Administration (WISHA) regulations.

In our opinion, the on-site soil classifies as Type B as described in Washington Administrative Code (WAC) 296-155 Part N. Temporary cut and fill slopes in Type B soils may be inclined at 1H:1V or flatter. This recommendation assumes that all surface loads are kept a minimum distance of at least ½ the depth of the cut away from the top of the slope. Flatter slopes will be necessary if surface loads are imposed above the cuts a distance equal to or less than one half the depth of the cut.

We recommend a maximum inclination of 3H:1V for permanent cut slopes. Surface drainage should be directed away from slope faces. Some minor raveling could occur with time. All slopes should be covered with topsoil and seeded as soon as possible after earthwork operations are complete to encourage the development of a vegetative cover, or otherwise protected.

WEATHER CONSIDERATIONS

The on-site soil contains a high percentage of fines (clay and silt), and is moisture sensitive. When the moisture content of the soil is more than a few percent above the optimum moisture content, it becomes muddy and unstable. Operation of equipment in these conditions will be difficult and the required compaction criteria for structural fill will not be achieved. Additionally, disturbance of near-surface soil should be expected if earthwork is completed during periods of wet weather. During dry weather, on-site soil should: 1) be less susceptible to disturbance; and 2) provide better support for construction equipment. Therefore, we recommend that earthwork be scheduled for the normally warmer months unless delays in the construction schedule can be tolerated.

If wet weather earthwork is unavoidable, we recommend the following steps be taken should near-surface soil conditions begin to deteriorate:

- The ground surface in and around the work area should be sloped so that surface water is directed away from excavations and exposed soil. The ground surface should be graded so that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Earthwork activities should not take place during periods of heavy precipitation.
- Slopes with exposed soil should be covered with plastic sheeting.
- The contractor should take necessary measures to prevent on-site soil and soil to be used as fill from becoming wet or unstable. These measures may include the use of plastic sheeting, sumps with pumps, and grading. The site soil should not be left uncompacted and exposed to moisture. Sealing the surficial soil by rolling with a smooth-drum roller before periods of precipitation should help reduce the extent to which the soil becomes wet or unstable.

- Construction activities should be scheduled so that the length of time that soil is left exposed to moisture is reduced to the extent practical.

In addition, we recommend that sloped surfaces in exposed or disturbed soil be restored so that surface runoff does not become channeled. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.

Unprotected site soil also can deteriorate under construction traffic if exposed to inclement weather. Accordingly, to the degree possible, we recommend that construction equipment and personnel be prohibited from traversing prepared subgrade areas during wet weather conditions. Excavations that are prepared before inclement weather should be re-inspected to identify areas requiring repair. Any such areas should be overexcavated to firm bearing or a depth of 2 feet, whichever is less, and replaced with compacted structural fill as discussed in the previous section of this report.

ADDITIONAL SERVICES

In addition to construction monitoring services mentioned in previous sections, GeoEngineers can provide special inspection and testing of reinforced concrete, structural masonry, structural steel, and other structural items required by the UBC/IBC. We will be pleased to discuss these services with you before construction commences.

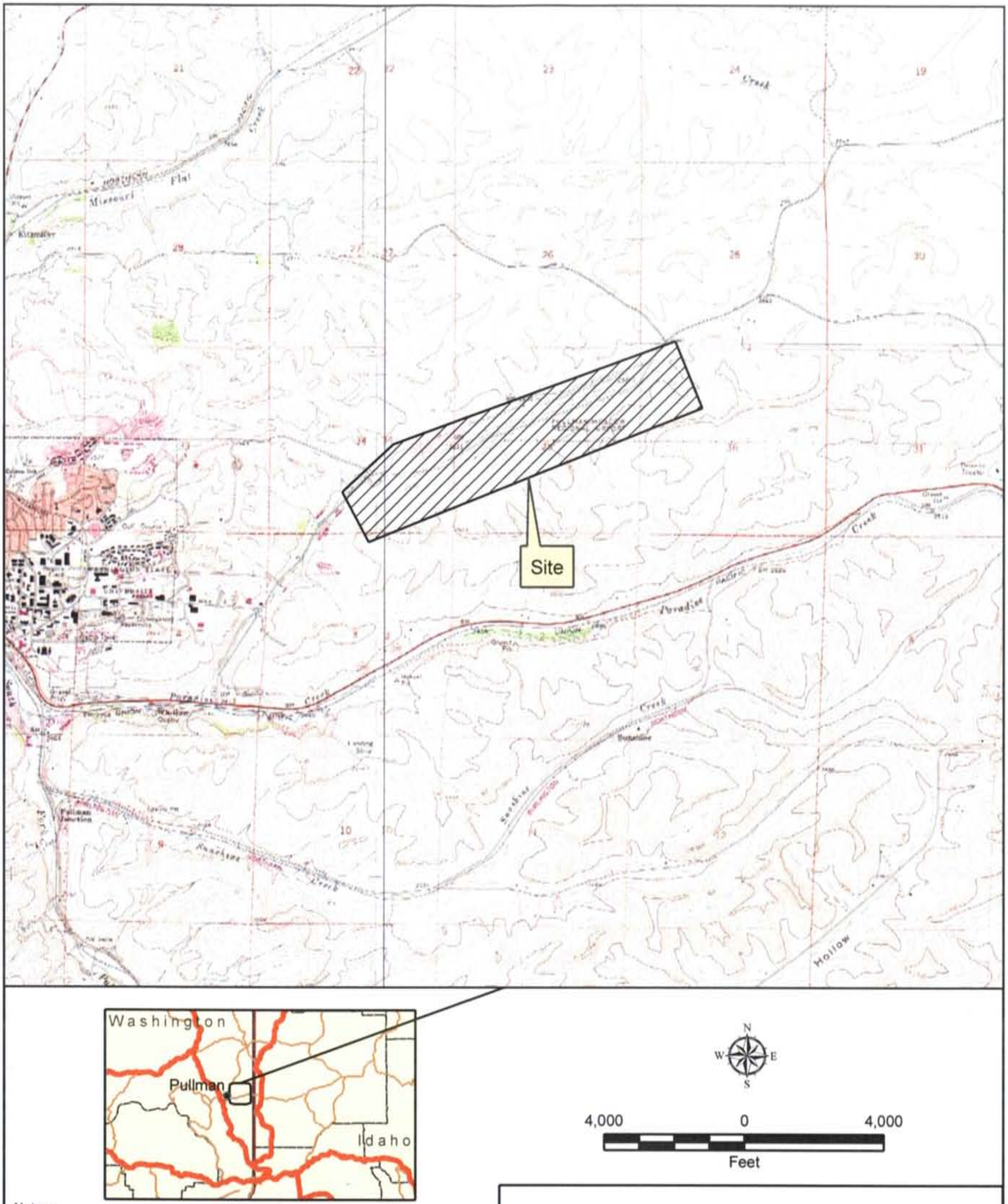
LIMITATIONS

We have prepared this report for use by the Pullman-Moscow Regional Airport, Toothman-Orton Engineering and their selected design consultants in support of your preparation of a master plan and construction cost estimates for an alternate realignment of Runway 5-23 at the Pullman-Moscow Regional Airport in Pullman, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix B titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

We appreciate the opportunity to provide these services. Please call should you have any questions regarding the contents of this report or require additional information.



Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 11 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

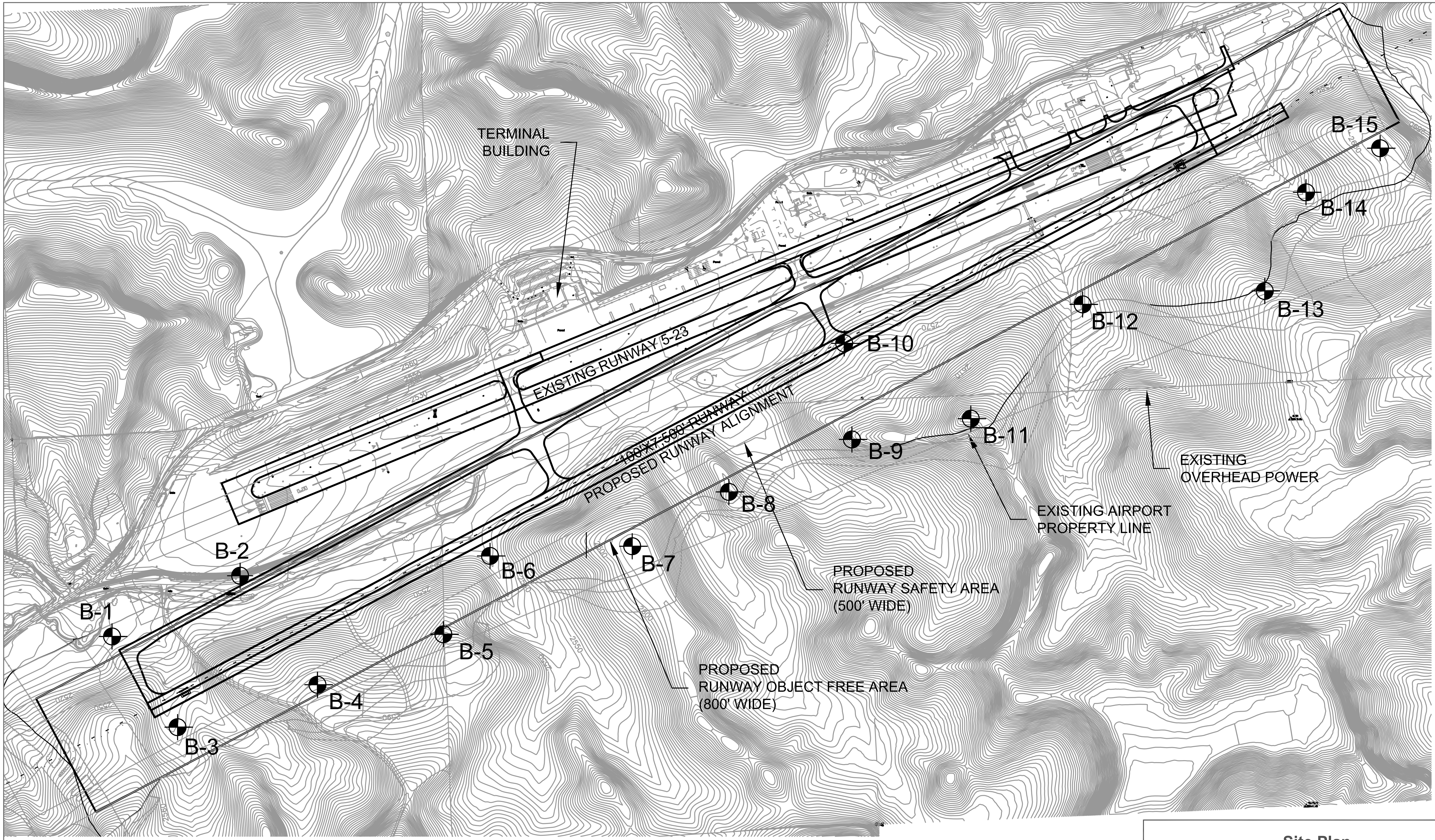
Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure 1

Office: SPOK   Path: P:\16\16649001\00\GIS\MXDs\1664900100Figure1.mxd   Map Revised: December 18, 2007

SPOK P:\16\16649-001\00\CAD\1664900100F2.dwg LDS:tlm 12/18/07 rev 12/21/07



Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Contour interval equals 2 feet.

Reference: Base drawing provided by Toothman-Orton Engineering Co. titled "Pullman-Moscow Airport Master Plan Phase 1B Geotechnical Plan" dated 10/16/2007.

N W E S

600 0 600
Feet

Legend

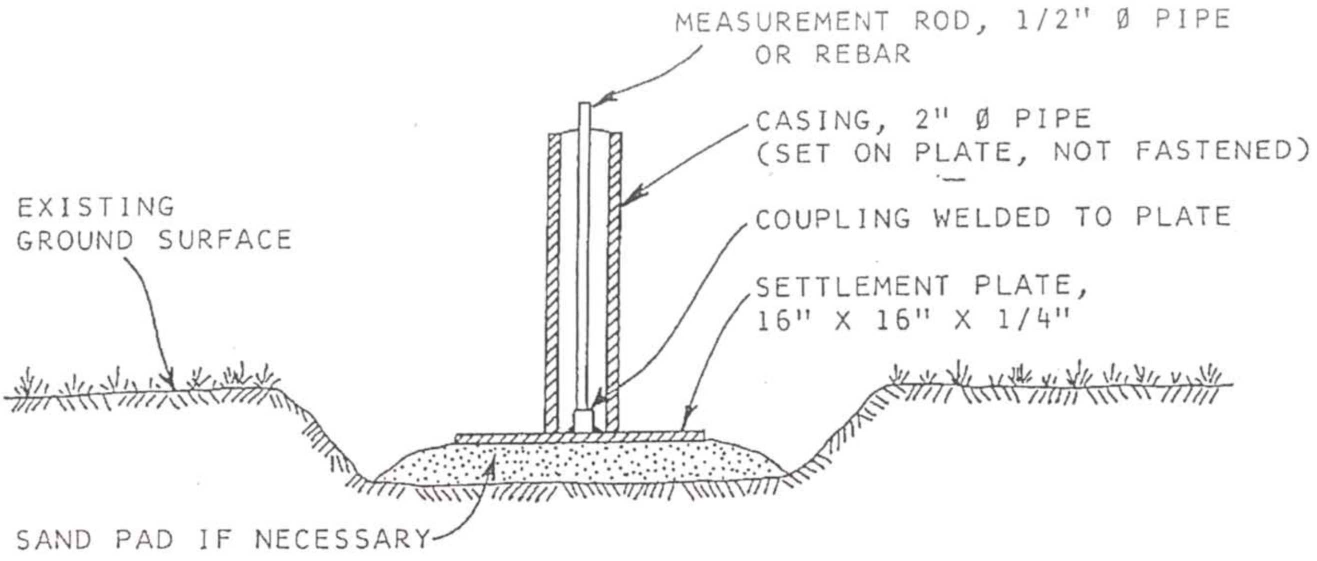
B-1 ⊕ Boring Number and Approximate Location

Site Plan

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure 2



(NOT TO SCALE)

NOTES:

1. INSTALL MARKERS ON FIRM GROUND OR ON SAND PADS IF NEEDED FOR STABILITY. TAKE INITIAL READING ON TOP OF ROD AND AT ADJACENT GROUND LEVEL PRIOR TO PLACEMENT OF ANY FILL.

2. FOR EASE IN HANDLING, ROD AND CASING ARE USUALLY INSTALLED IN 5-FOOT SECTIONS. AS FILL PROGRESSES, COUPLINGS ARE USED TO INSTALL ADDITIONAL LENGTHS. CONTINUITY IS MAINTAINED BY READING THE TOP OF THE MEASUREMENT ROD, THEN IMMEDIATELY ADDING THE NEW SECTION AND READING THE TOP OF THE ADDED ROD. BOTH READINGS ARE RECORDED.

3. RECORD THE ELEVATION OF THE TOP OF THE MEASUREMENT ROD IN EACH MARKER AT THE RECOMMENDED TIME INTERVALS. EACH TIME, NOTE THE ELEVATION OF THE ADJACENT FILL SURFACE.

4. READ THE MARKER TO THE NEAREST 0.01 FOOT, OR 0.005 FOOT IF POSSIBLE. NOTE THE FILL ELEVATION TO THE NEAREST 0.1 FOOT.

5. THE ELEVATIONS SHOULD BE REFERENCED TO A TEMPORARY BENCHMARK LOCATED ON STABLE GROUND AT LEAST 100 FEET FROM THE EMBANKMENT.

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SETTLEMENT MARKER SCHEMATIC

FIGURE 3

APPENDIX A

FIELD EXPLORATIONS AND LABORATORY TESTING

APPENDIX A
FIELD EXPLORATIONS AND LABORATORY TESTING

FIELD EXPLORATIONS

Soil and groundwater conditions at the site were explored on October 24 through 26 and 29 through 31, 2007 by drilling 15 borings (B-1 through B-15) at the approximate locations shown on Figure 2. The borings were advanced to depths in the range of about 15 to 75 feet below existing ground surface using a truck-mounted CME 75 hollow-stem auger drill rig owned and operated by GeoEngineers.

The explorations were continuously monitored by an engineer from our firm who examined and classified the soil encountered, obtained representative samples, and observed groundwater conditions, if encountered. Soil encountered in the explorations was classified in general accordance with ASTM D2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. Rock core recovered from the borings were classified in general accordance with the Unified Rock Classification System (URCS). Basic elements of the URCS are described in Figure A-2. Logs of the borings are presented in Log of Borings, Figures A-3 through A-17. The logs are based on interpretation of the field and laboratory data, and indicate the depth at which subsurface materials or their characteristics change, although these changes might actually be gradual.

Samples of soil encountered in the borings were obtained at approximate 2½- to 10-foot-depth intervals using both a 2-inch, outside-diameter, standard split-spoon sampler, and a 2.4-inch, inside-diameter, California-style split-barrel sampler. The samplers were driven into the soil using a 140-pound automatic hammer, free-falling 30 inches on each blow. The number of blows required to drive the samplers each of three, 6-inch increments of penetration were recorded in the field, along with visual-manual descriptions of soil based on ASTM D2488. The sum of the blow counts for the last two 6-inch increments of penetration is reported on the boring logs. The blow counts for the standard sampler are reported as the ASTM D1586 Standard Penetration Test (SPT) N-value. The approximate standard SPT N-values for the California-style sampler also are reported on the boring logs. The conversion of non-standard penetration resistance to SPT N-values was made using the Lacroix-Horn equation (ASTM SPT-523, 1973). Rock conditions were continuously sampled using a wire-line NX coring system.

Estimated latitude and longitude for proposed borings were established in our office before mobilizing to the site based on a site plan provided to us by Toothman-Orton Engineering. Exploration locations were established in the field using a Trimble GeoXT hand-held Global Positioning System (GPS) unit. Exploration locations should be considered accurate to the degree implied by the method used.

LABORATORY TESTING

Soil samples obtained from the explorations were returned to our laboratory for further examination and testing. Gradation tests (ASTM D1140) and moisture content determinations (ASTM D2216) were performed on representative soil samples. Results of percent fines (D1140) and moisture content determinations (D2216) are presented on the exploration logs at the respective sample depths. Atterberg limits determinations (ASTM D4318) also were accomplished on representative soil samples. Results are presented in Figures A-18 through A-20.

Modified proctor compaction testing (ASTM D1550) was accomplished on representative soil samples to estimate optimum moisture content and maximum dry density. Results are presented in Figures A-21 through A-25. Additionally, consolidation testing (ASTM D2435) was accomplished on representative soil samples. Results are presented in Figures A-26 and A-27.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	▨	GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
			▨	GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▨	GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			▨	GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	▨	SW	WELL-GRADED SANDS, GRAVELLY SANDS
			▨	SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▨	SM	SILTY SANDS, SAND - SILT MIXTURES
			▨	SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▨	ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
			▨	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▨	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▨	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
			▨	CH	INORGANIC CLAYS OF HIGH PLASTICITY
			▨	OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			▨	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
▨	CC	Cement Concrete
■	AC	Asphalt Concrete
▨	CR	Crushed Rock/ Quarry Spalls
▨	TS	Topsoil/ Forest Duff/Sod

▽	**Measured groundwater level in exploration, well, or piezometer**
▼	**Groundwater observed at time of exploration**
≡	**Perched water observed at time of exploration**
▼	**Measured free product in well or piezometer**

Stratigraphic Contact

—	**Distinct contact between soil strata or geologic units**
/	**Gradual change between soil strata or geologic units**
– – –	**Approximate location of soil strata change within a geologic soil unit**

Sampler Symbol Descriptions

■	**2.4-inch I.D. split barrel**
◨	**Standard Penetration Test (SPT)**
□	**Shelby tube**
☰	**Piston**
◧	**Direct-Push**
☒	**Bulk or grab**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	**Percent fines**
AL	**Atterberg limits**
CA	**Chemical analysis**
CP	**Laboratory compaction test**
CS	**Consolidation test**
DS	**Direct shear**
HA	**Hydrometer analysis**
MC	**Moisture content**
MD	**Moisture content and dry density**
OC	**Organic content**
PM	**Permeability or hydraulic conductivity**
PP	**Pocket penetrometer**
SA	**Sieve analysis**
TX	**Triaxial compression**
UC	**Unconfined compression**
VS	**Vane shear**

Sheen Classification

NS	**No Visible Sheen**
SS	**Slight Sheen**
MS	**Moderate Sheen**
HS	**Heavy Sheen**
NT	**Not Tested**

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

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Figure A-1

UNIFIED ROCK CLASSIFICATION SYSTEM (URCS)*

BASIC ELEMENTS

DEGREE OF WEATHERING

WEATHERED		ALTERED	REPRESENTATIVE	
SAND SIZE COMPLETELY DECOMPOSED STATE (CDS) E	GRAVEL SIZE PARTLY DECOMPOSED STATE (PDS) D	STAINED STATE (STS) C	VISUALLY FRESH STATE (VFS) B	MICRO FRESH STATE (HAND LENSE) (MFS) A
PLASTIC NON-PLASTIC	PLASTIC NON-PLASTIC	COMPARE TO FRESH STATE	UNIT WEIGHT, RELATIVE ABSORPTION	

ESTIMATED STRENGTH

REMOLDING		REACTION TO IMPACT OF 1 LB. BALLPEEN HAMMER		
“MOLDABLE” (FRIABLE) (MBL) E	“CRATERS” (SHEARS) (CQ) D	“DENTS” (COMPRESSIVE) (DQ) C	“PITS” (TENSIONAL) (PQ) B	“REBOUNDS” (ELASTIC) (RQ) A
<1,000 PSI (<7 Mpa)	1,000 TO 3,000 PSI (7 TO 21 Mpa)	3,000 TO 8,000 PSI (21 TO 55 Mpa)	8,000 TO 15,000 PSI (55 TO 103 Mpa)	>15,000 PSI (>103 Mpa)

DISCONTINUITIES

<table>
<tr><th colspan="4">TRANSMITS WATER</th><td rowspan="4">LATENT
PLANES OF
SEPARATION
(LPS)
C</td><td rowspan="4">SOLID-
PREFERRED
BREAKAGE
(SPB)
B</td><td rowspan="4">SOLID-
RANDOM
BREAKAGE
(SRB)
A</td></tr>
<tr><td>YES</td><td>NO</td><td>YES</td><td>NO</td></tr>
<tr><td colspan="2">3-DIMENSIONAL
PLANES OF
SEPARATION
(3D)
E</td><td colspan="2">2-DIMENSIONAL
PLANES OF
SEPARATION
(2D)
D</td></tr>
<tr><td colspan="2">INTERLOCK</td><td colspan="2">ATTITUDE</td></tr>
</table>

UNIT WEIGHT

LESS THAN 130 LBS/CU FT (2.10 Mg/CU M) (<130) E	130 TO 140 LBS/CU FT (2.10 TO 2.25 Mg/CU M) (130) D	140 TO 150 LBS/CU FT (2.25 TO 2.40 Mg/CU M) (140) C	150 TO 160 LBS/CU FT (2.40 TO 2.55 Mg/CU M) (150) B	GREATER THAN 160 LBS/CU FT (2.55 Mg/CU M) (>160) A

DESIGN NOTATION

WEATHERING	STRENGTH	DISCONTINUITY	WEIGHT
A-E	A-E	A-E	A-E

*Williamson, Douglas A., 1984, Unified Rock Classification System: Association of Engineering Geologists Bulletin, Vol. XXI, No. 3, pp. 345-354

ROCK CLASSIFICATION SYSTEM

Figure A-2

Date(s) Drilled	10/31/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	17.5	Surface Elevation (ft)	2512	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

SAMPLES										
Interval Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
					ML	2 inches gray silt with organic matter and trace sand (soft, moist) (topsoil)			
15	10	1			ML	Dark gray silt with trace organic matter (stiff, moist)			
					CL	Dark gray clay with trace silt (stiff, moist)			
18	19	2			CL	Brownish tan clay with occasional gravel and trace sand (stiff, moist)	28	95	Nspt=7
18	10	3							
18	8	4					26		%F=88 AL; LL=35; PI=12
18	6	5			CL	Greenish gray clay (medium stiff, moist)			
					CL	Dark brown clay with fine sand (medium stiff, moist to wet)			
18	20	6					37	82	Nspt=8
					CL	Dark gray clay with fine sand (stiff, moist)			

Elevation feet: 2510, 2505, 2500, 2495, 2490, 2485, 2480

Depth feet: 0, 5, 10, 15, 20, 25, 30, 35

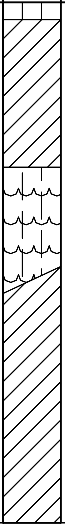
LOG OF BORING B- 1

GEOENGINEERS

Project:	Pullman-Moscow Airport Runway Realignment
Project Location:	Pullman, Washington
Project Number:	16649-001-00

Figure: A- 3
Sheet 1 of 1

Date(s) Drilled	10/26/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	15	Surface Elevation (ft)	2514	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	



Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0							ML	Dark brown silt with organic matter and trace sand (soft, dry to moist) (topsoil)			
		▮	18	13	1			CL	Brown clay (stiff, moist)			
2510		▮	18	13	2							
	5							OH	Black organic clay (medium stiff to stiff, moist)			
		▮	18	8	3							
								CL	Gray clay (medium stiff, moist)			
2505		▮	18	15	4					27	96	CS; Nspt=6
	10											
2500		▮	18	6	5				Blue and gray mottled clay (medium stiff, moist)			
	15											
2495												
	20											
2490												
	25											
2485												
	30											
2480												
	35											

LOG OF BORING B- 2

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 4
Sheet 1 of 1

Date(s) Drilled	10/30/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore/NX Core
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	20	Surface Elevation (ft)	2534	Groundwater Elevation (ft)	2520
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					ML	Dark gray silt with organic matter and trace sand (soft, dry to moist) (topsoil)			
		10	8	1		CL/ML	Dark gray silty clay (stiff, moist)			
2530		15	10	2		CL	Gray clay with trace silt (medium stiff to stiff, moist)			
	5	18	15	3				29	89	CS; Nspt-6
2525		18	9	4			Grades to greenish gray in color			
	10									
2520		6	50/6"	5	▽	GC	Dark gray clayey fine gravel with sand (very dense, wet) (weathered basalt)			
	15	16		6		RX	Dark gray fractured basalt rock, visually fresh state, rebound quality, latent separation (BAC0)			REC=100% RQD=50%
		37		7						REC=80% RQD=22%
						CL	Dark brown sandy clay			
						RX	Dark gray fractured basalt rock, partly decomposed state, pit quality, 3-D separation (DBE0)			
2515	20									

Groundwater observed at approximately 14 foot depth

2510 / 25 — 2505 / 30 — 2500 / 35

LOG OF BORING B- 3

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment

Project Location: Pullman, Washington

Project Number: 16649-001-00

Figure: A- 5

Sheet 1 of 1

Date(s) Drilled	10/24/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	Grab/SPT
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	30	Surface Elevation (ft)	2583	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0	☒			1			ML	Gray silt with organic matter (soft, dry to moist) (topsoil)			
							▨	CL-ML	Gray silty clay with fine sand (stiff, moist)			
2580												
		■	18	9	2					12		%F=75
	5											
							▨	ML-CL	Brown clayey silt (stiff, moist)			
2575												
		■	18	13	3							
	10											
2570												
		■	18	15	4							
	15											
2565												
		■	18	9	5							
	20											
2560												
	25											
2555									Grades with increasing moisture			
		■	18	9	6							
	30											
2550												
	35											

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LOG OF BORING B- 4

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 6
Sheet 1 of 1

Date(s) Drilled	10/24/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	35	Surface Elevation (ft)	2586	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	 Recovered (in)	 Blows/foot	 Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0							ML	Gray silt with organic matter (stiff to medium stiff, moist) (topsoil)			
2585								CL-ML	Gray silty clay with fine sand (medium stiff, moist)			
		▮	18	7	1					12		%F=78
	5											
2580												
								CL	Brown clay (medium stiff to stiff, moist)			
		▮	18	7	2							
	10											
2575												
		▮	18	21	3					21	102	Nspt=8
	15											
2570												
		▮	18	5	4							
	20											
2565												
		▮	18	10	5					23		CP; MDD=116;OM=15 AL; LL=36; PI=16 %F=96
	25											
2560												
		▮	18	11	6							
	30											
2555												
	35											

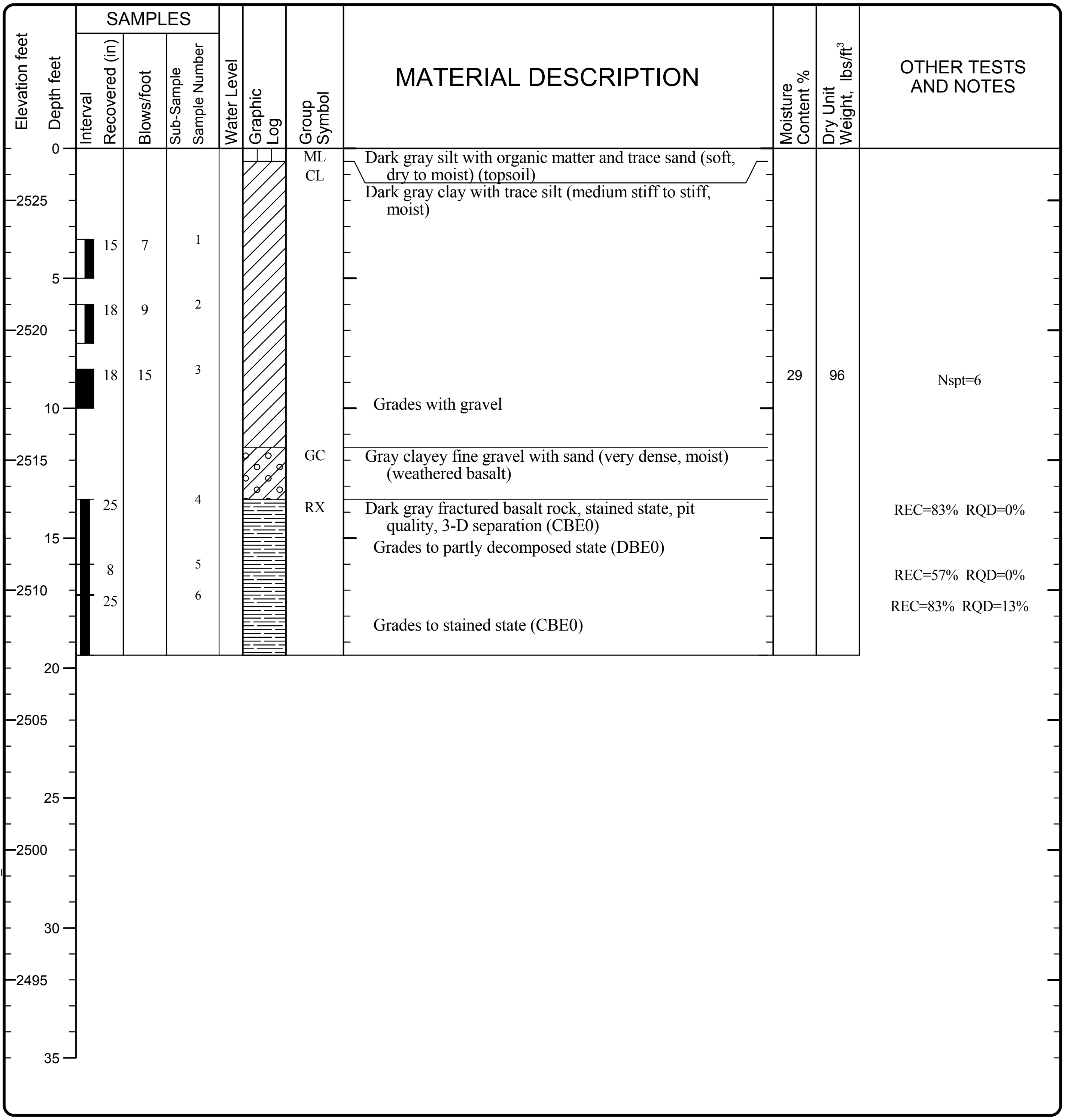
LOG OF BORING B- 5

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 7
Sheet 1 of 1

Date(s) Drilled	10/30/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore/NX Core
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	19.5	Surface Elevation (ft)	2527	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	



SAMPLES Interval	SAMPLES Recovered (in)	SAMPLES Blows/foot	SAMPLES Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
					ML	Dark gray silt with organic matter and trace sand (soft, dry to moist) (topsoil)			
					CL	Dark gray clay with trace silt (medium stiff to stiff, moist)			
▮	15	7	1						
▮	18	9	2						
▮	18	15	3				29	96	Nspt=6
						Grades with gravel			
					GC	Gray clayey fine gravel with sand (very dense, moist) (weathered basalt)			
▮	25		4		RX	Dark gray fractured basalt rock, stained state, pit quality, 3-D separation (CBE0)			REC=83% RQD=0%
						Grades to partly decomposed state (DBE0)			
▮	8		5						REC=57% RQD=0%
▮	25		6						REC=83% RQD=13%
						Grades to stained state (CBE0)			

LOG OF BORING B- 6

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 8
Sheet 1 of 1

Date(s) Drilled	10/24/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	Grab/SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	65	Surface Elevation (ft)	2607	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0	☒			1			ML	Gray silt with organic matter (stiff to medium stiff, moist) (topsoil)			
								ML	Gray silt (stiff, moist)			
2605												
		■	18	9	2							
	5											
2600								CL	Brown clay (stiff to very stiff, moist)			
		■	18	18	3							
	10											
2595												
		■	18	15	4							
	15											
2590												
		■	18	22	5					19		CP; MDD=114.5; OM=14 AL; LL=35; PI=14 %F=93
	20											
2585												
		■	18	21	6							
	25											
2580												
	30											
2575												
		■	18	17	7							
	35											

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LOG OF BORING B- 7

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Elevation feet	Depth feet	SAMPLES Interval	 Recovered (in)	 Blows/foot	 Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
2570	35						▨					
2565	40						▨	CL	Brown clay (hard, moist)			
		■	18	96	8		▨			22	102	Nspt=36
2560	45						▨					
2555	50						▨		Grades with increasing moisture			
		■	18	10	9		▨		Grades to medium stiff			
2550	55						▨					
2545	60						▨		Grades to very stiff			
		■	18	22	10		▨					
2540	65											
2535	70											
2530	75											

LOG OF BORING B- 7 (continued)

GeoEngineers

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 9
Sheet 2 of 2

Date(s) Drilled	10/30/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	30	Surface Elevation (ft)	2571	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0							ML	Light gray silt with organic matter and trace clay (soft, dry to moist) (topsoil)			
2570								CL-ML	Brown silty clay (very stiff, dry to moist)			
		■	18	22	1							
	5											
2565												
		■	18	10	2			CL	Reddish brown clay (stiff to very stiff, moist)			
	10											
2560												
		■	18	9	3							
	15											
2555												
		■	18	43	4					23	103	Nspt=16
	20											
2550												
	25											
2545												
		■	18	11	5							
	30											
2540												
	35											

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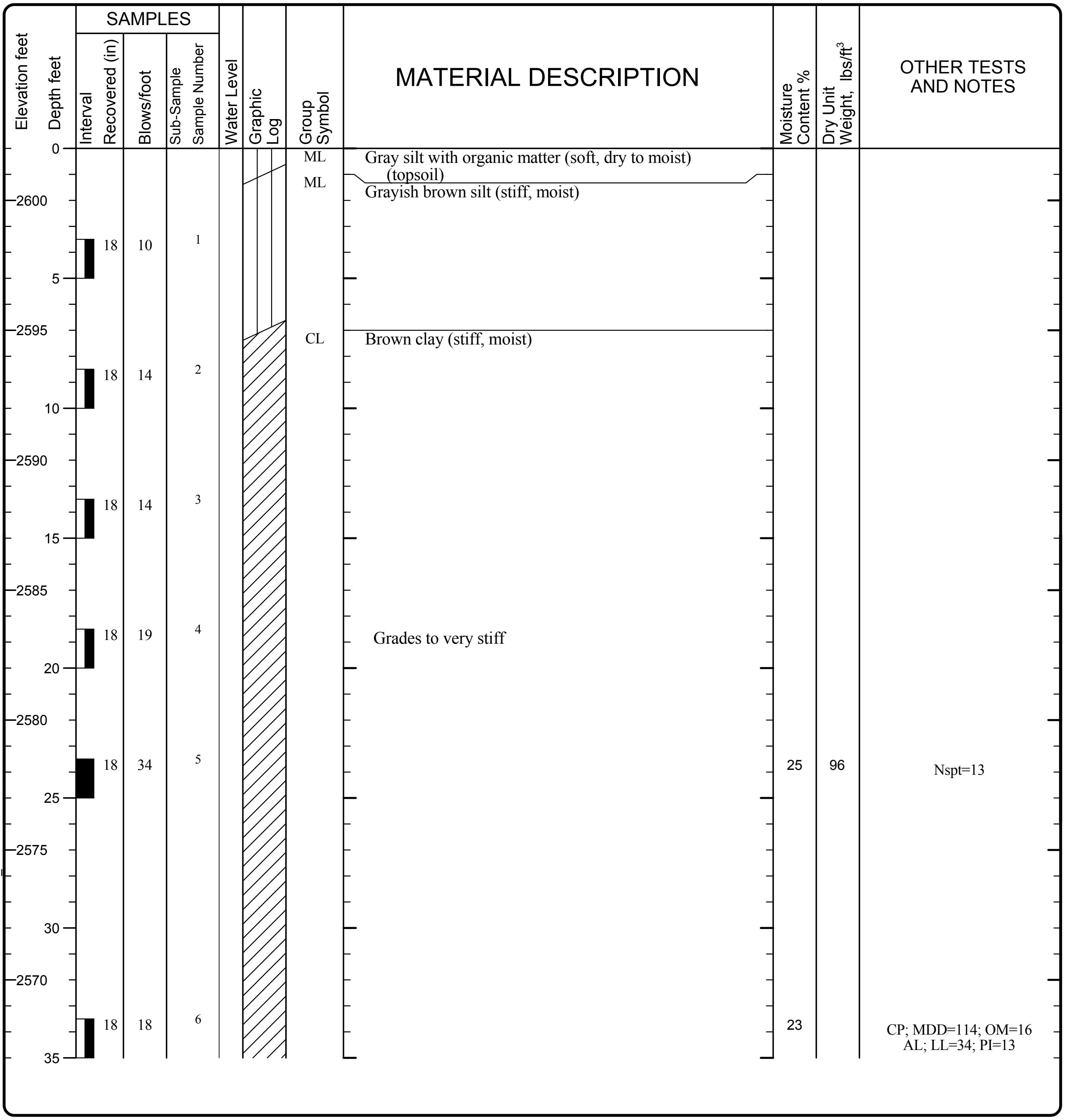
LOG OF BORING B- 8

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 10
Sheet 1 of 1

Date(s) Drilled	10/25/07	Logged By	DAT	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	55	Surface Elevation (ft)	2602	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	



Depth feet	Recovered (in)	Blows/foot	Sample Number	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
0				ML	Gray silt with organic matter (soft, dry to moist) (topsoil)			
				ML	Grayish brown silt (stiff, moist)			
	18	10	1					
				CL	Brown clay (stiff, moist)			
	18	14	2					
	18	14	3					
	18	19	4		Grades to very stiff			
	18	34	5			25	96	Nspt=13
	18	18	6			23		CP; MDD=114; OM=16 AL; LL=34; PI=13

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LOG OF BORING B- 9

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 11
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES Interval	 Recovered (in)	 Blows/foot	 Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	35											%F=94
2565												
	40								Grades to medium stiff			
2560												
			18	7	7							
	45											
2555												
	50											
2550												
			18	7	8							
	55											
2545												
	60											
2540												
	65											
2535												
	70											
2530												
	75											
2525												

LOG OF BORING B- 9 (continued)

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Date(s) Drilled	10/30/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	20	Surface Elevation (ft)	2562	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0						▨	ML	Dark gray silt with organic matter and trace sand (soft, moist) (topsoil)			
							▨	CL-ML	Reddish brown silty clay (stiff, moist)			
2560												
		◧	14	13	1							
	5											
2555							▨	CL	Reddish brown clay with trace silt (stiff, moist)			
		◧	18	10	2							
	10											
2550												
		■	18	19	3					24	98	Nspt=7
	15											
2545												
		◧	18	10	4				Grades to tanish gray			
	20											
2540												
	25											
2535												
	30											
2530												
	35											

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

LOG OF BORING B-10

GeoEngineers

Project: Pullman-Moscow Airport Runway Realignment

Project Location: Pullman, Washington

Project Number: 16649-001-00

Figure: A- 12

Sheet 1 of 1

Date(s) Drilled	10/25/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	Grab/SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	75	Surface Elevation (ft)	2658	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0	☒			1			ML	Gray silt with organic matter (stiff to medium stiff, moist) (topsoil)			
								ML	Gray silt (stiff, moist)			
2655												
		■	18	11	2							
	5											
								CL	Brown clay (stiff, moist)			
2650												
		■	18	14	3							
	10											
2645												
		■	18	15	4							
	15											
2640												
		■	18	13	5					21		CP; MDD=115; OM=15 AL; LL=37;PI=17 %F=95
	20											
									Grades to very stiff			
2635												
		■	18	21	6							
	25											
2630												
	30											
2625												
		■	18	26	7							
	35											

LOG OF BORING B-11

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment

Project Location: Pullman, Washington

Project Number: 16649-001-00

Elevation feet	Depth feet	Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
			18	23	8							
			18	56	9					21	105	Nspt=21
									Grades to medium stiff			
			18	11	10							
									Grades to stiff			
			18	23	11							

V6_GTBORING P:\16\1664900\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

LOG OF BORING B-11 (continued)

GeoEngineers

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 13
Sheet 2 of 2

Date(s) Drilled	10/29/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	20	Surface Elevation (ft)	2566	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0							ML	Dark gray silt with organic matter and trace sand (medium stiff, moist) (topsoil)			
2565								CL	Grayish brown clay with trace silt (medium stiff, moist)			
		▮	14	7	1							
	5											
2560												
		▮	18	6	2				Grades to gray			
	10											
2555												
		▮	18	7	3				Grades to tan			
	15											
2550												
		▮	18	5	4				Grades with increasing moisture			
	20											
2545												
	25											
2540												
	30											
2535												
	35											

LOG OF BORING B-12

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 14
Sheet 1 of 1

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

Date(s) Drilled	10/26/07	Logged By	BJB	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	Grab/SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	60	Surface Elevation (ft)	2678	Groundwater Elevation (ft)	Not Encountered
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES				Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
		Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number							
	0	☒			1			ML	Gray silt with organic matter (stiff to medium stiff, moist) (topsoil)			
								ML	Gray silt (medium stiff, moist)			
2675												
		■	18	11	2							
	5											
								CL	Brown clay (medium stiff, moist)			
2670												
		■	18	9	3							
	10											
2665												
		■	18	30	4					19		AL; LL=35; PI=14 %F=95
	15											
								CL	Brown clay (hard, moist)			
2660												
		■	18	36	5							
	20											
2655												
	25											
2650												
		■	18	106	6					19	109	Nspt=40
	30											
2645												
	35											

LOG OF BORING B-13

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	35							CL-ML	Brown silty clay (stiff, moist)			
2640		▮	18	12	7							
	40											
2635												
	45											
2630		▮	18	19	8							
	50											
2625												
	55											
2620		▮	18	24	9							
	60											
2615												
	65											
2610												
	70											
2605												
	75											
2600												

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

LOG OF BORING B-13 (continued)

GeoEngineers

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 15
Sheet 2 of 2

Date(s) Drilled	10/30/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	45	Surface Elevation (ft)	2587	Groundwater Elevation (ft)	2543
.		Datum/ System	NAVD 88	.	

Elevation feet	Depth feet	SAMPLES Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft³	OTHER TESTS AND NOTES
	0					ML	Dark brown silt with organic matter and trace sand (soft, moist) (topsoil)			
2585						CL-ML	Dark brown silty clay (stiff, moist) (possible fill)			
		14	12	1						
	5					CL	Dark brown clay (stiff, moist)			
2580		17	11	2			Grades to reddish brown			
2575	10	18	11	3						
2570	15						Grades to medium stiff			
		18	12	4				29	88	Nspt=5
2565	20	18	6	5				24		CP; MDD=112.5; OM=15 AL; LL=40; PI=19 %F=93
2560	25									
2555	30						Grades to tanish gray and soft			
	35	18	4	6						

LOG OF BORING B-14

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 16
Sheet 1 of 2

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	35						▨					
2550							▨					
	40						▨					
2545							▨					
		▮	18	7	7	▼	▨		Grades to wet			
	45											
2540												
	50											
2535												
	55											
2530												
	60											
2525												
	65											
2520												
	70											
2515												
	75											
2510												

Groundwater encountered at approximately 44 foot depth

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

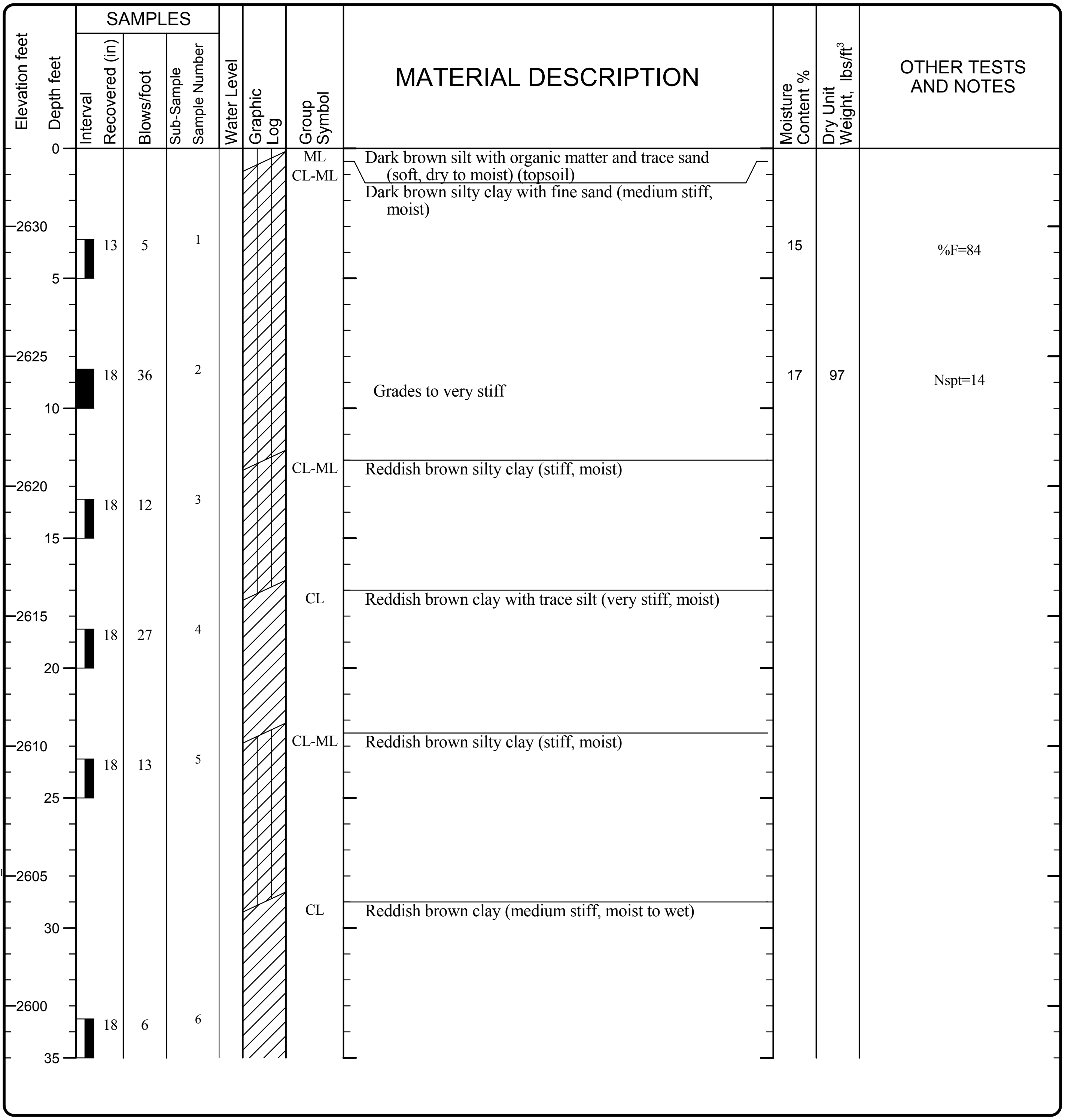
LOG OF BORING B-14 (continued)

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 16
Sheet 2 of 2

Date(s) Drilled	10/29/07	Logged By	KHK	Checked By	LDS
Drilling Contractor	GeoEngineers, Inc.	Drilling Method	Hollow-Stem Auger	Sampling Methods	SPT/Dames & Moore
Auger Data	3 3/4-inch ID	Hammer Data	140 lb hammer/30 in drop	Drilling Equipment	CME 75
Total Depth (ft)	65	Surface Elevation (ft)	2633	Groundwater Elevation (ft)	2589
.		Datum/ System	NAVD 88	.	



Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Water Level	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	0						ML	Dark brown silt with organic matter and trace sand (soft, dry to moist) (topsoil)			
							CL-ML	Dark brown silty clay with fine sand (medium stiff, moist)			
2630		▮	13	5	1				15		%F=84
	5										
2625		▮	18	36	2			Grades to very stiff	17	97	Nspt=14
	10										
							CL-ML	Reddish brown silty clay (stiff, moist)			
2620		▮	18	12	3						
	15										
							CL	Reddish brown clay with trace silt (very stiff, moist)			
2615		▮	18	27	4						
	20										
							CL-ML	Reddish brown silty clay (stiff, moist)			
2610		▮	18	13	5						
	25										
2605											
							CL	Reddish brown clay (medium stiff, moist to wet)			
	30										
2600		▮	18	6	6						
	35										

V6_GTBORING P:\16\16649001\00\FINALS\1664900100.GPJ GEIV6_1.GDT 12/21/07

LOG OF BORING B-15

GeoEngineers

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 17
Sheet 1 of 2

Elevation feet	Depth feet	SAMPLES Interval	SAMPLES Recovered (in)	SAMPLES Blows/foot	SAMPLES Sub-Sample Sample Number	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Moisture Content %	Dry Unit Weight, lbs/ft^3	OTHER TESTS AND NOTES
	35						▨					
2595												
	40											
2590												
		█	18	9	7	▼			Grades to stiff and wet			
	45											
2585												
	50											
2580												
		█	18	13	8				Grades with decreasing moisture content			
	55											
2575												
	60											
2570												
		█	18	34	9					30	92	Nspt=13
	65											
2565												
	70											
2560												
	75											
2555												

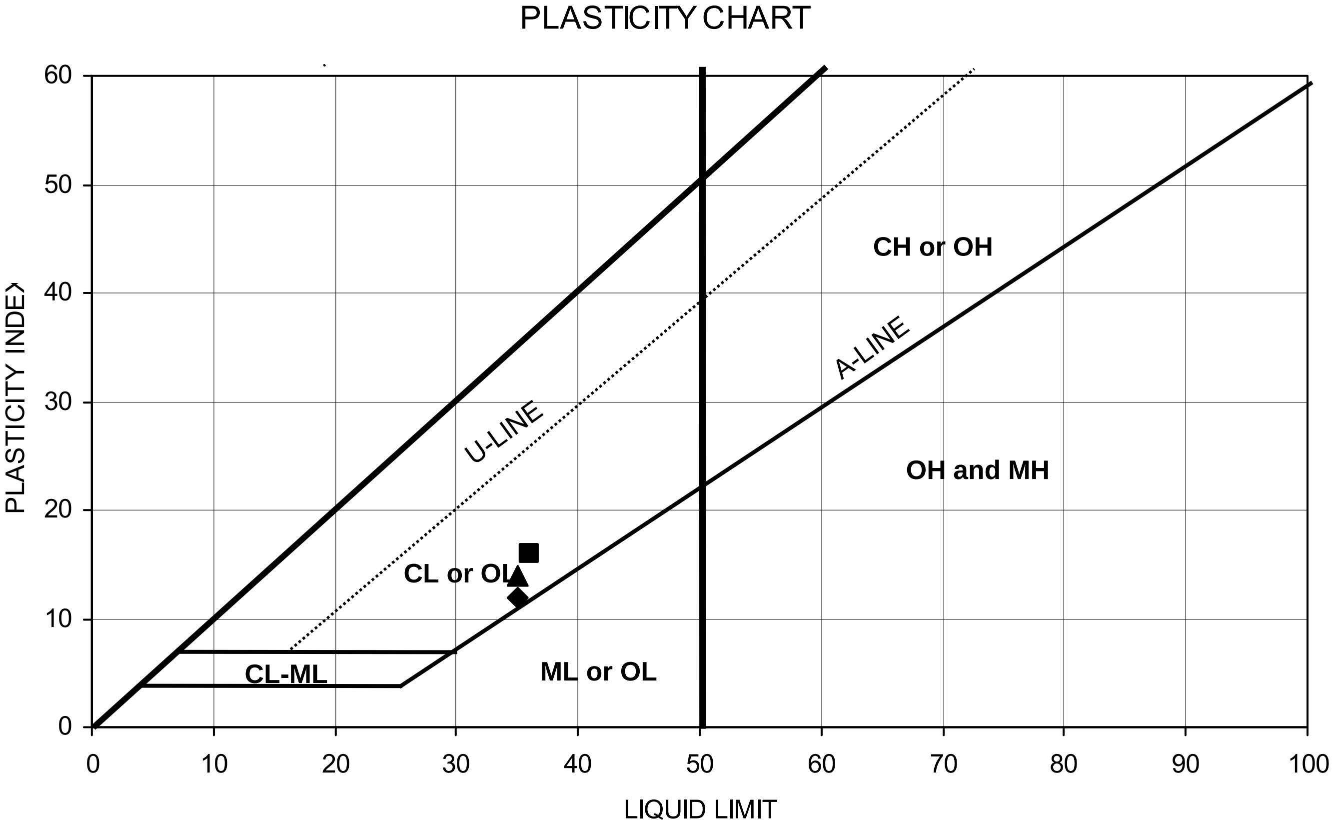
Groundwater encountered at approximately 44 foot depth

LOG OF BORING B-15 (continued)

GEOENGINEERS

Project: Pullman-Moscow Airport Runway Realignment
Project Location: Pullman, Washington
Project Number: 16649-001-00

Figure: A- 17
Sheet 2 of 2



SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SOIL DESCRIPTION
◆	B-1	8½	26	35	12	Clay with occasional gravel and trace sand
■	B-5	8½-33½	23	36	16	Clay
▲	B-7	8½-33½	19	35	14	Clay

Atterberg Limits Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GeoEngineers

Figure A-18

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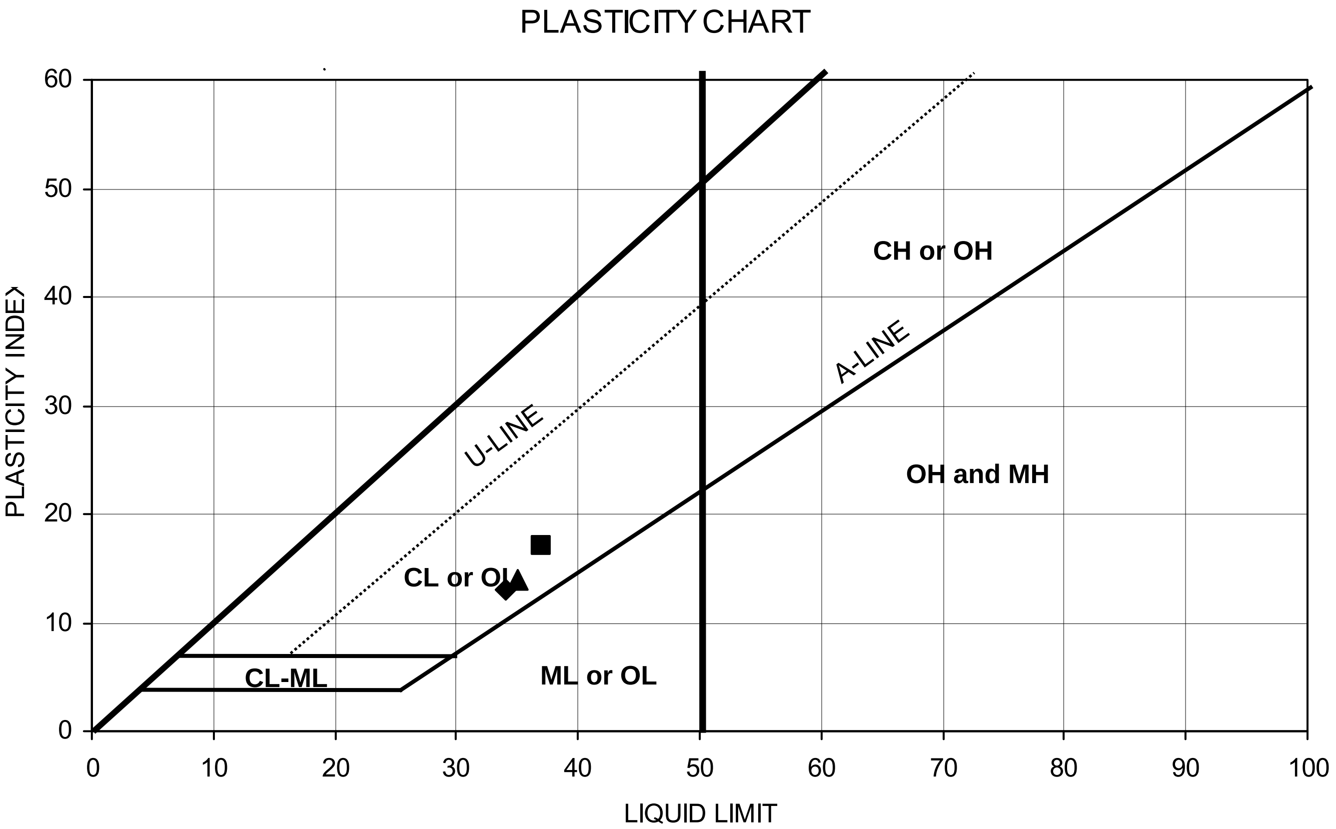

SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SOIL DESCRIPTION
◆	B-9	13-53	23	34	13	Clay
■	B-11	13½-43½	21	37	17	Clay
▲	B-13	13½	19	35	14	Clay

Atterberg Limits Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-19

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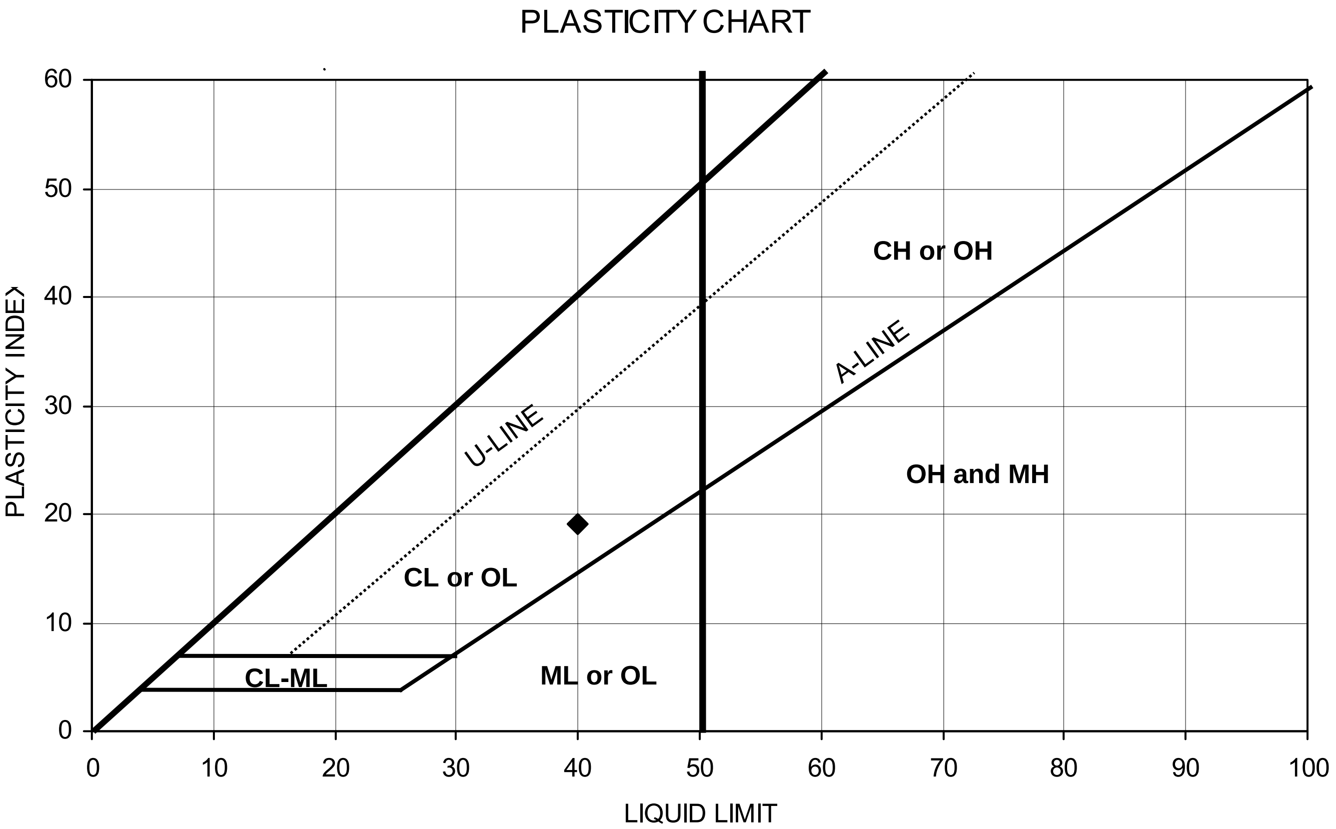


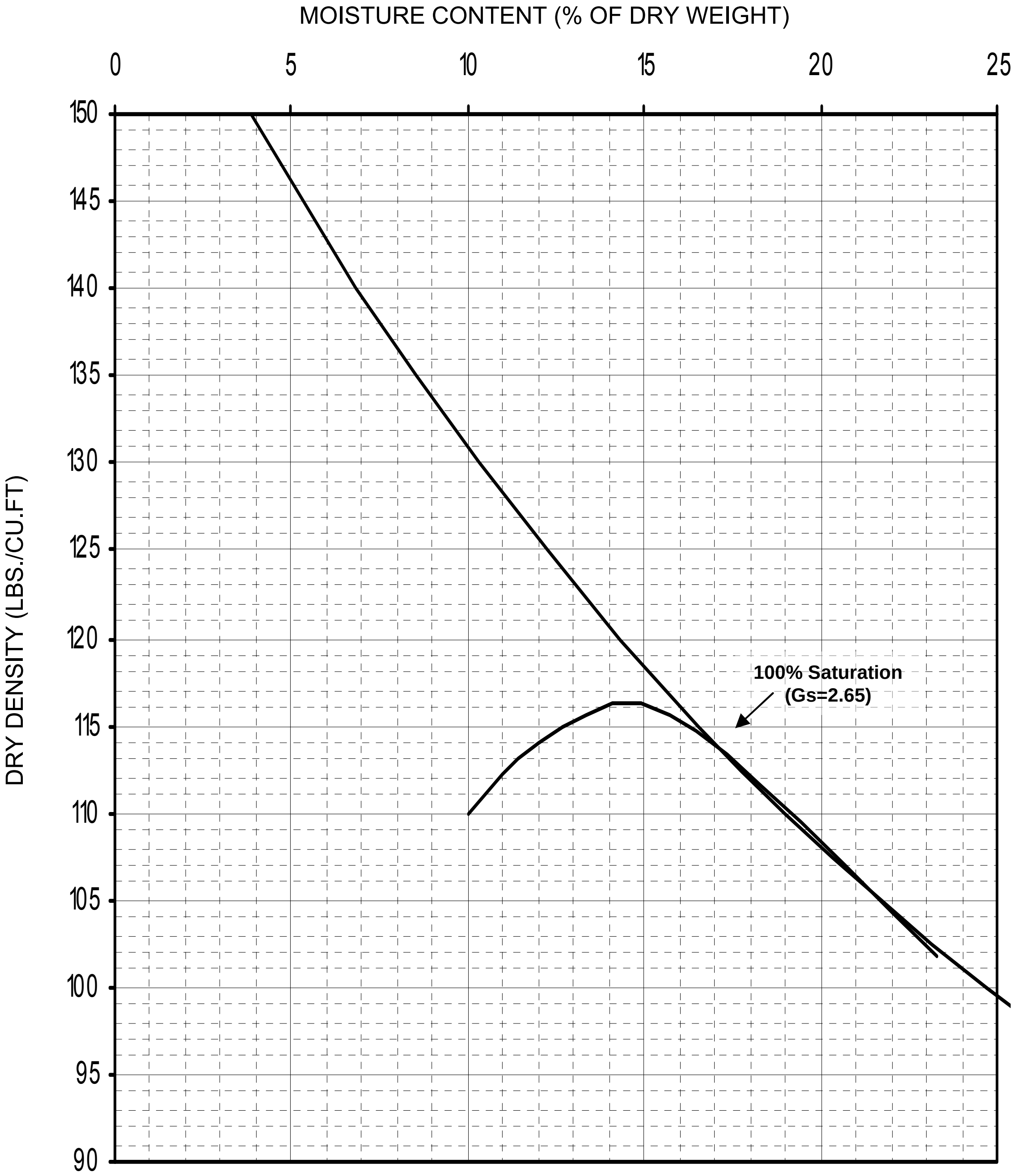
SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SOIL DESCRIPTION
◆	B-14	8½-43½	24	40	19	Clay

Atterberg Limits Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-20



SAMPLE NUMBER	SAMPLE DEPTH (FEET)	SOIL DESCRIPTION	OPTIMUM MOISTURE CONTENT	MAXIMUM DRY DENSITY (LBS/FT³)
B-5	8½- 33½	Clay	15.0%	116.0

NOTE: Tests performed in accordance with ASTM D-1557

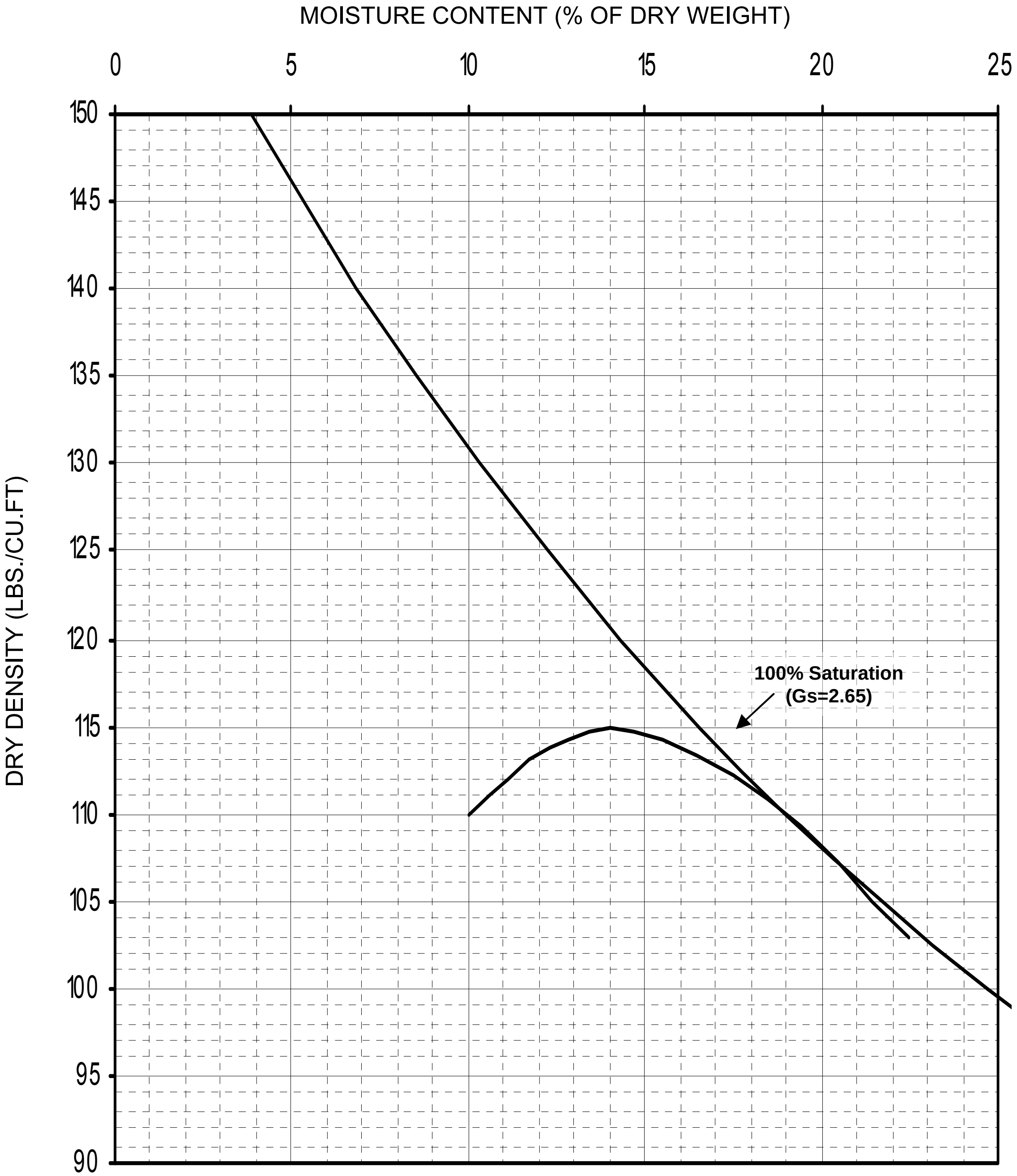
Compaction Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-21

Spok: P:\16\16649-001\00\finals\1664900100c.ppt LDS:tlm 12/19/07



SAMPLE NUMBER	SAMPLE DEPTH (FEET)	SOIL DESCRIPTION	OPTIMUM MOISTURE CONTENT	MAXIMUM DRY DENSITY (LBS/FT³)
B-7	8½- 33½	Clay	14.0%	114.5

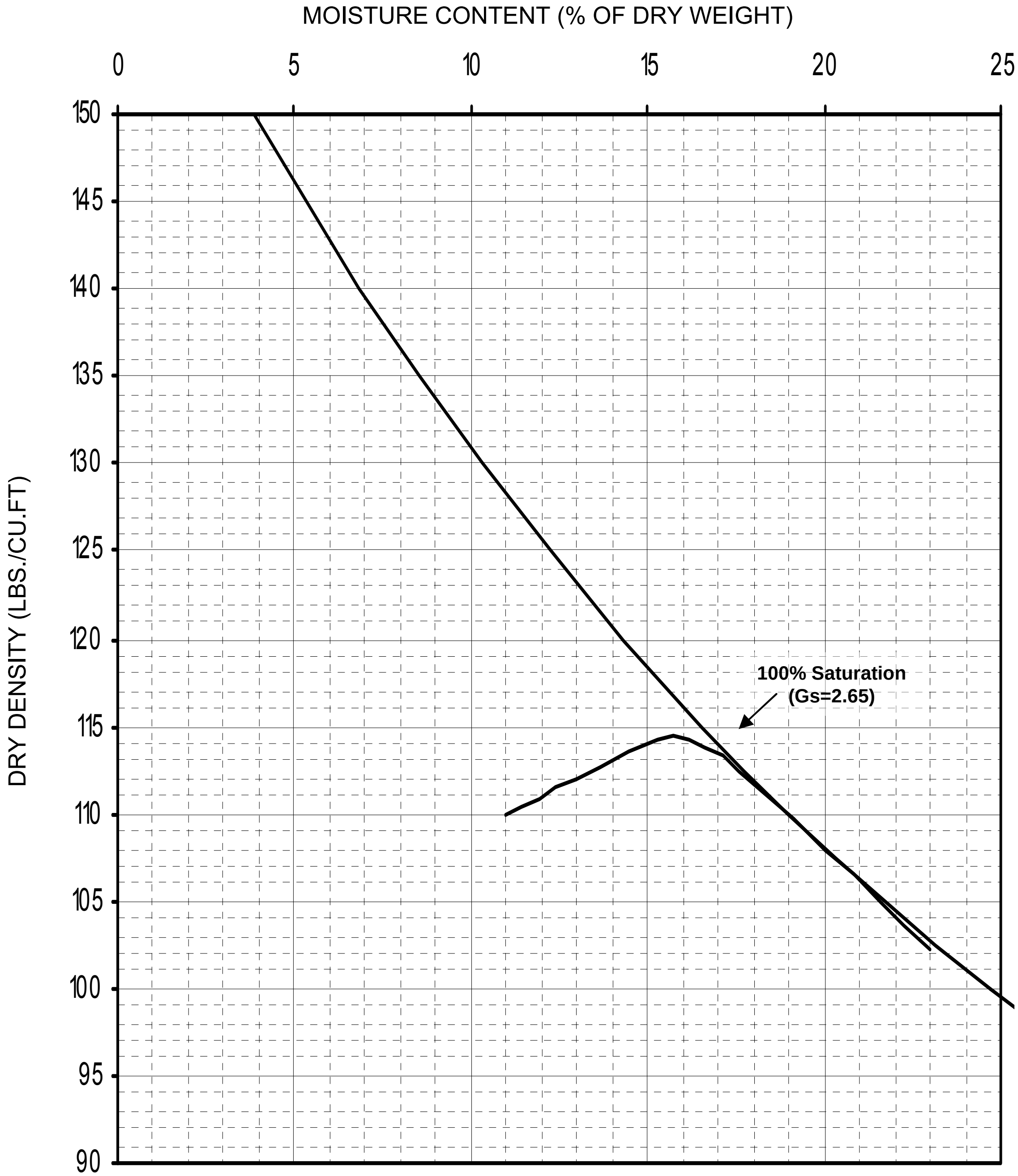
NOTE: Tests performed in accordance with ASTM D-1557

Compaction Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-22



SAMPLE NUMBER	SAMPLE DEPTH (FEET)	SOIL DESCRIPTION	OPTIMUM MOISTURE CONTENT	MAXIMUM DRY DENSITY (LBS/FT³)
B-9	13-53	Clay	16.0%	114.0

NOTE: Tests performed in accordance with ASTM D-1557

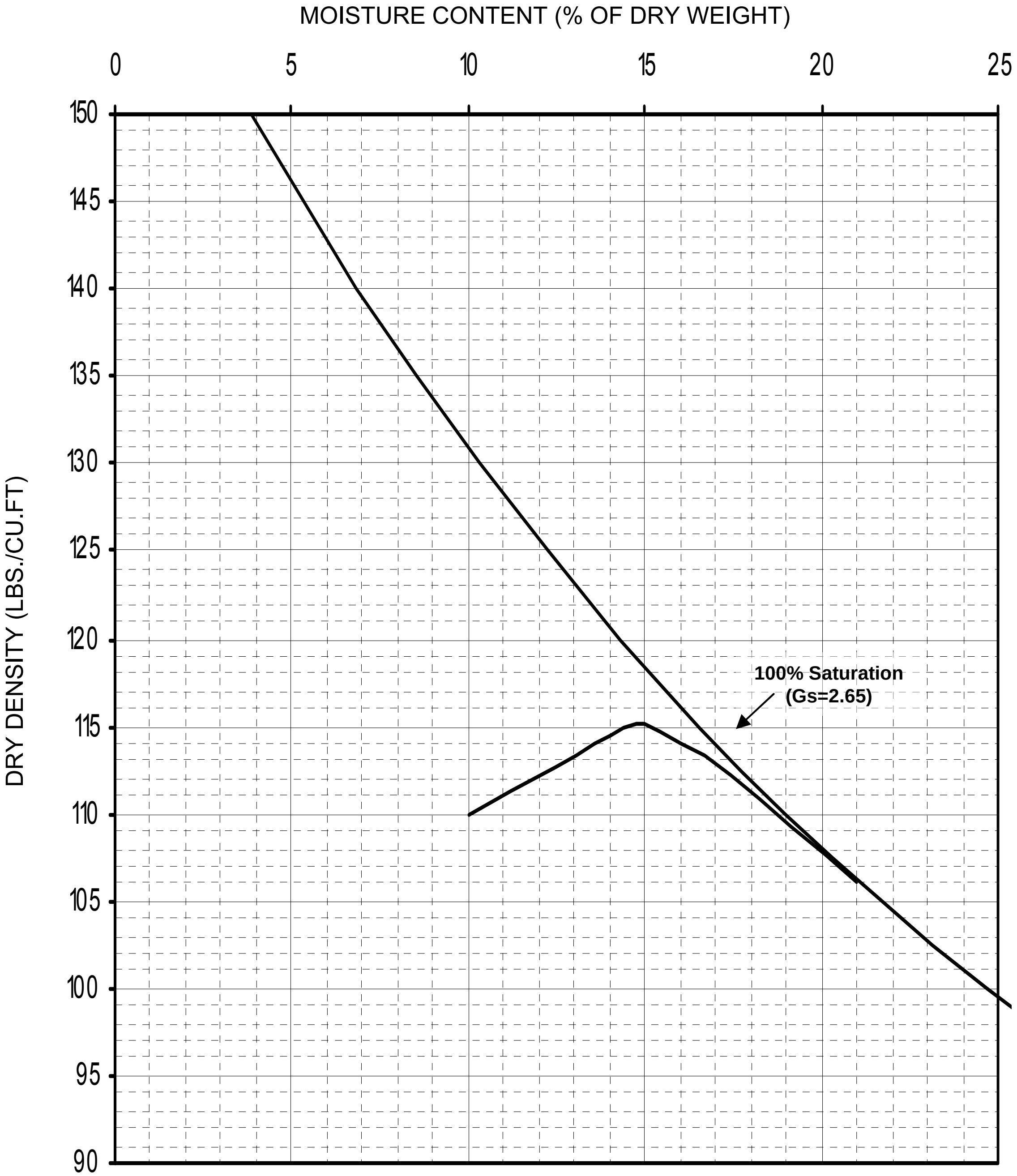
Compaction Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-23

Spok: P:\16\16649-001\00\finals\1664900100c2.ppt LDS:tlm 12/19/07



SAMPLE NUMBER	SAMPLE DEPTH (FEET)	SOIL DESCRIPTION	OPTIMUM MOISTURE CONTENT	MAXIMUM DRY DENSITY (LBS/FT³)
B-11	13½- 43½	Clay	15.0%	115.0

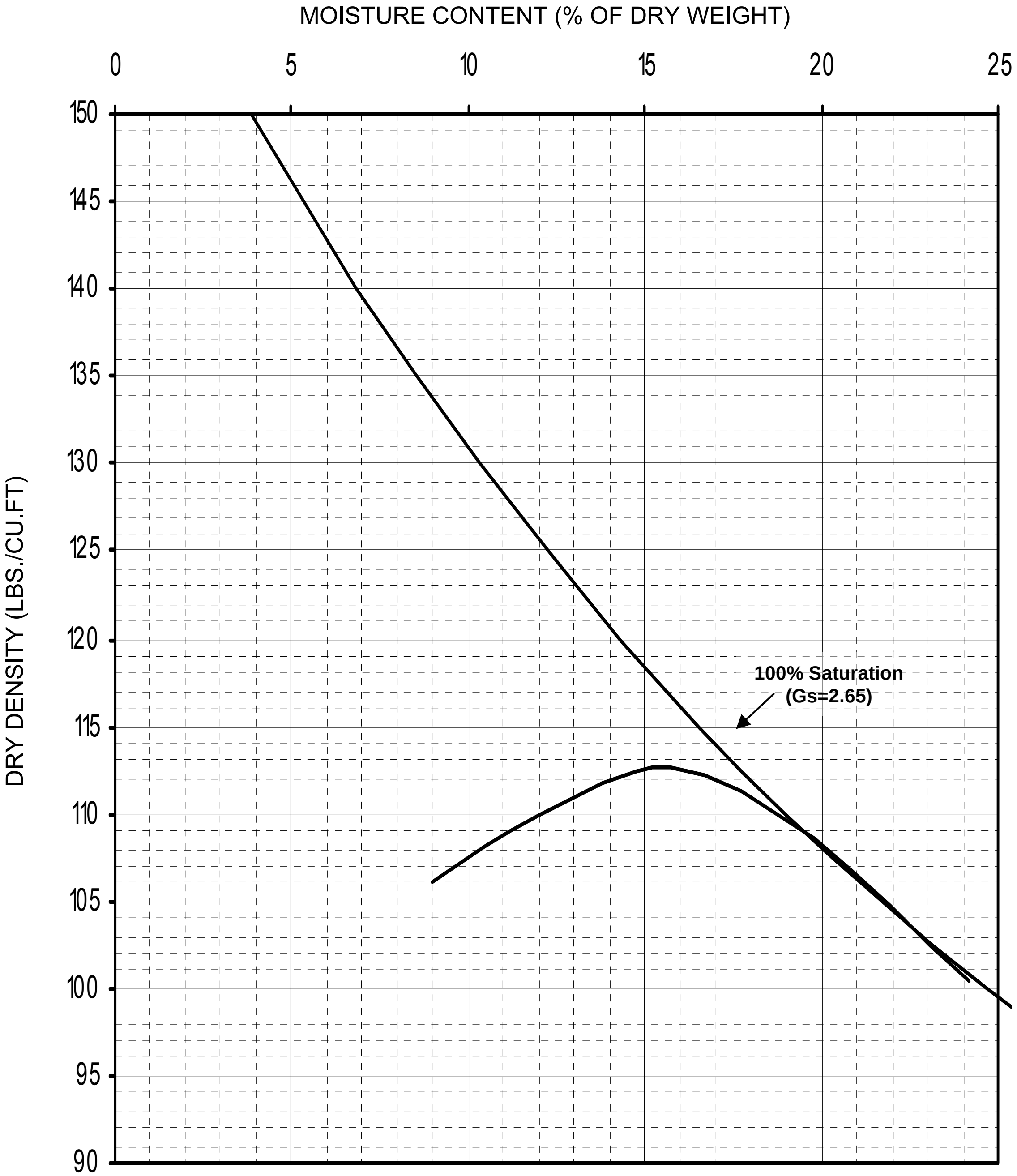
NOTE: Tests performed in accordance with ASTM D-1557

Compaction Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-24



SAMPLE NUMBER	SAMPLE DEPTH (FEET)	SOIL DESCRIPTION	OPTIMUM MOISTURE CONTENT	MAXIMUM DRY DENSITY (LBS/FT³)
B-14	8½- 43½	Clay	15.5%	112.5

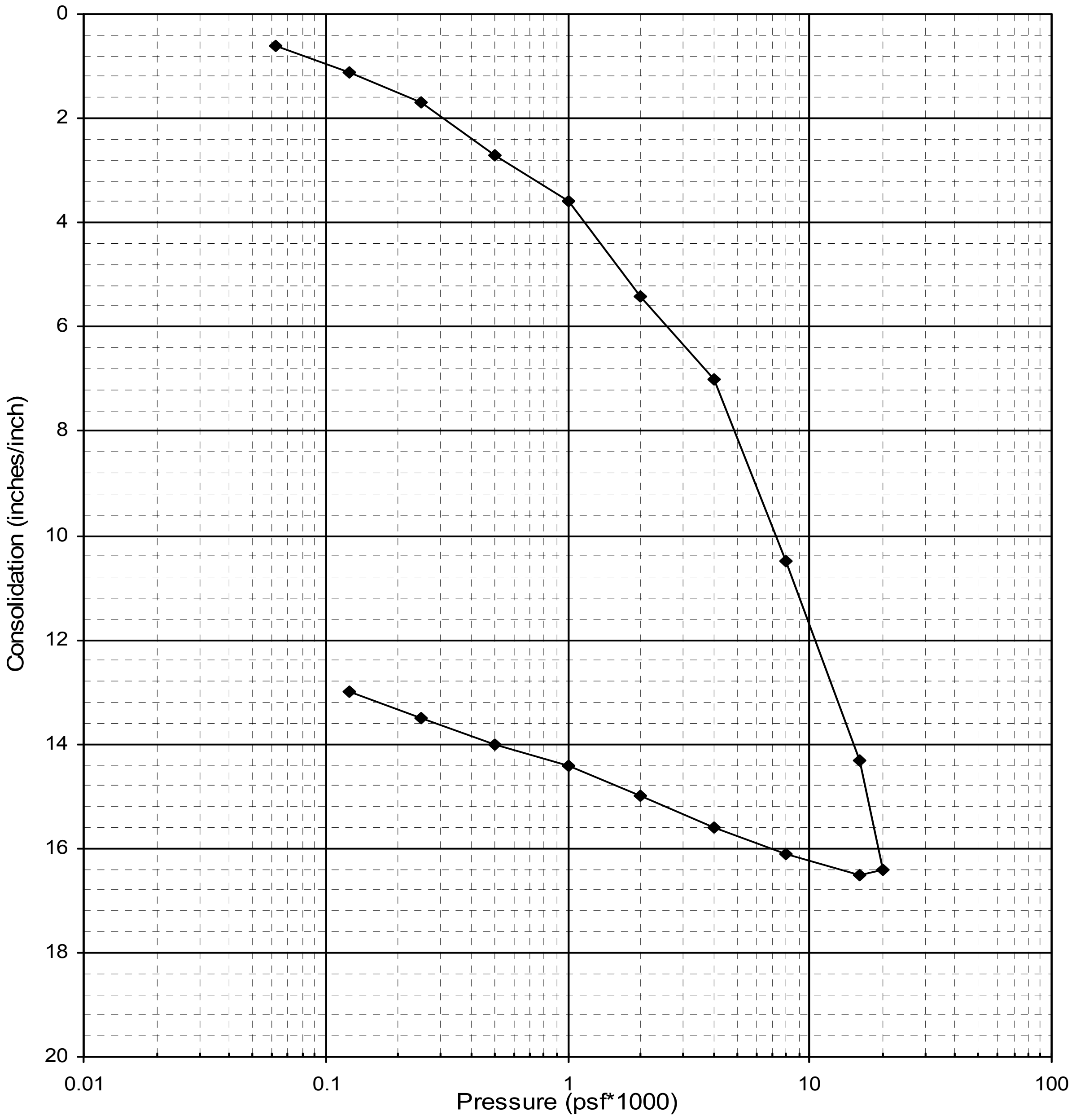
NOTE: Tests performed in accordance with ASTM D-1557

Compaction Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-25



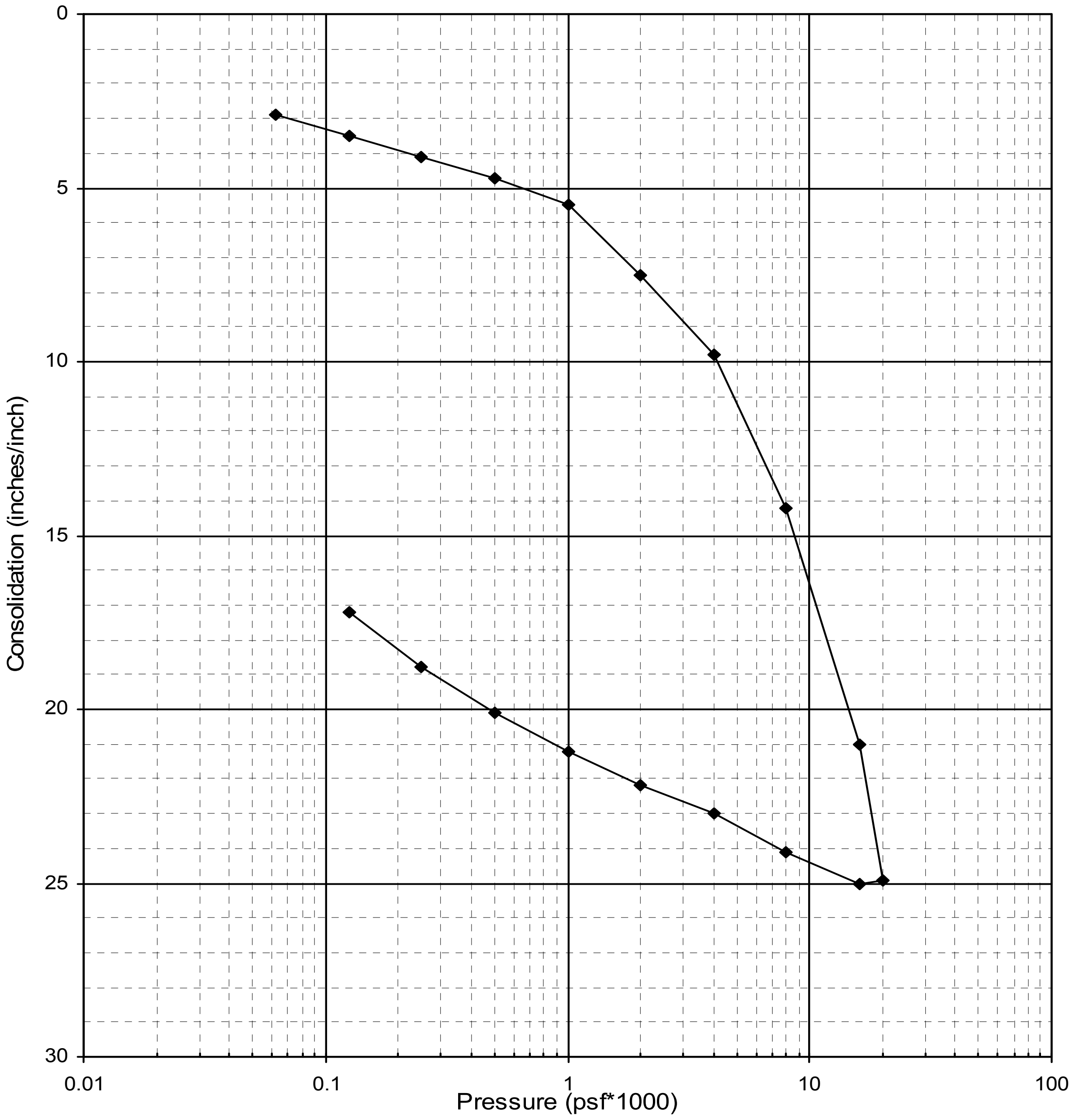
BORING NUMBER	SAMPLE DEPTH (FEET)	SOIL CLASSIFICATION	INITIAL MOISTURE CONTENT	INITIAL DRY DENSITY (LBS/FT³)
B-2	8½	Clay	27	94

Consolidation Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-26



BORING NUMBER	SAMPLE DEPTH (FEET)	SOIL CLASSIFICATION	INITIAL MOISTURE CONTENT	INITIAL DRY DENSITY (LBS/FT³)
B-3	6	Clay with trace silt	29	90

Consolidation Test Results

Pullman-Moscow Airport Runway Realignment
Pullman, Washington

GEOENGINEERS

Figure A-27

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APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE

APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES, PERSONS AND PROJECTS

This report has been prepared for use by the Pullman-Moscow Regional Airport, Toothman-Orton Engineering and their selected design consultants in support of your preparation of a master plan and construction cost estimates for an alternate realignment of Runway 5-23 at the Pullman-Moscow Regional Airport in Pullman, Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. No one except the Pullman-Moscow Regional Airport, Toothman-Orton Engineering and their selected design consultants should rely on this report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

This report has been prepared for the Pullman-Moscow Regional Airport, Toothman-Orton Engineering and their selected design consultants in support of your preparation of a master plan and construction cost estimates for an alternate realignment of Runway 5-23 at the Pullman-Moscow Regional Airport in Pullman, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or
- project ownership.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org .

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

SUBSURFACE CONDITIONS CAN CHANGE

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or ground water fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

MOST GEOTECHNICAL AND GEOLOGIC FINDINGS ARE PROFESSIONAL OPINIONS

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

GEOTECHNICAL ENGINEERING REPORT RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers’ professional judgment and opinion. GeoEngineers’ recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A GEOTECHNICAL ENGINEERING OR GEOLOGIC REPORT COULD BE SUBJECT TO MISINTERPRETATION

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

DO NOT REDRAW THE EXPLORATION LOGS

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

GIVE CONTRACTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

CONTRACTORS ARE RESPONSIBLE FOR SITE SAFETY ON THEIR OWN CONSTRUCTION PROJECTS

Our geotechnical recommendations are not intended to direct the contractor’s procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

READ THESE PROVISIONS CLOSELY

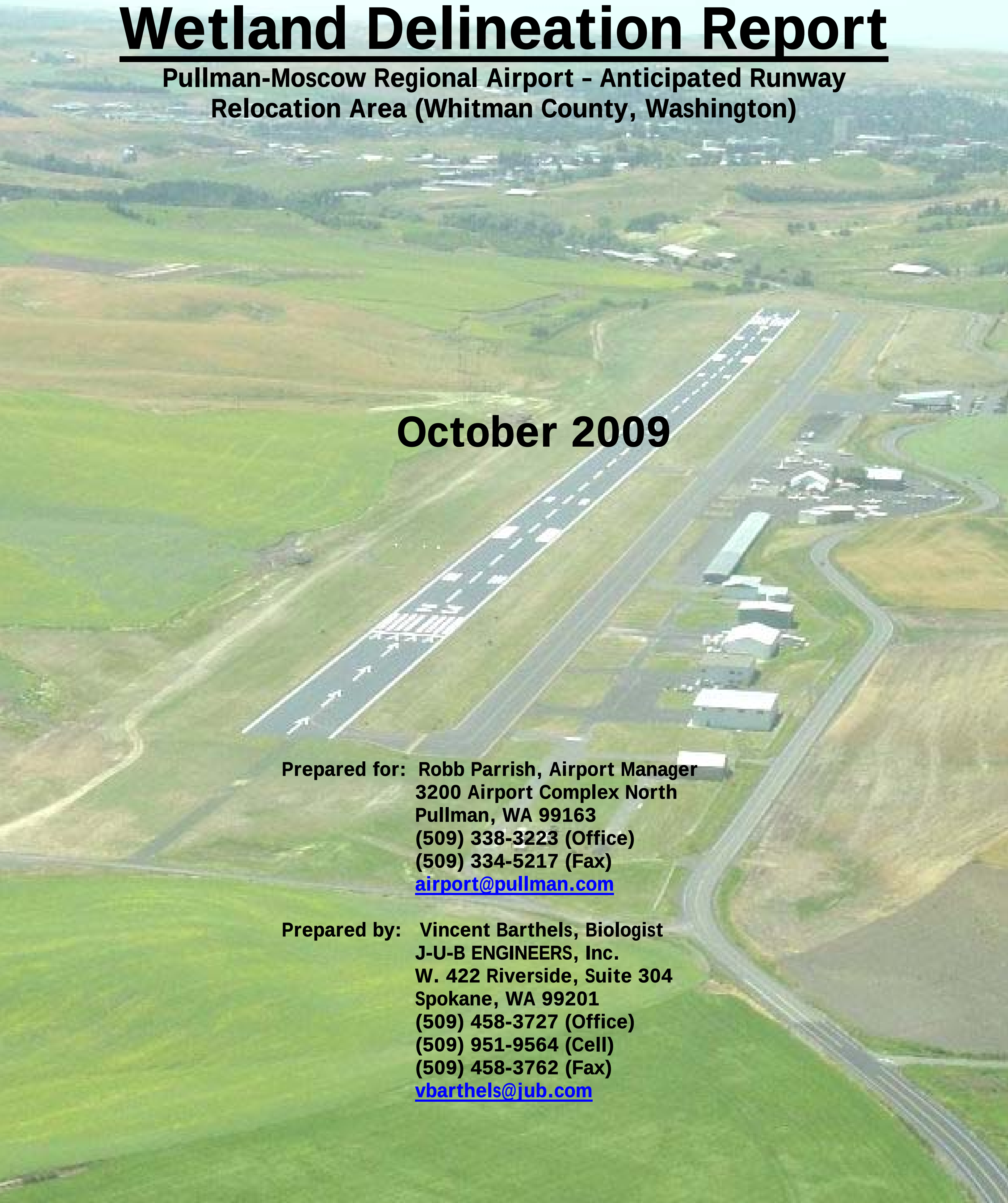
Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

GEOTECHNICAL, GEOLOGIC AND ENVIRONMENTAL REPORTS SHOULD NOT BE INTERCHANGED

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Wetland Delineation Report

Pullman-Moscow Regional Airport - Anticipated Runway Relocation Area (Whitman County, Washington)



October 2009

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Appendix

Introduction

This wetland delineation was authorized by Robb Parrish, the airport manager, in order to properly define the wetland boundaries within the approximately 350-acre defined study area, pursuant to the U.S. Army Corps of Engineers Wetland Delineation Manual Technical Report Y-87-1 (1987 Manual) and the Arid West Regional Supplement (2006). The defined study area is linked to the anticipated runway relocation area and is located within the very north part of Section 3, Township 14 North, Range 46 East, and Sections 34, 35, 36, Township 15 North, Range 46 East, Whitman County, Washington.

This investigation was performed to determine the presence or absence of wetland boundaries within the defined study area. A preliminary investigation was conducted on September 23, 2008; at this time, the hydrologic characteristics were not evident, so the field investigation was postponed to the following spring. The actual field investigation was conducted on April 22nd and 30th, 2009. It should be noted that the field conditions were observed near the beginning of the growing season, when hydrologic characteristics were evident. The primary investigator was Vincent Barthels, Biologist for J-U-B ENGINEERS, Inc. Gregg Rayner, senior biologist, and Jeremiah Nill, biologist, both also with J-U-B ENGINEERS, Inc. also assisted in the delineation and the subsequent report.

Methods

The wetland delineation was conducted using methodology described in the U.S. Army Corps of Engineers Wetland Delineation Manual (1987 Manual) and the Arid West Regional Supplement (2006). Specific investigations were performed at 5 transects within the study area. Soil test pits (STPs) were established in order to identify the presence/absence of hydrophytic plant communities, wetland hydrology and hydric soils within each of the transects. The soil test pits were marked with wooden lath and orange flagging. Professional land surveying was performed by J-U-B ENGINEERS, Inc. to capture the established soil test pit markers and wetland boundaries set in the field using a Trimble R8 GNSS RTK (Real Time Kinematics) Global Positioning System (GPS) unit. This system has an accuracy of about +/- 10mm (0.03 feet) + 1ppm RMS Horizontal, and +/- 20mm (0.06 feet) + 1ppm vertical. The GPS points were downloaded into ACAD 2009 to convert established GPS waypoints into the developed Wetland Delineation Map, which aided in the determination of wetland acreage within the defined study area. Photos were taken to properly document pertinent locations (see appendix – photo inventory).

Sources of information used for this investigation included: 1) Whitman County Soil Survey (USDA 1975; see appendix – soil survey map); 2) Moscow West, WA-ID USGS 7.5 minute Quad Map; 3) National List of Plant Species that Occur in Wetlands (Resource Management Group, Inc. 1994); 4) Plant identification references (see references); 5) Moscow West, WA-ID - National Wetland Inventory (NWI) Map (see appendix); 6) DNR Water Typing Map (see appendix); 7) Munsell soil chart (2000 Edition); and, 8) Hydric Soils List – Whitman County, Washington (USDA 2005).

Discussion

Topography

The topography of the project study area is slightly undulating (5-25% slopes), especially the northwest facing rolling wheat fields located in the southern portion of the study area. Within the Runway Protection Zone (RPZ), situated in the northern portion of the study area, the existing grade is relatively flat; in this area the land has been graded with a 2% to 3% slope toward the west. The elevation of the study area falls within the range of 2,500 feet to 2,700 feet above sea level.

Climate

The project area has an average annual temperature of 47.1 degrees Fahrenheit. The average annual rainfall is 20.99 inches; whereas, the average annual snowfall is 35.2 inches. The growing season typically falls between April 11th and October 13th, 185 days (USDA/NRCS 2009).

Plant communities

Plant communities primarily consisted of assorted herbaceous vegetation, such as grasses and annual weeds, and several shrubs and trees. Table 1 illustrates the dominant plant species that were encountered within the subject property.

Table 1 - Common vegetation encountered within the subject property

Common Name	Scientific Name	Wetland Indicator Status
Baltic Rush	*Juncus balticus*	FACW
Canadian thistle	*Cirsium arvense*	FACU
Cattail	*Typha latifolia*	OBL
Cheat-grass	*Bromus tectorum*	FACU
Clover	*Trifolium spp.*	FAC
Club moss	*Lycopodium spp.*	FAC
Common mullein	*Verbascum thapsus*	FACU
Common yarrow	*Achillea millefolium*	FACU
Dalmatian toadflax	*Linaria dalmatica*	FACU
Flix-weed	*Descurainia Sophia*	FACU
Gumweed	*Madia gracilis*	NI
Hawthorn	*Crataegus douglasii*	FAC
Idaho Fescue	*Festuca idahoensis*	FACU
Kentucky Bluegrass	*Poa pratensis*	FAC
Meadow foxtail	*Alopecurus pratensis*	FACW
Mustard	*Sisymbrium altissimum*	FACU
Orchard Grass	*Dactylis glomerata*	FACU
Quack grass	*Agropyron repens*	FAC
Quaking Aspen	*Populus tremula*	FAC
Rabbitfoot polypogon	*Polypogon monspeliensis*	FACW
Red Top	*Agrostis alba*	FAC
Red-osier dogwood	*Cornus stolonifera*	FACW
Reed canary grass	*Phalaris arundinacea*	FACW
Sedge	*Carex spp.*	FACW
Smooth brome	*Bromus inermis*	FACU
Spotted knapweed	*Centaurea maculosa*	FACU
St. John’s wort	*Hypericum majus*	FACW
Thistle	*Cirsium spp.*	FACU
Watercress	*Nasturtium officinale*	FACW
Watson’s willow herb	*Epilobium ciliatum*	FACW
Wheat	*Triticum aestivum*	NI
Willow	*Salix spp.*	FAC-OBL

Hydrology

The majority of the hydrology within the project area is derived from a combination of snow melt, precipitation events, run-off from adjacent higher elevations and a high ground water table. Several ephemeral drainages, traversing through the wheat fields located in the southern portion of the study area, tie into the primary ditchline at the cutslope of the RPZ; these waters travel westerly through a combination of open ditches and/or a safety area subsurface drainage system. Waters eventually flow into Airport Creek, near where this Creek outlets under the existing runway. Airport Creek flows westerly in the study area and eventually ties into Paradise Creek near Highway 270. Wetland hydrology along the fringe of Airport Creek can be attributed to lateral seepage.

Soils

The soils identified for the project study area include: Caldwell silt loam (19); Latah silt loam (54); Naff silt loam, 7 to 25 percent slopes (59); Palouse silt loam, 3 to 7 percent slopes (64); Palouse silt loam, 7 to 25 percent slopes (65); Palouse silt loam, 7 to 25 percent slopes, eroded (66); Palouse-Thatuna silt loams, 7 to 25 percent slopes (71); and Thatuna silt loam, 7 to 25 percent slopes (104) (USDA 1968). Of these soil types, Caldwell silt loam, Latah silt loam, and Thatuna silt loam 7 to 25 percent slopes, are listed as hydric on the Whitman County Hydric Soils List (USDA 2001). General characteristics of the soils mapped within the defined project are described in the following table (Table 2).

Table 2 - Characteristics of mapped soil types within the subject property

Soil Type	**Drainage Class**	**Soil Coloration and Texture**	**Permeability**	**Run-off Potential**
Caldwell silt loam **(19)**	Moderate to poorly drained	The surface layer is grayish brown and dark gray silt loam about 17 inches thick. The subsoil is gray silty clay loam to a depth of 39 inches. The substratum, to a depth of 60 inches, is brownish gray silty clay loam	Moderately slow	Very slow
Latah silt loam **(54)**	Poorly drained	The surface layer is dark grayish brown silt loam about 19 inches thick. The subsurface layer is light gray and light brownish gray silt loam to a depth of 30 inches. The subsoil is brown silty clay loam to a depth of 60 inches.	Moderate	Very slow
Naff silt loam, 7 to 25 percent slopes **(59)**	Well drained	The surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer, to a depth of 18 inches, is dark brown silty clay loam. The subsoil, is yellowish brown silty clay loam to a depth of 47 inches. Below this, to a depth of 60 inches, is light yellowish brown silt loam.	Moderately slow	Medium

Palouse silt loam, 3 to 7 percent slopes **(64)**	Well drained	The surface layer is dark grayish brown and grayish brown silt loam about 26 inches thick. The subsoil is pale brown silt loam extending to a depth of 60 inches.	Moderate	Slow
Palouse silt loam, 7 to 25 percent slopes **(65)**	Well drained	The surface layer is dark grayish brown and grayish brown silt loam about 24 inches thick. The subsoil is pale brown silt loam extending to a depth of 60 inches.	Moderate	Medium
Palouse silt loam, 7 to 25 percent slopes, eroded **(66)**	Well drained	The surface layer is dark grayish brown and grayish brown silt loam about 24 inches thick. The subsoil is pale brown silt loam extending to a depth of 60 inches.	Moderate	Slow
Palouse-Thatuna silt loams, 7 to 25 percent slopes **(71)**	Well drained	This complex is 50 percent Palouse silt loams and 45 percent Thatuna silt loams. The Palouse soil is found in convex areas and the Thatuna soil in concave areas.	Moderate	Medium
Thatuna silt loam, 7 to 25 percent slopes **(104)**	Moderately well drained	The surface layer is dark grayish brown silt loam about 16 inches thick. The subsoil is brown silt loam to depth of 33 inches, light brownish gray silt loam to a depth of 39 inches, and pale brown and light yellowish brown silty clay loam extending to a depth of 60 inches	Moderate	Medium

Wetland/Stream Classifications

The National Wetlands Inventory (NWI) Map classifies a **PEM1A** (palustrine, emergent, persistent and temporary) wetland, associated with Airport Creek and starting where Airport Creek outlets under the existing runway. The DNR Forest Practice Activity Map also illustrates the aforementioned feature and several other ephemeral drainages within the defined study area as “U” or “unclassified” channels (see DNR maps in the appendix).

Findings

Data forms reflect the conditions as assessed in the field and can be found in the Appendix attached to this report. The following subsections summarize the findings along the established transects, how the wetland boundary was determined and discusses the classification and functionality of the wetland.

Field Investigations:

Transect A (STP #1-4):

The first three soil test pits were examined along the primary axis of Transect A. A fourth STP (#4), or satellite plot, was established to determine whether wetland areas exist landward of the right bankfull elevation further upstream of Transect A. Wetland parameters were fulfilled at only STP #2. Hydrophytic vegetative structure consisted of reed canary grass, hawthorn, and red-osier dogwood. The wetland hydrology was evidenced by the presence of a high water table. Hydric soil was indicated by redox concentrations located in a gleyed matrix below a thick dark layer. STP #1, #3 and #4 did not fulfill all of the wetland parameters and consequently received upland designations.

Transect B (STP# 5-8):

Four soil test pits were recorded along Transect B. All three of the wetland parameters were fulfilled at STP #6 and #7. At the wetland test pits, the hydrophytic vegetative structure consisted of reed canary grass, meadow foxtail, cattails, willows and hawthorns. The wetland hydrology was evidenced by the presence of a high water table as well as surface inundation. Hydric soils were indicated by a depleted matrix located below a dark surface and common mottling observed in a clay layer. STP #5 and #8 did not fulfill all of the wetland parameters and consequently received upland designations.

Transect C (STP# 9-12):

Four soil test pits were examined within Transect C. Wetland parameters were fulfilled at STP #10 and #11. Hydrophytic vegetative structure consisted of reed canary grass, cattails and meadow foxtail. The wetland hydrology was evidenced by the presence of surface water and a high water table. Hydric soils were indicated by common mottling in a clay layer located 8 inches below the surface and a hydrogen sulfide smell encounter just below the existing grade. STP #9 and #12 did not fulfill any of the wetland parameters and consequently received upland designations.

Transect D (STP# 13-17):

Five soil test pits were dug along Transect D. Wetland parameters were fulfilled at STP #14 and #16. Hydrophytic vegetation structure consisted of reed canary grass, cattails and hawthorns. The wetland hydrology was evidenced by the presence of a high water table. Hydric soil was indicated by redox concentrations and a hydrogen sulfide smell encounter just below the existing grade. STP #13, #15 and #17 did not fulfill all of the wetland parameters and, consequently, received upland designations.

Transect E (STP# 18-19):

Two soil test pits were examined along Transect E. This transect was established to document the conditions along the ephemeral ditch located along the toe of cut-slope of the RPZ (or near the end of the 200 foot safety area extending south of the edge of the runway). Within the ephemeral ditch, sparse vegetative cover (less than 40%) was observed. Hydrophytic vegetative structure consisted of reed canary grass, cattails and small patches of watercress. The wetland hydrology was evidenced by the presence of surface water and a high water table. Hydric soils were indicated by common mottling in a clay layer located 8 inches below the surface and a hydrogen sulfide smell encounter just below the existing grade. STP #18 did not fulfill any of the wetland parameters and consequently received upland designation.

Additional soil test pits were not dug in or around the other identified ephemeral features located within the wheat fields (see wetland delineation maps) in an attempt to lessen the magnitude of trampling the planted crop, coupled with the fact that the similar soil characteristics are believed to be present throughout the eastern portion of the study area. The presence of noticeable standing water (i.e. correlated to the alluvial fans linked to low gradient portions of the seasonal streams) and/or an entrenched or scoured channel was enough of an indication or physical characteristic to mark these features in the field without additional soil test pits, which is consistent with the standards set forth in 33 CFR 328.3.

It should be noted that maintenance of the RPZ ditch to original specifications would not require a Department of the Army permit under Section 404 of the Clean Water Act. Federal Regulation 33 CFR 323.4(a)(3) states that the construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance (but not construction) of drainage ditches does not require a permit. Any activities associated with the "maintenance of drainage ditches" must not involve the widening or deepening of the existing drainage ditch. Maintenance only includes the removal of accumulated sediment, vegetation, or debris. Within the RPZ, specifically nearest stations 75+00 and 92+50, the width of the ephemeral ditch could be better managed to the designed specifications by clearing and maintaining un-impeded inlets to the sub-surface safety area drainage system. By maintaining the safety area drainage system on a regular (i.e. annual) basis, the RPZ could maximize the required useable (i.e. dry and drivable) area between the runway's southern edge and the designed ditch, situated near the catch point or toe of the safety grading area.

Types of wetlands identified:
Essentially, three different types of wetlands or waterway features were identified and delineated; they include: a riverine wetland, a depressional wetland, and several sloped wetlands or associated ephemeral stream channels/ditches (see wetland delineation maps for the precise location of each feature within the defined study area).

How the wetland and/or stream boundaries were chosen:
The wetland boundary was determined primarily by the distinct vegetation shift between the aforementioned hydrophytic species and upland and/or transitional species, such as cheat grass, common mullein, wheat, smooth brome or creeping thistle. Hydric soil indicators and wetland hydrology further substantiated the delineated boundaries. Streams and ditches were delineated based on the ordinary high mark, in accordance with 33 CFR 328.3.

Wetland classification and functionality:
The wetland areas associated with the subject property are characterized as seasonal, emergent, wetlands. Based on Cowardin's (1979) wetland classification system, this complex of wetland features are field verified to be PEM1C, which is consistent with the NWI Map designation.

In accordance with the City of Pullman's City Code – Critical Areas and Resources Section, or more specifically - Chapter 16.50.250 (2), wetland areas are to be classified or rated pursuant to the Department of Ecology's Wetland Rating System for Eastern Washington. The Airport Creek Drainage was rated as a riverine system and scored to be a Category II Wetland based on its rating (see DOE rating forms), which scored a total of 56 points [12 for Water Quality functions, 28 for hydrologic functions and 16 for habitat functions]. Secondly, the small depressional wetland (0.2 acres) located along the cutslope of the service roadway scored to be a Category III Wetland based on its rating (see DOE rating forms), which scored a total of 39 points [18 for Water Quality functions, 12 for hydrologic functions and 9 for habitat functions]. Thirdly, the identified sloped wetlands and associated ephemeral stream channels/ditches were all characterized as sloped features and scored to be a Category IV Wetlands based on their rating (see DOE rating forms), which scored a total of 24 points [14 for Water Quality functions, 4 for hydrologic functions and 6 for habitat functions].

Collectively, the wetlands identified in this report share several important functions and values that include: the ability to protect and improve water quality; flood storage; ground water recharge; and, provide for wildlife habitat (and, in addition, airport creek provides for marginal fish habitat). These wetlands generally act as a sloped catch basin by intercepting run-off from adjacent higher elevations. These wetlands filter the water by degrading or breaking down pollutants.

Conclusion

Within the approximately 350-acre defined study area, the following features were identified and delineated: 8.4 total areas of riverine wetlands; 0.2 total areas of depressional wetlands; and, 6.1 total areas of sloped wetlands or associated ephemeral stream channels/ditches. Based on the anticipated runway relocation footprint illustrated on the wetland delineation maps, the estimated project impacts correlate to 6.7 acres of Category II (Riverine) Wetlands and 5.7 acres of Category IV (Sloped) Wetlands. The enclosed wetland delineation maps illustrate the delineated features located within the defined 350-acre project study area. It should be noted, however, that final authority rests with the appropriate regulatory agencies.

Respectfully submitted by:

10-14-09

Vincent J. Barthels, Biologist
J-U-B ENGINEERS, Inc.

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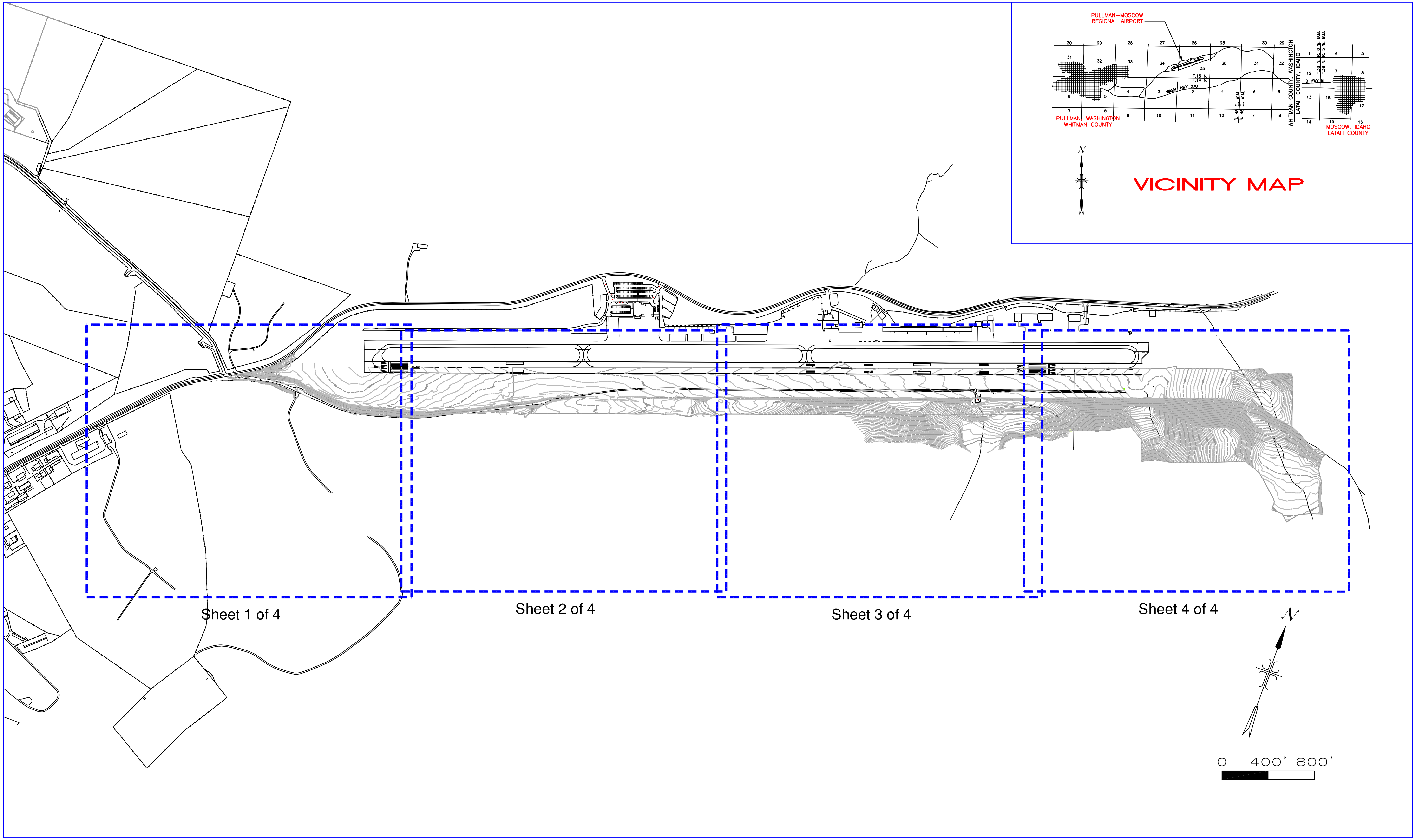
APPENDIX



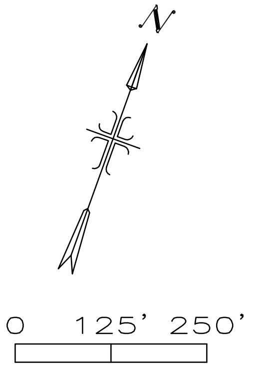
J-U-B
Environmental Group

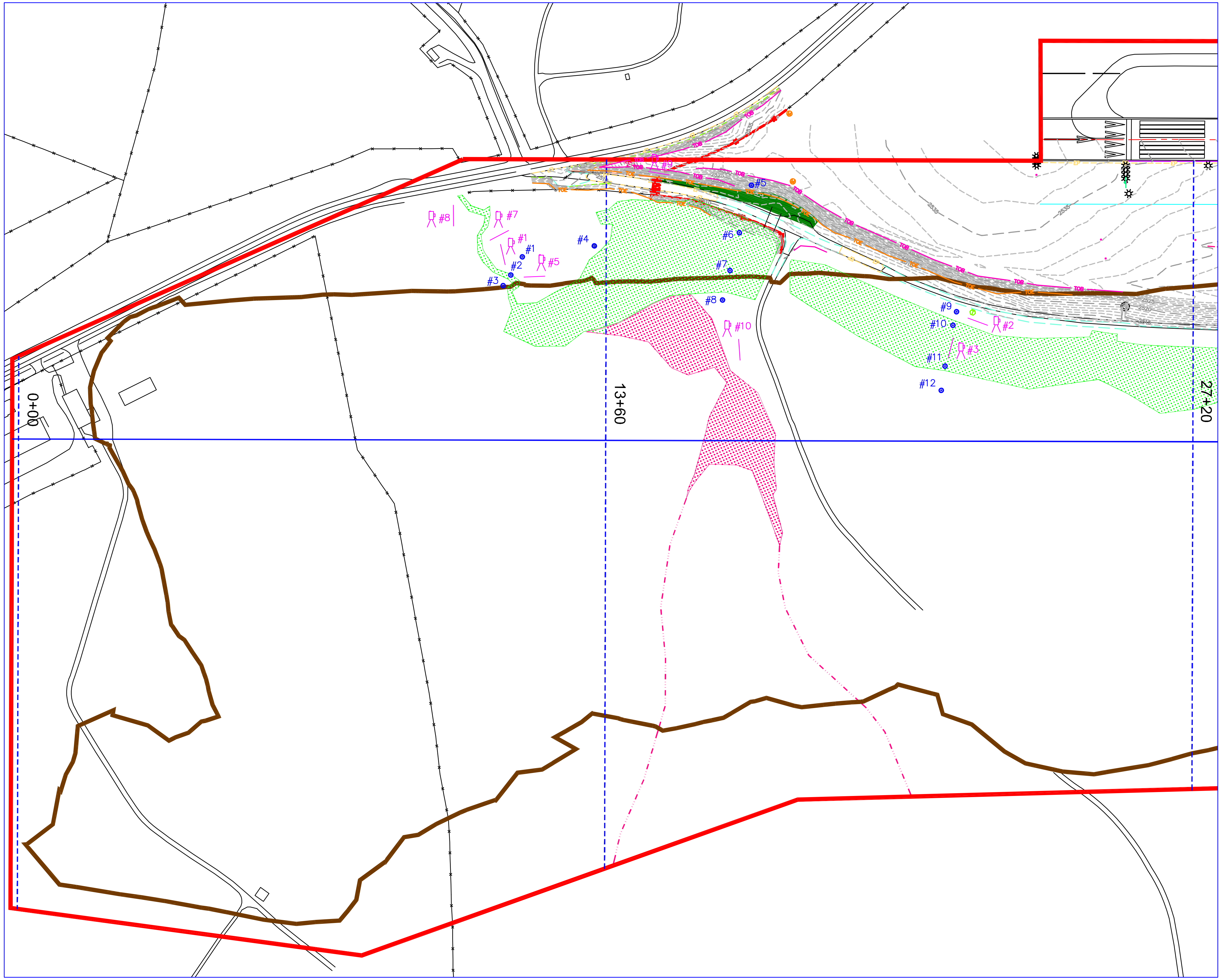
CAD FILE: 2006010B

Sheet Index
Pullman Moscow Regional Airport

LEGEND

🟩	Riverine Wetlands (8.4 acres total within the 350 acre Project Study Area)
▨	Sloped Wetlands and Ephemeral Channels (6.1 acres total within the 350 acre Project Study Area)
■	Depressional Wetlands (0.2 acres total within the 350 acre Project Study Area)
☐	Project Study Area Limits (Appprox. 350 Acres)
☐	Anticipated Limits of Runway Expansion
68+00	Established Baseline through Study Area and Relative Stationing
#1 ●	Soil Test Pit (19)
#1	Photo Point (14)





Environmental Group

CAD FILE: 2006010B-Dredged

Wetland Delineation Map
Pullman Moscow Regional Airport

Sheet
1 of 4

LEGEND

🟩	Riverine Wetlands (8.4 acres total within the 350 acre Project Study Area)
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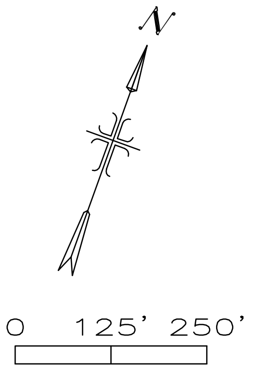

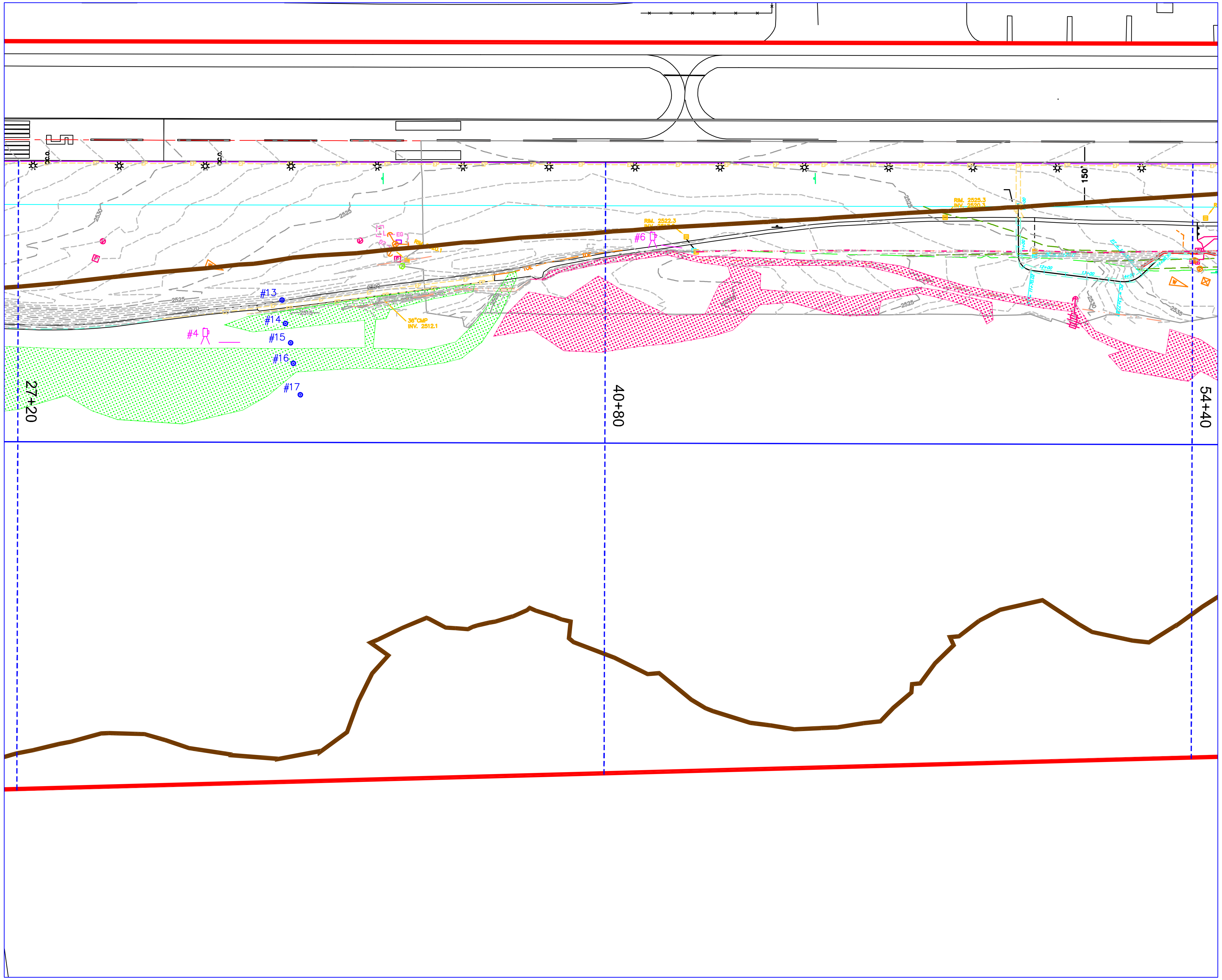

Wetland Delineation Map
Pullman Moscow Regional Airport

J-U-B Environmental Group

CAD FILE: 2006010B-Dredged

Sheet
2 of 4

LEGEND

▨	Riverine Wetlands (8.4 acres total within the 350 acre Project Study Area)
▨	Sloped Wetlands and Ephemeral Channels (6.1 acres total within the 350 acre Project Study Area)
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#1 ●	Soil Test Pit (19)
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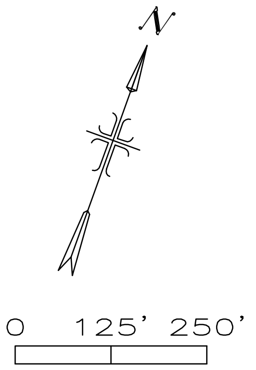

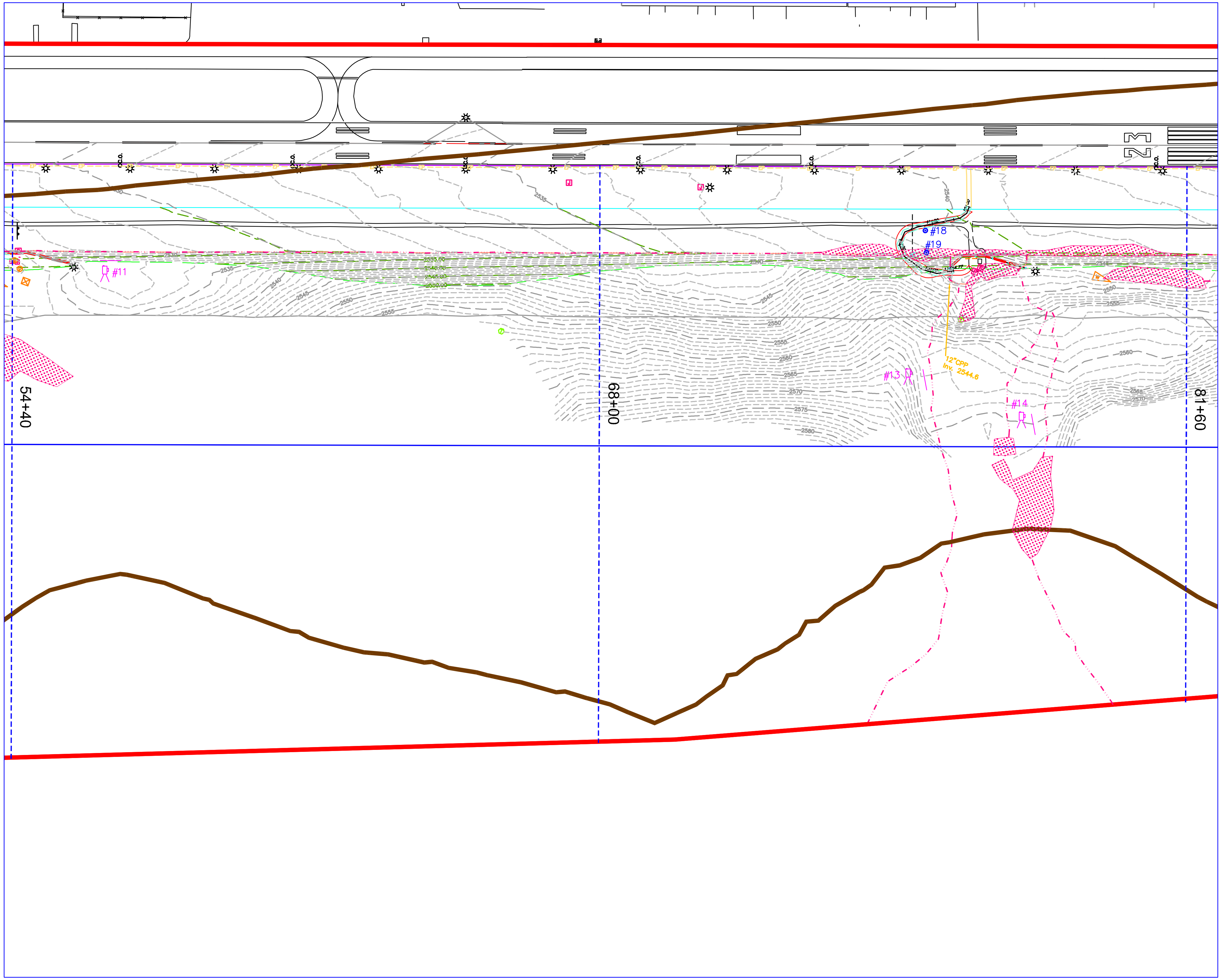

Wetland Delineation Map
Pullman Moscow Regional Airport

Sheet
3 of 4

LEGEND

🟩	Riverine Wetlands (8.4 acres total within the 350 acre Project Study Area)
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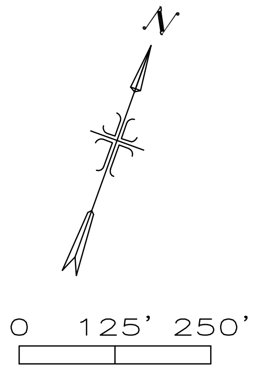

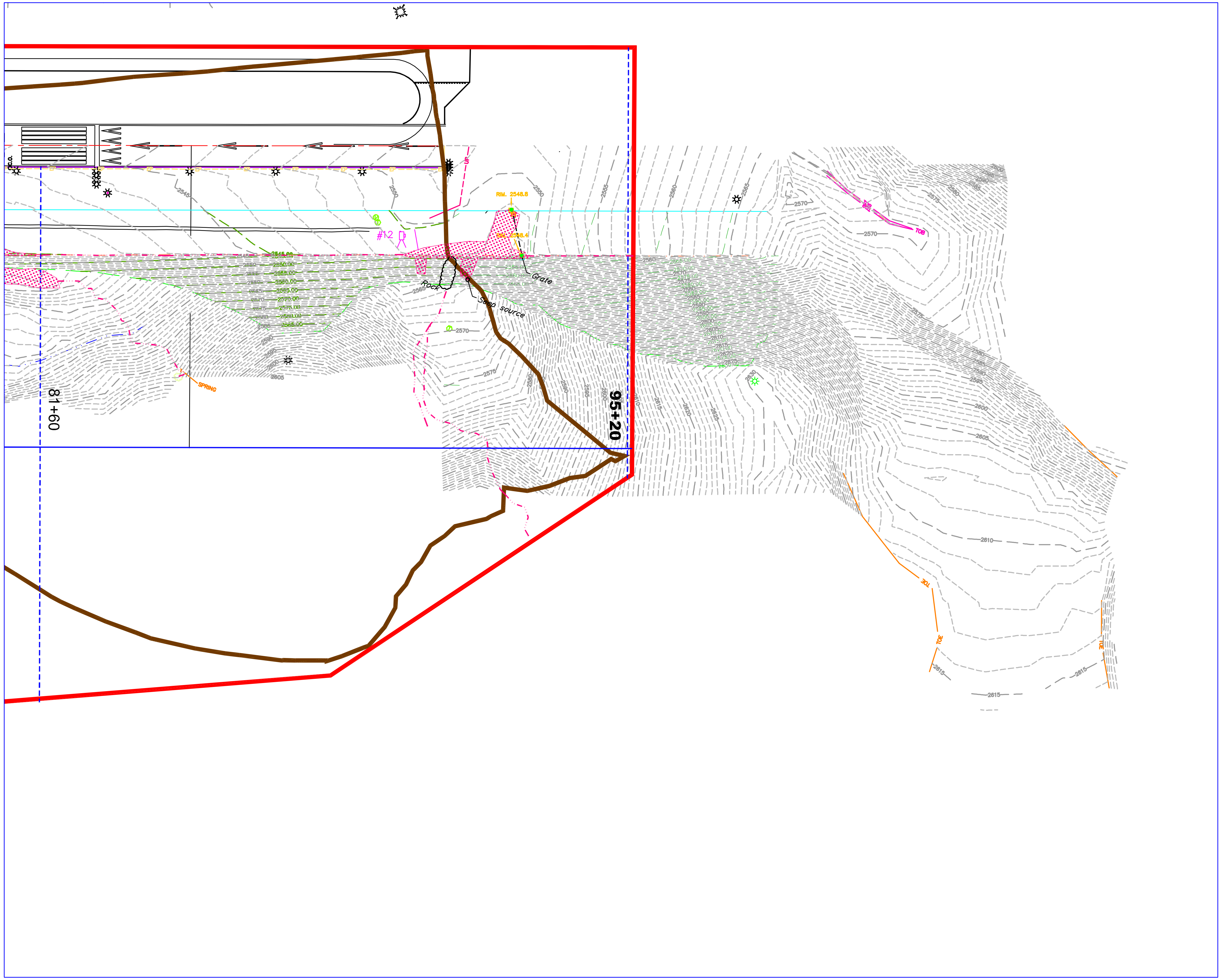

J-U-B Environmental Group

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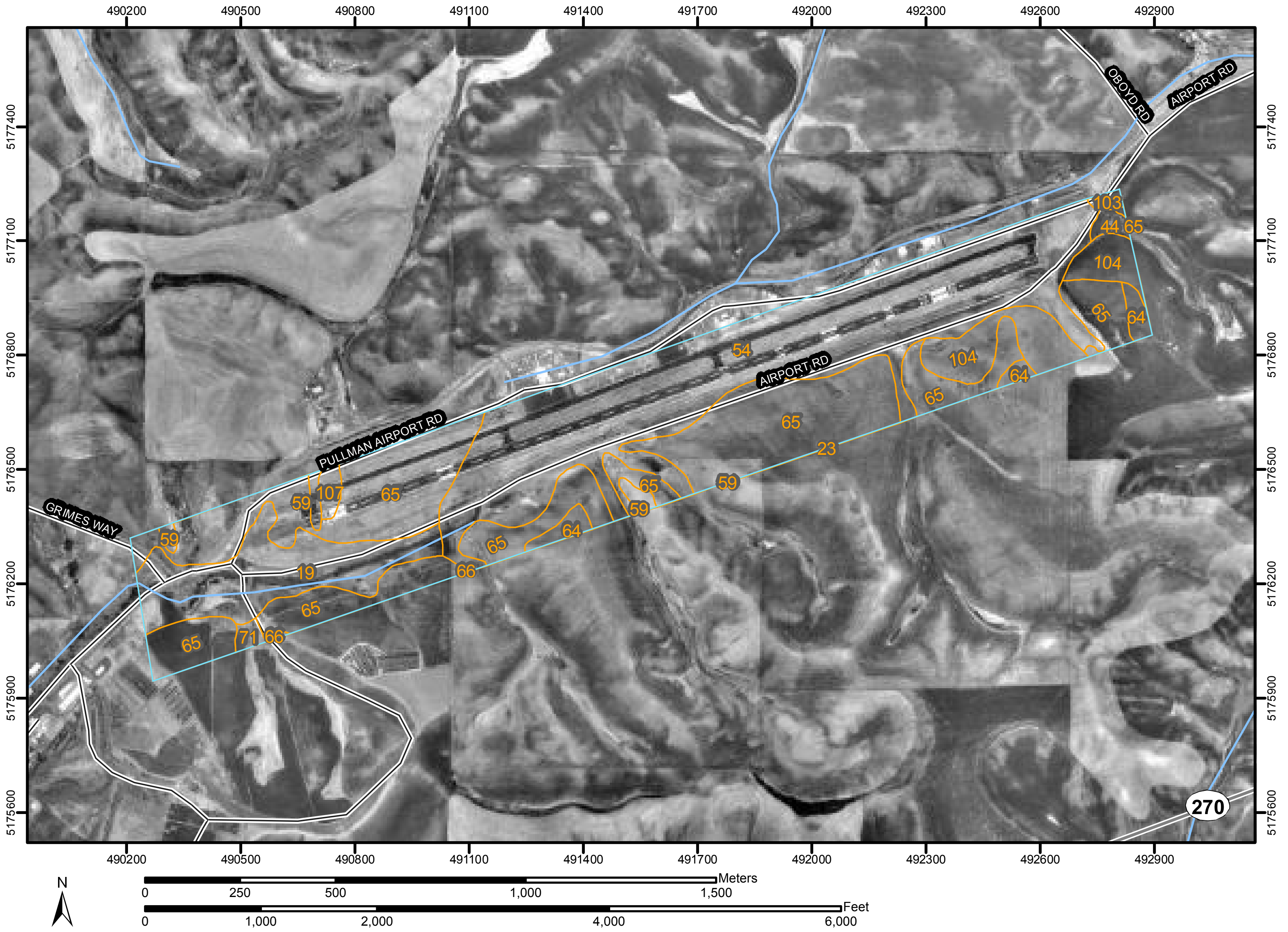
Wetland Delineation Map
Pullman Moscow Regional Airport

Sheet
4 of 4

Soil Map–Whitman County, Washington



MAP LEGEND

Area of Interest (AOI)

- □ Area of Interest (AOI)

Soils

- □ Soil Map Units

Special Point Features

- ⊍ Blowout
- ⊠ Borrow Pit
- ✳ Clay Spot
- ◆ Closed Depression
- ✕ Gravel Pit
- ∴ Gravelly Spot
- ⊘ Landfill
- Λ Lava Flow
- ⫫ Marsh
- ⚒ Mine or Quarry
- ◎ Miscellaneous Water
- ◉ Perennial Water
- ∨ Rock Outcrop
- \+ Saline Spot
- ⁘ Sandy Spot
- ≡ Severely Eroded Spot
- ◇ Sinkhole
- ʓ Slide or Slip
- ø Sodic Spot
- ≣ Spoil Area
- ○ Stony Spot
- ∞ Very Stony Spot
- ψ Wet Spot
- ▲ Other

Special Line Features

- ∿ Gully
- ⋯ Short Steep Slope
- ⌃ Other

Political Features

Municipalities

- ● Cities
- ▦ Urban Areas

Water Features

- 🟦 Oceans
- ∼ Streams and Canals

Transportation

- ┼┼┼ Rails

Roads

- ∿ Interstate Highways
- ∿ US Routes
- ∿ State Highways
- ∿ Local Roads
- ∿ Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Whitman County, Washington
Survey Area Data: Version 7, Nov 21, 2006

Date(s) aerial images were photographed: 7/11/1996; 7/13/1996

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Whitman County, Washington (WA075)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
19	Caldwell silt loam	28.4	10.8%
23	Calouse silt loam, 5 to 25 percent slopes, eroded	0.0	0.0%
44	Konert silt loam	1.4	0.5%
54	Latah silt loam	102.5	38.9%
59	Naff silt loam, 7 to 25 percent slopes	2.7	1.0%
64	Palouse silt loam, 3 to 7 percent slopes	4.7	1.8%
65	Palouse silt loam, 7 to 25 percent slopes	103.7	39.3%
66	Palouse silt loam, 7 to 25 percent slopes, eroded	0.4	0.2%
71	Palouse-Thatuna silt loams, 7 to 25 percent slopes	1.1	0.4%
103	Thatuna silt loam, 3 to 7 percent slopes	0.8	0.3%
104	Thatuna silt loam, 7 to 25 percent slopes	16.1	6.1%
107	Thatuna-Tilma silt loams, 7 to 25 percent slopes	1.7	0.6%

Totals for Area of Interest (AOI)	263.7	100.0%

NATIONAL WETLANDS INVE

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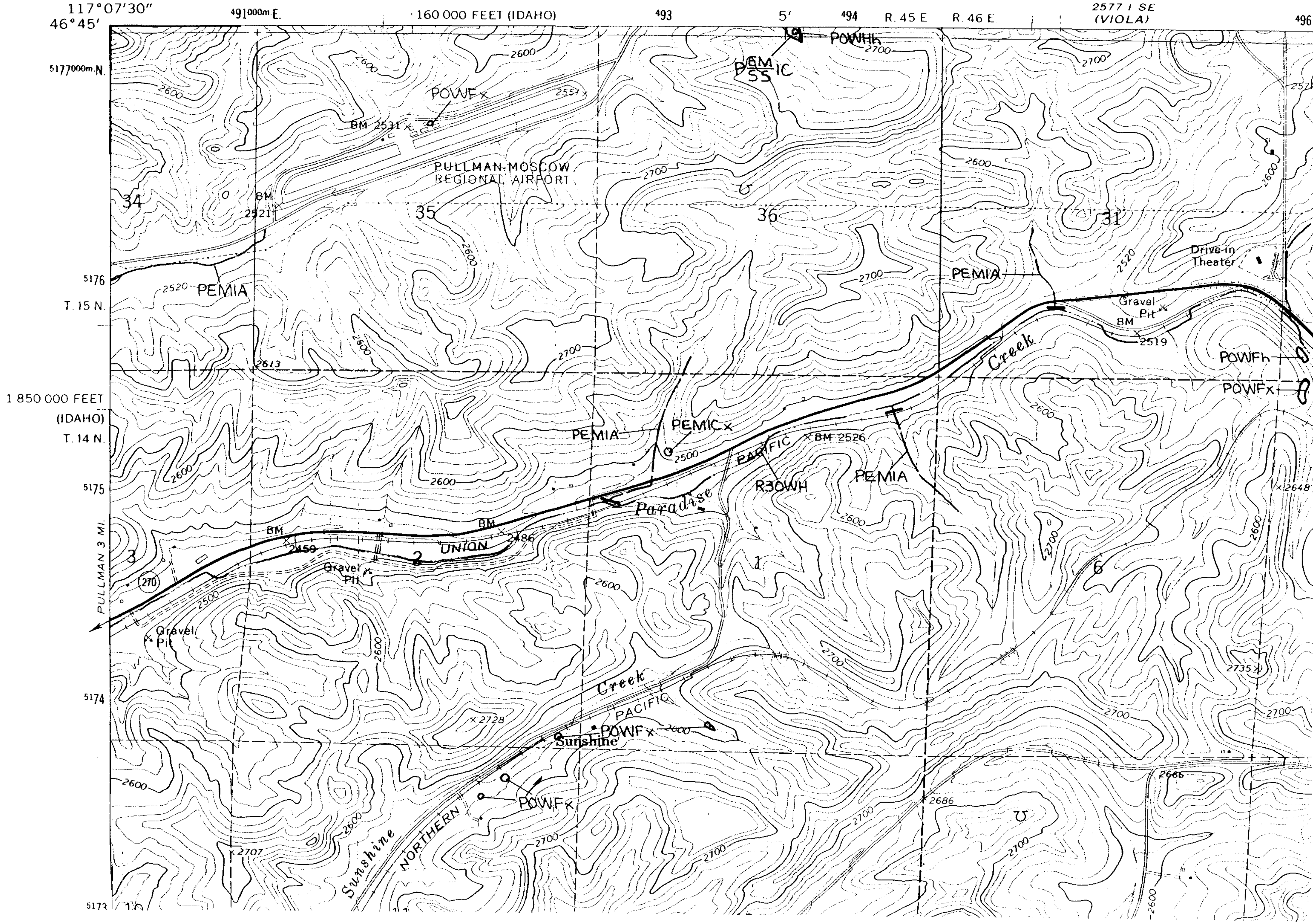
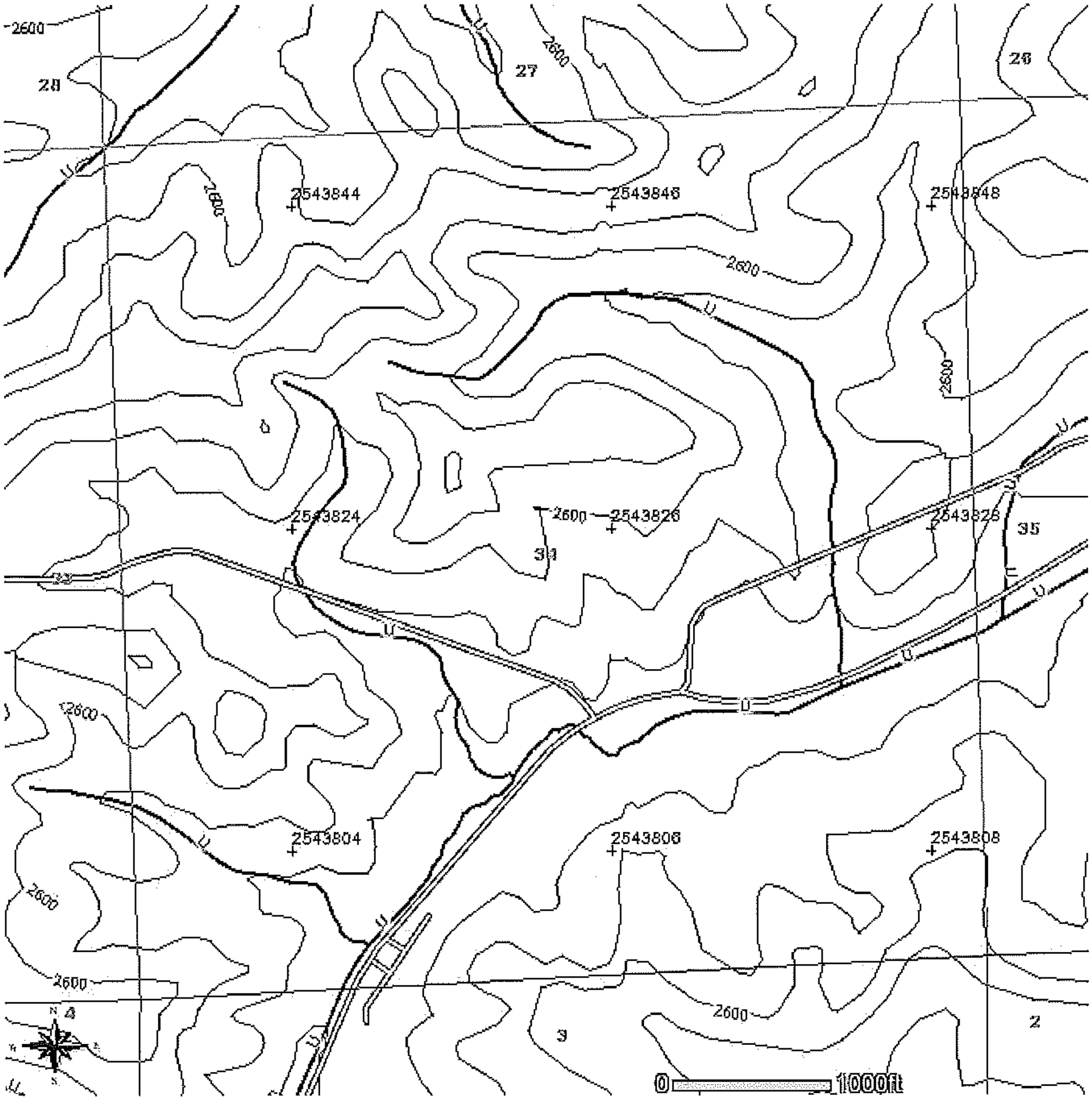


FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 15 NORTH HALF 0, RANGE 45 EAST (W.M.) HALF 0, SECTION 34

Application #:______________________________



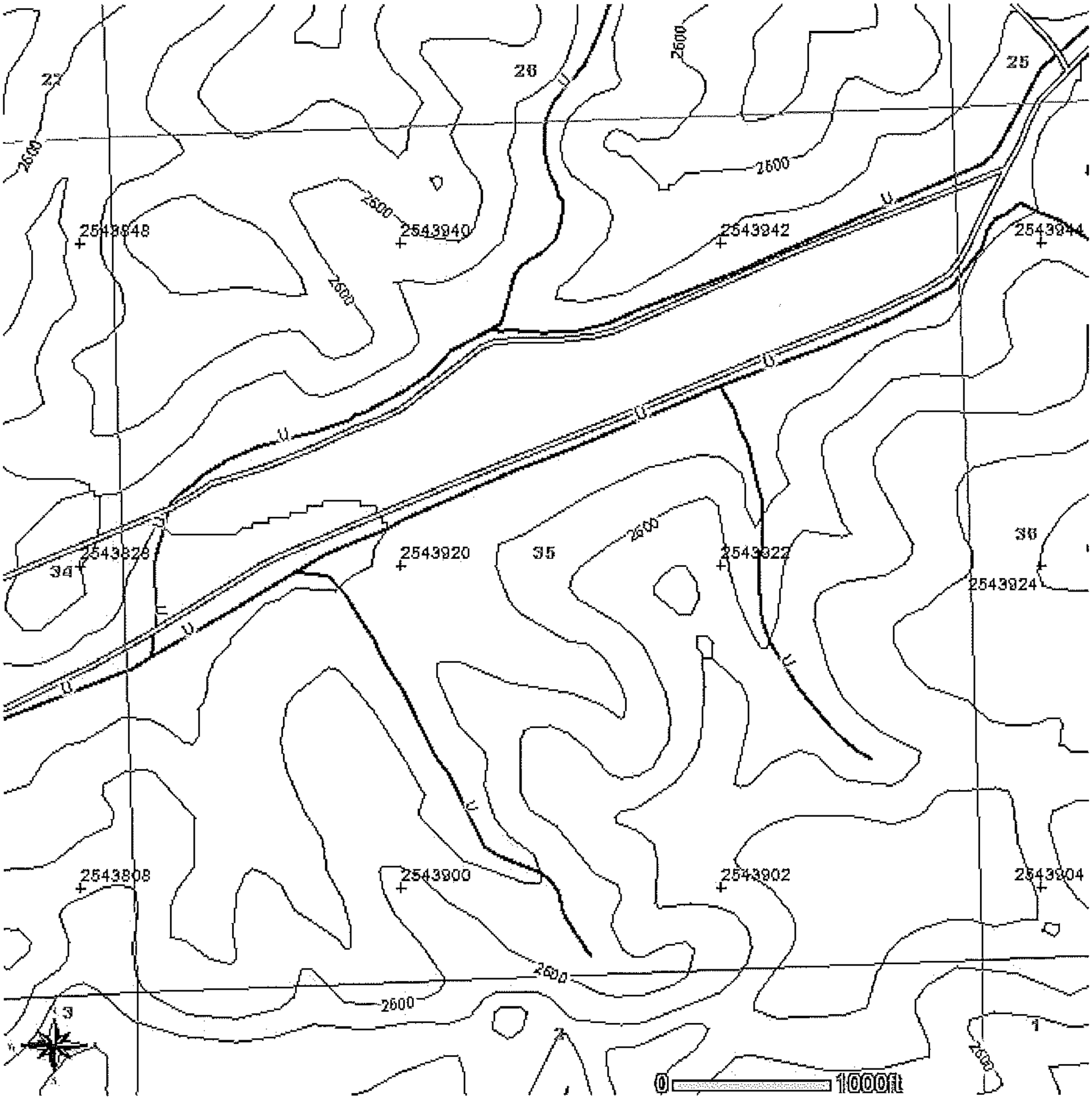
Please use the legend from the FPA Instruction or provide a list of symbols used.

Wednesday, March 12, 2008 4:35:44 PM
NAD 83
Contour Interval: 40 Feet

FOREST PRACTICE ACTIVITY MAP

TOWNSHIP 15 NORTH HALF 0, RANGE 45 EAST (W.M.) HALF 0, SECTION 35

Application #:______________________________



Please use the legend from the FPA Instruction or provide a list of symbols used.

Wednesday, March 12, 2008 4:36:29 PM
NAD 83
Contour Interval: 40 Feet

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #1 (Upland): Transect A

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 21.40'' N Long: 117° 07' 30.27'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes ___ No X**
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present	Yes ___ No X	

Remarks:

All three wetland parameters were not met at this site; therefore, STP #1 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Phalaris arundinacea*	85	Yes	FACW
2. *Dipsacus sylvestris*	10	No	NI-FAC
3. *Cirsium arvense*	5	No	FACU
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
Total Number of Dominant Species Across All Strata:	1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Vegetation parameter was fulfilled based on the dominant presence of reed canary grass.

SOIL

Sampling Point: STP #1 (Upland): Transect A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-22	10 YR 3/1	100	___	___	___	___	Silt loam	___
22-28	10 YR 2/1	100	___	___	___	___	Silty clay loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:
Non-hydric. Redox features were not observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 22
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches) 20

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
Wetland hydrology was not present. Pit was dry to a depth of 20 inches. STP #1 was located landward of the bankfull elevation associated with Airport Creek.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #2 (Wetland): Transect A

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 20.53'' N Long: 117° 07' 31.80'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___ Hydric Soil Present? Yes X No ___ Wetland Hydrology Present Yes X No ___	**Is the Sampled Area within a Wetland?**	**Yes X No ___**

Remarks:

Wetland parameters were met at this site; therefore, STP #2 received a wetland designation. STP is located below the bankfull elevation of Airport Creek

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Crataegus douglasii*	25	Yes	FAC
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	25		
Sampling/Shrub Stratum			
1. *Cornus stolonifera*	5	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	5		
Herb Stratum			
1. *Phalaris arundinacea*	55	Yes	FACW
2. *Cirsium arvense*	10	No	FACU
3. *Dipsacus sylvestris*	5	No	NI-FAC
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	70		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
Total Number of Dominant Species Across All Strata:	3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

. The vegetation criteria has been met.

SOIL

Sampling Point: STP #2 (Wetland)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10 YR 3/1	100	___	___	___	___	Silty clay loam	___
14-20	10 GY 4/1	60	2.5 Y 5/4	35	D	M	Clay	2 types of redox
___	___	___	10 YR 5/6	5	C	M	Clay	features present
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- X Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

- ___ 1 cm Muck (A9) (**LRR C)**
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

Gleyed matrix below a thick dark layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine)**
- ___ Drift Deposits (B3) (**Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Induation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizosphere along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine)**
- ___ Drift Deposits (B3) (**Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___

Water Table Present? Yes X No ___ Depth (inches) 4

Saturation Present? Yes X No ___ Depth (inches) 2
(includes capillary fringe)

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:

Observed wetland hydrology present.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #3 (Upland): Transect A

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 19.41'' N Long: 117° 07' 31.80'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?** Yes ___ No X
Hydric Soil Present?	Yes ___	No X	
Wetland Hydrology Present	Yes ___	No X	

Remarks:
Wetland parameters were not met at this site; therefore, STP #3 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Crataegus douglasii*	35	Yes	FAC
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	35		
Sampling/Shrub Stratum			
1. *Rosa woodsii*	10	Yes	FACU
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	10		
Herb Stratum			
1. *Bromus inermis*	60	Yes	NI-FACU
2. *Triticum aestivum*	20	No	NI-FACU
3. *Phalaris arundinacea*	10	No	FACW
4. *Cirsium arvense*	10	No	FACU
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___ ___	___	___	
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	10	x 2 = 20
FAC species	35	x 3 = 105
FACU species	100	x 4 = 400
UPL species	___	x 5 = ___
Column Totals:	145 (A)	525 (B)

Prevalence Index = B/A = 3.6

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks:

Vegetative community did not pass either the Dominance or Prevalence Index tests.

SOIL

Sampling Point: STP #3 (Upland): Transect A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-19	10 YR 3/1	100	___	___	___	___	Silt loam	___
19-28	10 YR 2/1	100	___	___	___	___	Silty clay loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:
Non hydric. Redox features were not observed

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes ___ No X Depth (inches) ___
Saturation Present? Yes ___ No X Depth (inches) ___
(includes capillary fringe)

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
No hydrology present within 28 inches of soil surface or existing grade.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09
Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #4 (Upland): Transect A
Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E
Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%
Subregion (LRR): B Lat: 046° 44’ 22.08’’ N Long: 117° 07’ 27.84’’ W Datum: NAD 1927
Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___ Hydric Soil Present? Yes ___ No X Wetland Hydrology Present Yes ___ No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No X**

Remarks:

All of the three wetland parameters were not met at this site; therefore, STP #4 received an upland designation. Linked to Transect A, this satellite pit was established to determine whether wetland conditions exist landward of the right bankfull.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Salix spp.*	15	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	15		
Herb Stratum			
1. *Phalaris arundinacea*	95	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	95		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	2 (A)
Total Number of Dominant Species Across All Strata:	2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is $\leq$ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Wetland vegetation present at this location.

SOIL

Sampling Point: STP #4 (Upland): Transect A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-20	10 YR 3/1	100	___	___	___	___	Silt loam	___
20-28	10 YR 2/1	100	___	___	___	___	Silty clay loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

- ___ 1 cm Muck (A9) (**LRR C)**
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
Wetland soils were not present at this site; No redox features observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine)**
- ___ Drift Deposits (B3) (**Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Induation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizosphere along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine)**
- ___ Drift Deposits (B3) (**Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 24
Saturation Present? Yes X No ___ Depth (inches) 21
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
Wetland hydrology was not present. Depth to water in soil test pit was 24 inches below the existing grade. STP #4 is located landward of the right bankfull elevation.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09
Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #5 (Upland): Transect B
Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E
Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): 30%
Subregion (LRR): B Lat: 046° 44' 21.89'' N Long: 117° 07' 21.73'' W Datum: NAD 1927
Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?**	**Yes ___**	**No X**
Hydric Soil Present?	Yes ___	No X			
Wetland Hydrology Present	Yes ___	No X			

Remarks:
Wetland parameters were not met at this site; therefore, STP #5 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			
Sampling/Shrub Stratum			
1. Rosa woodsii	10	No	Yes
2.			
3.			
4.			
5.			
Total Cover:	10		
Herb Stratum			
1. *Dipsacus sylvestris*	60	Yes	NI-FAC
2. *Cirsium arvense*	10	No	FACU
3. *Mentha arvensis*	10	No	FAC
4. *Galium triflorum*	10	No	FACU
5. *Equisetum arvense*	10	No	FAC
6.			
7.			
8.			
Total Cover:	100		
Woody Vine Stratum			
1.			
2.			
Total Cover:			

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species	80	x 4 = 240
UPL species	30	x 5 = 120
Column Totals:	110 (A)	360 (B)

Prevalence Index = B/A = 3.27

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤ 3.0[1]
- ___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___** **No X**

Remarks:

Mostly a "FAC/FACU" community; parameter was not fulfilled based on both the dominance and the prevalence index tests.

SOIL

Sampling Point: STP #5 (Upland): Transect B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-25	10 YR 3/3	100	___	___	___	___	Silt loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:
Wetland soils not present at this location; no redox features observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes ___ No X Depth (inches) ___
Saturation Present? Yes ___ No X Depth (inches) ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
The water table or saturation was not present within the upper 25 inches of the soil profile.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #6 (Wetland): Transect B

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44’ 21.89’’ N Long: 117° 07’ 21.55’’ W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes X No ___**
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present	Yes X	No ___	

Remarks:

Wetland parameters were met at this site; therefore, STP #6 received an wetland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Salix spp.*	30	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	30		
Herb Stratum			
1. *Phalaris arundinacea*	80	Yes	FACW
2. *Dipsacus sylvestris*	10	No	NI-FAC
3. *Typha latifolia*	10	No	OBL
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	2 (A)
Total Number of Dominant Species Across All Strata:	2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Vegetation parameter met. Willows are fairly recent plantings.

SOIL

Sampling Point: STP #6 (Wetland): Transect B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14	10 YR 3/1	100	___	___	___	___	Silt loam	___
14-24	10 Y 3/1	95	7.5 YR 4/4	5	D	RC	Silty clay	organic streaking
24-28	10 Y 2.5/1	100	___	___	___	___	Clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
_X_ Thick Dark Surface (F5)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: Claypan
Depth (inches): 24''

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:
Depleted matrix below dark surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes _X_ No ___ Depth (inches) 8
Saturation Present? Yes _X_ No ___ Depth (inches) 5
(includes capillary fringe)

Wetland Hydrology Present? **Yes** _X_ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
Wetland hydrology observed.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #7 (Wetland): Transect B

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 20.53'' N Long: 117° 07' 21.46'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___

Hydric Soil Present? Yes X No ___

Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks:

All three of the wetland parameters were met at this site; therefore, this STP received a wetland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Crataegus douglasii*	10	Yes	FAC
2. *Salix spp.*	10	Yes	FACW
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	20		
Herb Stratum			
1. *Phalaris arundinacea*	70	Yes	FACW
2. *Alopecurus pratensis*	20	No	FACW
3. *Sphagnum spp.*	10	No	FACW
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

Site dominated by hydrophytic vegetation.

SOIL

Sampling Point: STP #7 (Wetland): Transect B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-15	10 YR 3/1	100	___	___	___	___	Silt loam	___
15-29	10 YR 2/1	100	___	___	___	___	Silty clay	___
29-38	10 Y 3/1	50	7.5 YR 4/4	50	C	M	Clay	mottling present
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Thick Dark Surface (F5)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

- ___ 1 cm Muck (A9) (**LRR C)**
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Common mottling in clay layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

- ___ Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine)**
- ___ Drift Deposits (B3) (**Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Induation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizosphere along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine)**
- ___ Drift Deposits (B3) (**Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___

Water Table Present? Yes X No ___ Depth (inches) 6

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches) surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:

Wetland hydrology observed.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/22/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #8 (Upland): Transect B

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 19.29'' N Long: 117° 07' 21.46'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___ Hydric Soil Present? Yes ___ No X Wetland Hydrology Present Yes ___ No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No X**

Remarks:
All three wetland parameters were not met at this site; therefore, STP #8 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Phalaris arundinacea*	100	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Vegetation present at this site meets the requirements for wetland designation. Site is located in agricultural field.

SOIL

Sampling Point: STP #8 (Upland): Transect B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10 YR 3/1	100	___	___	___	___	Silt loam	___
18-27	10 YR 3/2	100	___	___	___	___	Silty clay loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
No redox features observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 21
Saturation Present? Yes X No ___ Depth (inches) 19
(includes capillary fringe)

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks:
Wetland hydrology was not present at this site.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman County Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #9 (Upland): Transect C

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44’ 22.08’’ N Long: 117° 07’ 15.44’’ W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X

Hydric Soil Present? Yes ___ No X

Wetland Hydrology Present Yes ___ No X

Is the Sampled Area within a Wetland? **Yes ___ No X**

Remarks:

All of the three wetland parameters were not fulfilled at this location; therefore, STP #9 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		

Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		

Herb Stratum			
1. *Dipsacus sylvestris*	60	Yes	NI-FAC
2. *Bromus tectorum*	40	Yes	UPL
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		

Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
Total Number of Dominant Species Across All Strata:	2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	60	x 3 = 180
FACU species	___	x 4 = ___
UPL species	40	x 5 = 200
Column Totals:	100 (A)	380 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___ No X**

Remarks:

Based on both the Dominance and Prevalence Index tests this vegetative community did not fulfill the vegetation parameter.

SOIL

Sampling Point: STP #9 (Upland): Transect C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-8	10YR 3/1	100	___	___	___	___	Silt loam	___
8-27	10YR 3/1	100	___	___	___	___	Silt loam	___
27-30	10YR 4/3	100	___	___	___	___	Silty clay loam	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No _X_

Remarks:
Dry soils observed, which lacked redox features. Non-hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes ___ No _X_ Depth (inches) ___
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches) ___

Wetland Hydrology Present? Yes ___ No _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
No water within 30 inches of soil surface.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #10 (Wetland): Transect C

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44’ 21.15’’ N Long: 117° 07’ 15.44’’ W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___

Hydric Soil Present? Yes X No ___

Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? **Yes X No ___**

Remarks:

All of the three wetland parameters were fulfilled at this location; therefore, STP #10 received a wetland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Salix spp.*	15	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	15		
Herb Stratum			
1. *Phalaris arundinacea*	60	Yes	FACW
2. *Alopecurus pratensis*	20	No	FACW
3. *Typha latifolia*	20	No	OBL
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	2 (A)
Total Number of Dominant Species Across All Strata:	2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

The vegetation parameter is met.

SOIL

Sampling Point: STP #10 (Wetland): Transect C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-8	10YR 3/1	100	___	___	___	___	Silty clay	___
8-20	10YR 4/1	95	10YR 4/4	5	C	M	Clay	Common mottling
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils^2.

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:
Observed redox features in clay layer 8'' below surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
X High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:
Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 6
Saturation Present? Yes X No ___ Depth (inches) 4
(includes capillary fringe)

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Observed wetland hydrology.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 11 (Wetland): Transect C

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 20.09'' N Long: 117° 07' 15.26'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___

Hydric Soil Present? Yes X No ___

Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? **Yes X No ___**

Remarks:

All of the three wetland parameters were fulfilled at this location; therefore, STP #11 received a wetland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *zphalaris arundinacea*	80	Yes	FACW
2. *Typha latifolia*	20	No	OBL
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
Total Number of Dominant Species Across All Strata:	1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Hydrophytic vegetation present.

SOIL

Sampling Point: STP# 11 (Wetland): Transect C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-8	10YR 2/1	___	___	___	___	___	Clay	___
8-20	10YR 4/1	___	___	___	___	___	Clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
X Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:
Sulfur smell encountered when digging STP just below the surface (within 10 inches of the surface).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
X High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 2
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches) Surface

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Hydrology evident.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #12 (Upland): Transect C

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 19.10'' N Long: 117° 07' 15.08'' W Datum: NAD 1927

Soil Map Unit Name: Caldwell silt loam (19) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present Yes ___ No X

Is the Sampled Area within a Wetland? **Yes ___ No X**

Remarks:
None of the three wetland parameters were fulfilled at this location; therefore STP #12 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Triticum aestivum*	100	Yes	NI-FACU
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___ No X**

Remarks:

Planted wheat is considered to be a "FACU" crop. Vegetation parameter is not met.

SOIL

Sampling Point: STP #12 (Upland): Transect C

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-16	10YR 3/1	100	___	___	___	___	Silt loam	___
16-22	10YR 3/1	90	10YR 4/4	10	___	___	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes _____ No _X

Remarks:
Common mottling below 16 inches is attributed to lateral seepage from Airport Creek. Based on the depth of the redox features, this soil type is non-hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes _X_ No ___ Depth (inches) 18
Saturation Present? (includes capillary fringe) Yes _X_ No ___ Depth (inches) 16

Wetland Hydrology Present? Yes ___ No _X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Saturation was below 12 inches at early part of the growing season. Wetland hydrology was not met.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP #13 (Upland): Transect D

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): ___ Local relief (concave, convex, none): ___ Slope (%): Less than 5%

Subregion (LRR): ___ Lat: 046° 44' 27.79'' N Long: 117° 06' 58.81'' W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes _X_ No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No _X	**Is the Sampled Area within a Wetland?**	Yes ___ No _X
Hydric Soil Present?	Yes ___	No _X		
Wetland Hydrology Present	Yes ___	No _X		

Remarks:
None of the three wetland parameters were fulfilled at this location; therefore STP #13 received an upland designation

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Poa spp.*	60	Yes	FACU
2. *Cirsium arvense*	10	No	FACU
3. *Erodium cicutarium*	10	No	NI-FACU
4. *Plantago major*	10	No	FAC
5. *Asclepias speciosa*	10	No	FAC
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	20	x 3 = 60
FACU species	80	x 4 = 320
UPL species	___	x 5 = ___
Column Totals:	100 (A)	380 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ___ No _X

Remarks:

STP located in cut in field associated with Airport Runway. Vegetation parameter is not met.

SOIL

Sampling Point: STP #13 (Upland): Transect D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-20	10YR 4/3	100	___	___	___	___	Silt loam	___
20+	N/A	100	___	___	___	___	Crushed subgrade basalt	(1.25'' rock)
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No _X

Remarks:
No redox features observed. Non-hydric soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes ___ No _X_ Depth (inches) ___
Saturation Present? Yes ___ No _X_ Depth (inches) ___
(includes capillary fringe)

Wetland Hydrology Present? Yes ___ No _X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Pit completely dry, no hydrology observed.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 14 (Wetland): Transect D

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44’ 27.04’’ N Long: 117° 06’ 58.90’’ W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? **Yes X No ___**

Remarks:
All three of the wetland parameters were fulfilled at this location.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Phalaris arundinacea*	100	Yes	FACW
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Algal bloom present in ponded, back water slough, near STP#14. Vegetative parameter met.

SOIL

Sampling Point: STP# 14 (Wetland): Transect D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-8	10YR 3/1	100	___	___	___	___	Silty clay	___
8-23	10YR 3/1	90	10YR 4/4	10	C	M	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
_X_ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:
Sulfur smell encountered when digging STP just below the surface (within 10 inches of surface).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
_X_ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes _X_ No ___ Depth (inches) _4_
Saturation Present? (includes capillary fringe) Yes _X_ No ___ Depth (inches) _2_

Wetland Hydrology Present? **Yes** _X_ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Evident hydrology observed.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 15 (Upland): Transect D

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): ___ Local relief (concave, convex, none): ___ Slope (%): Less than 5%

Subregion (LRR): ___ Lat: 046° 44' 25.99'' N Long: 117° 06' 58.81'' W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X

Hydric Soil Present? Yes ___ No X

Wetland Hydrology Present Yes ___ No X

Is the Sampled Area within a Wetland? **Yes ___ No X**

Remarks:

All three of the wetland parameters were not fulfilled at this location; therefore STP# 15 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Rosa woodsii*	10	Yes	FACU
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	10		
Herb Stratum			
1. *Cirsium arvense*	40	Yes	FACU
2. *Dipsacus sylvestris*	30	Yes	NI-FAC
3. *Phalaris arundinacea*	20	No	FACW
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	20	x 2 = 40
FAC species	30	x 3 = 90
FACU species	50	x 4 = 200
UPL species	___	x 5 = ___
Column Totals:	100 (A)	330 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤ 3.0[1]

___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___ No X**

Remarks:

Based on the Dominance and Prevalence Index tests this location did not fulfill vegetation parameter.

SOIL

Sampling Point: STP# 15 (Upland): Transect D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/1	100	___	___	___	___	Silt loam	___
18-24	10YR 4/1	90	10YR 4/6	10	C	M	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
_X_ Thick Dark Surface (F5)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be presen

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** ___ **No** _X_

Remarks:
Relic spoils. Relic hydric soils. Common mottles present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes ___ No _X_ Depth (inches) ___
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches) ___

Wetland Hydrology Present? **Yes** ___ **No** _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Dry to 24 inches. No hydrology observed.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 16 (Wetland): Transect D

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 24.87'' N Long: 117° 06' 59.17'' W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? **Yes X No ___**

Remarks:
All three of the wetland parameters were fulfilled at this location; therefore, STP# 16 received a wetland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. *Crataegus douglasii*	20	Yes	FAC
2. *Rosa woodsii*	5	No	FACU
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	25		
Herb Stratum			
1. *Typha latifolia*	45	Yes	OBL
2. *Phalaris arundinacea*	30	Yes	FACW
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	75		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
Total Number of Dominant Species Across All Strata:	3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Vegetation parameter fulfilled.

SOIL

Sampling Point: STP# 16 (Wetland): Transect D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-8	10YR 3/1	100	___	___	___	___	Silty clay	___
8-22	2.5YR 4/1	95	7.5YR 4/6	5	___	___	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes _X_ No ___

Remarks:
Sulfur smell encountered when digging STP just below the surface (within 10 inches of surface).

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
_X_ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___
Water Table Present? Yes _X_ No ___ Depth (inches) 10
Saturation Present? Yes _X_ No ___ Depth (inches) 7
(includes capillary fringe)

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Observed wetland hydrology.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 17 (Upland): transect D

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 34 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 23.88'' N Long: 117° 06' 58.90'' W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No X**
Hydric Soil Present?	Yes ___	No X		
Wetland Hydrology Present	Yes ___	No X		

Remarks:
None of the three wetland parameters were fulfilled at this location. Therefore; STP# 17 received an upland designation.

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Triticum aestivum*	100	Yes	NI-FACU
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	0 (A)
Total Number of Dominant Species Across All Strata:	1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___ No X**

Remarks:

Planted wheat is considered to be a "FACU" crop. Vegetation parameter is not met.

SOIL

Sampling Point: STP# 17 (Upland): Transect D

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-14	10Yr 3/1	100	___	___	___	___	Silty clay	___
14-20	10YR 3/1	95	7.5YR 4/6	5	C	M	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

Common mottling below 16 inches is attributed to lateral seepage from Airport Creek. Based on the depth of the redox features, this soil type is non-hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes X No ___ Depth (inches) 18
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches) 16

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

___

Remarks:

Saturation was below 12 inches at early part of the growing season. Wetland hydrology was not met.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09
Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 18 (Upland): Transect E
Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 35 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Low terrace Local relief (concave, convex, none): Concave Slope (%): Less than 5%
Subregion (LRR): ___ Lat: 046° 44’ 42.98’’ N Long: 117° 06’ 5.16’’ W Datum: NAD 1927
Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are “Normal Circumstances” present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No X
Hydric Soil Present? Yes ___ No X
Wetland Hydrology Present Yes ___ No X

Is the Sampled Area within a Wetland? **Yes ___ No X**

Remarks:
___

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Poa bulbosa*	75	Yes	FACU
2. *Trifloium repens*	20	No	FACU
3. *Taraxacum officinale*	5	No	FACU
4. ___	___	___	___
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	100		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum ___ % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	0 (A)
Total Number of Dominant Species Across All Strata:	1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes ___ No X**

Remarks:

FACU community present. This site does not meet the vegetation parameter.

SOIL

Sampling Point: STP# 18 (Upland): Transect E

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-20	10YR 3/1	100	___	___	___	___	Silt loam	___
20+	10YR 3/2	100	___	___	___	___	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

- ___ 1 cm Muck (A9) (**LRR C)**
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No _X

Remarks:
No redox feature present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine)**
- ___ Drift Deposits (B3) (**Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Induation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizosphere along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine)**
- ___ Drift Deposits (B3) (**Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches) ___

Water Table Present? Yes ___ No _X_ Depth (inches) ___

Saturation Present? Yes ___ No _X_ Depth (inches) ___
(includes capillary fringe)

Wetland Hydrology Present? Yes ___ No _X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
No hydrology within 20 inches of the surface.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Pullman Moscow Regional Airport (PMRA) City/County: Whitman Sampling Date: 4/30/09

Applicant/Owner: Robb Parrish, Airport Manager State: WA Sampling Point: STP# 19 (Wetland): Transect E

Investigator(s): Vince Barthels, J-U-B ENGINEERS, Inc. Section, Township, Range: S. 35 T.15 N. R.45 E

Landform (hillslope, terrace, etc): Floodplain Local relief (concave, convex, none): Concave Slope (%): Less than 5%

Subregion (LRR): B Lat: 046° 44' 41.99'' N Long: 117° 06' 4.62'' W Datum: NAD 1927

Soil Map Unit Name: Latah silt loam (54) NWI classification: PEM1A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? No Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? No (If needed, explain answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present Yes X No ___

Is the Sampled Area within a Wetland? **Yes X No ___**

Remarks:

___

VEGEGATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dorman Species?	Indicator Status
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
Total Cover:	___		
Sampling/Shrub Stratum			
1. ___	___	___	___
2. ___	___	___	___
3. ___	___	___	___
4. ___	___	___	___
5. ___	___	___	___
Total Cover:	___		
Herb Stratum			
1. *Poa bulbosa*	10	Yes	FACU
2. *Trifolium repens*	10	Yes	FAC
3. Typha latifolia	10	Yes	OBL
4. *Nasturtium officinale*	10	Yes	FACW
5. ___	___	___	___
6. ___	___	___	___
7. ___	___	___	___
8. ___	___	___	___
Total Cover:	40		
Woody Vine Stratum			
1. ___	___	___	___
2. ___	___	___	___
Total Cover:	___		

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust ___

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC:	3 (A)
Total Number of Dominant Species Across All Strata:	4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	75% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	___	x 1 = ___
FACW species	___	x 2 = ___
FAC species	___	x 3 = ___
FACU species	___	x 4 = ___
UPL species	___	x 5 = ___
Column Totals:	___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%
___ Prevalence Index is ≤ 3.0[1]
___ Morphological Adaptions[1] (Provide supporting data in remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

Sparse vegetation in man-made ditch at toe of Safety Area.

SOIL

Sampling Point: STP#19 (Wetland)

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
Inches	Color Moist	%	Color (moist)	%	Type [1]	Loc [2]	Texture	Remarks
0-10	10YR 5/3	100	___	___	___	___	Silt loam	___
10-12	10YR 4/3	95	2.5YR 4/6	5	C	M	Silty clay	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___
___	___	___	___	___	___	___	___	___

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix.

[2] Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators of Problematic Hydric Soils[2].

___ 1 cm Muck (A9) (**LRR C)**
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3] Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Sulfur smell encountered when digging STP just below the surface (within 10 inches of the surface)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine)**
___ Drift Deposits (B3) (**Nonriverine)**
___ Surface Soil Cracks (B6)
___ Induation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)

___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizosphere along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine)**
___ Drift Deposits (B3) (**Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches) ___
Water Table Present? Yes ___ No X Depth (inches) ___
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches) Surface

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
___

Remarks:
Saturated at surface but dry at 6 inches.

Photo Inventory

<u>The following 14 photos were taken on either April 22nd or 30th, 2009.</u>

Photo 1: The wooden stakes (blue = wetland boundary and orange = soil test pit) in the photo mark Transect A. At this location, the channel is rather incised and the wetland boundary does not extend landward of the bankfull elevation.

Photo 2: Looking in a downstream direction at Transect C. The orange flagged stakes mark STP # 9 (upland) and # 10 (wetland); whereas, the blue flagged middle stake marks the wetland boundary.

Photo 3: Illustrates the vertical grade difference along the southern portion of Transect C, nearest STP #11 and #12. The wetland boundary along the southern edge was determined to be at the end of the reed canary grass.

Photo 4: STP #15 is an upland pit located in some relic spoils along/above the right bankfull of Airport Creek. The wetland hydrology parameter was not fulfilled at this location.

Photo 5: This photo is a representation of the hydric soils observed within the Airport Creek drainage way. Hydric soils were indicated by a depleted matrix located below a dark surface and common mottling observed in the clay layer below the “A” horizon.

Photo 6: Within the RPZ, there are many existing infield or storm drains, like this grated inlet. Water collected in this system eventually is directed or discharged into Airport Creek, near the culvert outlet under the existing runway.

Photo 7: Near the west end of the project study area, Airport Creek becomes very entrenched due to the degradation of the channel. This nearly vertical cut bank extends approximately 4 feet above the current water surface elevation.

Photo 8: Airport Creek crosses Airport Road via this squashed CMP. The cross-section of this CMP measures to be 7 feet in height and 11 feet in width.

Photo 9: A small (0.2 acres) depressional and impounded wetland is situated along the cutslope of the existing service road that parallels the runway. Cattails are the dominant hydrophytic vegetation in this area.

Photo 10: In this draw, there is an ephemeral sloped wetland that is dominated by a combination of reed canary grass and meadow foxtail. Standing surface water was observed throughout the delineated wetland feature.

Photo 11: Looking at the RPZ near the center portion of the project study area. The ditchline or ephemeral stream at the toe of the RPZ flows into Airport Creek near the outlet of the culvert under the existing runway.

Photo 12: Here is an example of a sloped wetland on the hillslope of the RPZ. The presence of cattails and watercress indicate that this wetland could be characterized as intermittent, compared to other wetlands that are more seasonal or ephemeral.

Photo 13: Here is a typical ephemeral channel that is located within the wheat fields toward the southern portion of the project area. Generally speaking, these features have channel widths that are less than 3 feet wide. No vegetation exists below the OHWM since the substrate is a very hard, restrictive, clay layer.

Photo 14: Here is an alluvial fan or wetted mud flat, which is located in a low-gradient portion of the ephemeral waterway. For the purpose of this study, these areas were included as “sloped” wetlands.

Wetland name or number Airport Creek

WETLAND RATING FORM – EASTERN WASHINGTON

Version 2 - Updated June 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): Airport Creek on PMRA Date of site visit: 4/22/09

Rated by Vince Barthels (J-V-B) Trained by Ecology? Yes X No___ Date of training 10-31-07

SEC: 34 TWNSHP: 15 RNGE: 45 Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: ~~Figure~~___ Estimated size 8.4 Acres

Figure 1 = See Wetland Delineation Maps - Sheets 1 & 2

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II X III___ IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for "Water Quality" Functions	12
Score for Hydrologic Functions	28
Score for Habitat Functions	16
TOTAL score for functions	56

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ III___ Does not Apply X

Final Category **(choose the "highest" category from above)** II

Summary of basic information about the wetland unit

Wetland Type		Wetland Class	
Vernal Pool		**Depressional**	
Alkali		**Riverine**	X
Natural Heritage Wetland		**Lake-fringe**	
Bog		**Slope**	
Forest			
None of the above		Check if unit has multiple HGM classes present	☐

6-15-09

Wetland name or number Airport Creek

R	**Riverine Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland functions to improve water quality	**Points** (only 1 score per box)
R	**R 1.0 Does the wetland unit have the potential to improve water quality?**	*(see p. 45)*
R	R 1.1 Area of surface depressions within the riverine unit that can trap sediments during a flooding event: Depressions cover >1/3 area of wetland points = 6 Depressions cover > 1/10 area of wetland points = 3 If depressions > 1/10th of area of unit draw polygons on aerial photo or map Depressions present but cover < 1/10 area of wetland [✓ points = 1] No depressions present points = 0	Figure 1 1
R	R 1.2 Characteristics (cover) of the vegetation in the unit *(area of polygons with >90% cover at person height. This is **not** Cowardin vegetation classes)*: Forest or shrub > 2/3 the area of the wetland points = 10 Forest or shrub 1/3 – 2/3 area of the wetland points = 5 Ungrazed, herbaceous plants > 2/3 area of wetland [✓ points = 5] Ungrazed herbaceous plants 1/3 – 2/3 area of wetland points = 2 Forest, shrub, and ungrazed herbaceous < 1/3 area of wetland points = 0 Aerial photo or map showing polygons of different vegetation cover	Figure 1 5
R	**Total for R1** *Add the points in the boxes above*	6
R	**R 2.0 Does the wetland have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft — Wetland intercepts groundwater within the Reclamation Area — Untreated stormwater flows into wetland X Tilled fields or orchards within 150 feet of wetland — Water flows into wetland from a stream or culvert that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential or urban areas are within 150 ft of wetland — The river or stream that floods the wetland has a contributing basin where human activities have raised the levels of sediment, toxic compounds or nutrients in the river water above water quality standards — Other________ [✓ **YES** multiplier is **2**] **NO** multiplier is **1**	*(see p.46)* multiplier 2
R	**TOTAL - Water Quality Functions** Multiply the score from R1 by the multiplier in R2 ***Record score on p. 1 of field form***	12

Wetland name or number Airport Creek

R	**Riverine Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation	**Points** (only 1 score per box)
R	**R 3.0 Does the wetland have the potential to reduce flooding and erosion?**	*(see p. 47)*
R	R 3.1 Amount overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow of water and the width of the stream or river channel (distance between banks).* *Calculate the ratio: width of wetland/ width of stream.* If the ratio is 2 or more [✓ points = 10] If the ratio is between 1 and < 2 points = 8 If the ratio is ½ to < 1 points = 4 If the ratio is ¼ to < ½ points = 2 If the ratio is < ¼ points = 1 Aerial photo or map showing average widths	Figure 1 10
R	R 3.2 Characteristics of vegetation that slow down water velocities during floods: *Treat large woody debris as "forest or shrub" (area of polygons with >90% cover at person height. This is **not** Cowardin vegetation classes)*: Forest or shrub for more than 2/3 the area of the wetland. points = 6 Forest or shrub for >1/3 area OR herbaceous plants > 2/3 area [✓ points = 4] Forest or shrub for > 1/10 area OR herbaceous plants > 1/3 area points = 2 Vegetation does not meet above criteria points = 0 Aerial photo or map showing polygons of different vegetation types	Figure 1 4
R	**Total for R3** *Add the points in the boxes above*	14
R	**R 4.0 Does the wetland have the opportunity to reduce flooding and erosion?** *Answer NO if the major source of water is irrigation return flow or water levels are controlled by a reservoir.* Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* X There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding. — There are natural resources downstream (e.g. salmon redds) than can be damaged by flooding — Other________________ [✓ **YES** multiplier is **2**] **NO** multiplier is **1**	*(see p. 50)* multiplier 2
R	**TOTAL - Hydrologic Functions** Multiply the score from R3 by the multiplier in R4 ***Record score on p. 1 of field form***	28

Comments

Wetland name or number Airport Creek

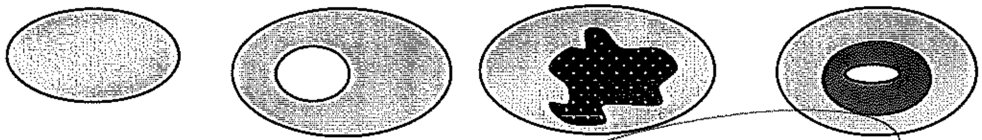
These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the <u>potential</u> to provide habitat for many species?	
H 1.1 <u>Categories of vegetation structure</u> ***(see p.62)*** *Check the vegetation classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is ¼ acre or more than 10% of the area if unit is < 2.5 acres.* ____Aquatic bed _X_Emergent plants 0-12 in. (0 – 30 cm) high are the highest layer and have > 30% cover _X_Emergent plants >12 – 40 in.(>30 – 100cm) high are the highest layer with >30% cover ____Emergent plants > 40 in.(> 100cm) high are the highest layer with >30% cover ____Scrub/shrub (areas where shrubs have >30% cover) ____Forested (areas where trees have >30% cover) *Add the number of vegetation types that qualify. If you have:* 4-6 types points = 3 3 types points = 2 2 types [✓ points = 1] 1 type points = 0 Map of Cowardin vegetation classes and areas with different heights of emergents	Figure 1 1
H 1.2. Is one of the vegetation types "aquatic bed?" ***(see p.64)*** YES = 1 point [✓ NO = 0 points]	0
H 1.3. <u>Surface Water</u> ***(see p.65)*** H 1.3.1 Does the unit have areas of "open" water (without herbaceous or shrub plants) over at least ¼ acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? *Note: answer YES for Lake-fringe wetlands* YES = 3 points & **go to H 1.4** NO = go to H 1.3.2 H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least ¼ acre or 10% of its area, AND that has an unvegetated bottom (*answer yes only if H 1.3.1 is NO*)? [✓ YES = 3 points] NO = 0 points Map showing areas of open water	Figure 1 3
H 1.4. <u>Richness of Plant Species</u> ***(see p. 66)*** Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasean Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites ,Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)* If you counted: > 9 species points = 2 4-9 species [✓ points = 1] # of species 8 < 4 species points = 0 points *List species below if you wish* * see wetland data forms	1

Wetland name or number Airport Creek

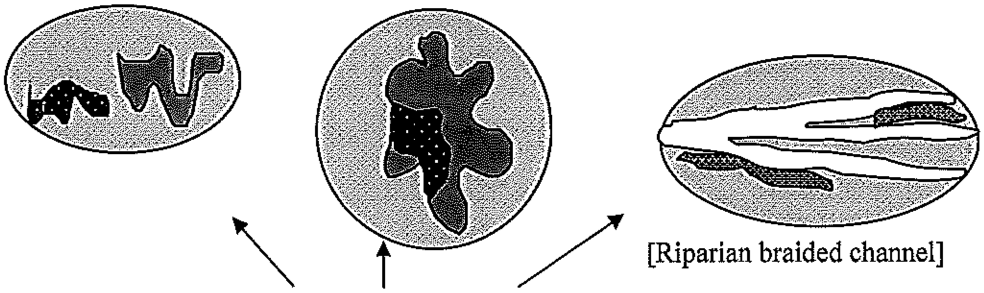
H 1.5. Interspersion of habitats *(see p. 67)*

Decided from the diagrams below whether interspersion between categories of vegetation (described in H 1.1), or categories and un-vegetated areas (can include open water or mudflats) is high, medium, low, or none.

Figure 1



None = 0 points　Low = 1 point　[✓ Moderate = 2 points]



High = 3 points

NOTE: If you have four or more vegetation categories or three vegetation categories and open water the rating is always "high". Use maps from H1.1 and H1.3

2

H 1.6. Special Habitat Features: *(see p. 68)*

Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.

____ Loose rocks larger than 4" **or** large, downed, woody debris (>4in. diameter) within the area of surface ponding or in stream.

_X_ Cattails or bulrushes are present within the unit.

____ Standing snags (diameter at the bottom > 4 inches) in the wetland unit or within 30 m (100ft) of the edge.

____ Emergent or shrub vegetation in areas that are permanently inundated/ponded. *The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.*

____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>45 degree slope) OR signs of recent beaver activity

____ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*

Maximum score possible = 6

1

TOTAL Potential to provide habitat
Add the scores in the column above

8

Comments

Wetland name or number Airport Creek

H 2.0 Does the wetland have the opportunity to provide habitat for many species?

H 2.1 Buffers *(see p. 71)*

Figure 1

Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed." Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.

— 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference **Points = 5**

— 330 ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4**

— 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4**

— 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3**

— 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3**

If buffer does not meet any of the criteria above

X No paved areas (except paved trails) or buildings within 80ft (25 m) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. [✓ **Points = 2**]

— No paved areas or buildings within 170ft (50m) of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2**

— Heavy grazing in buffer. **Points = 1**

— Vegetated buffers are <6.6ft wide (2m) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland). **Points = 0**

— Buffer does not meet any of the criteria above. **Points = 1**

Aerial photo showing buffers

2

H 2.2 Wet Corridors *(see p. 72)*

H 2.2.1 Is the wetland unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor at least ¼ mile long with surface water or flowing water throughout most of the year (> 9 months/yr)? (*dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor*).

YES = 4 points (go to H 2.3) NO = go to H 2.2.2

H 2.2.2 Is the unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor, at least ¼ mile long with water flowing seasonally, **OR** a lake-fringe wetland without a "wet" corridor, **OR** a riverine wetland without a surface channel connecting to the stream?

[✓ YES = 2 points (go to H 2.3)] NO go to H 2.2.3

H 2.2.3 Is the wetland within a 1/2 mile of any permanent stream, seasonal stream, or lake (*do not include man-made ditches*)?

YES = 1 point NO = 0 points

2

Wetland name or number Airport Creek

H 2.3 <u>Near or adjacent to other priority habitats listed by WDFW</u> ***(see p. 74)*** Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections **do not** have to be relatively undisturbed. These are DFW definitions. Check with your local DFW biologist if there are any questions.* _X_ **Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Aspen Stands:** Pure or mixed stands of aspen greater than 2 acres. ____**Cliffs:** Greater than 25 ft high and occurring below 5000 ft. ____**Old-growth forests:** (east of Cascade crest): In general, stands will be >150 years of age, with 10 trees/acre that are > 21 in dbh, and 1 - 3 snags/acre > 12-14 in diameter. ____**Mature forests:** Stands with average diameters exceeding 21 in dbh; crown cover may be less that 100%; decay, 80 - 160 years old east of the Cascade crest. ____**Prairies and Steppe:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community. ____**Shrub-steppe:** Tracts of land consisting of plant communities with one or more layers of perennial grasses and a conspicuous but discontinuous layer of shrubs. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft, composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%. ____**Urban Natural Open Space:** A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats,* especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development. ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres). If wetland has **2 or more** Priority Habitats = **4 points** If wetland has **1** Priority Habitat = **2 points** No Priority habitats = **0 points** *ote: All vegetated wetlands are by definition a priority habitat but are not included in this list. <u>Nearby wetlands are addressed in question H 2.4)</u>*	2

Comments

Wetland name or number Airport Creek

H 2.4 Landscape *(choose the **one** description of the landscape around the wetland that best fits)* ***(see p. 76)*** — The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (*Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs*) **points = 5** — There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development) **points = 5** X There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed? [✓ **points = 2**] — There is at least 1 wetland within ½ mile. **points = 1** — Does not meet any of the four criteria above **points = 0**	2
H 2. TOTAL Score - opportunity for providing habitat *Add the scores in the column above*	8
H 3.0 Does the wetland unit have indicators that its ability to provide habitat is reduced?	
H 3.1 Indicator of reduced habitat functions ***(see p. 75)*** Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? *(NOTE: This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers)* YES = **- 5 points** [✓ NO = 0 points]	*Points will be subtracted* 0
Total Score for Habitat Functions *– add the points for H 1, H 2, and H 3 and record the result on p. 1*	16

Comments

Wetland name or number Roadside Depressional/PMRA

WETLAND RATING FORM – EASTERN WASHINGTON

Version 2 - Updated June 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): Near Western Gate/Service Rd on PMRA Date of site visit: 4/22/09

Rated by Vince Barthels (J-V-B) Trained by Ecology? Yes X No___ Date of training 10/31/07

SEC: 34 TWNSHP: 15 RNGE: 45 Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure 1* Estimated size 0.2 Acres

Figure 1 = See Wetland Delineation Map - Sheet 1.

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III X IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for "Water Quality" Functions	18
Score for Hydrologic Functions	12
Score for Habitat Functions	9
TOTAL score for functions	39

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ III___ Does not Apply X

Final Category (choose the "highest" category from above) III

Summary of basic information about the wetland unit

Wetland Type		Wetland Class	
Vernal Pool		Depressional	X
Alkali		Riverine	
Natural Heritage Wetland		Lake-fringe	
Bog		Slope	
Forest			
None of the above		Check if unit has multiple HGM classes present	☐

6-15-09

Wetland name or number Roadside Depressional/PMRA

D	**Depressional Wetlands** WATER QUALITY FUNCTIONS - Indicators that the wetland functions to improve water quality	**Points** (only 1 score per box)
D	**D 1.0 Does the wetland unit have the <u>potential</u> to improve water quality?**	*(see p. 38)*
D	D 1.1 Characteristics of surface water flows out of the wetland unit: Wetland has no surface water outlet - points = 5 Wetland has an intermittently flowing outlet [✓ points = 3] Wetland has a highly constricted permanently flowing outlet points = 3 Wetland has a permanently flowing surface outlet points = 1	3
D	D 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions of soil types)* YES points = 3 NO [✓ points = 0]	0
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation for > 2/3 of area [✓ points = 5] Wetland has persistent, ungrazed, vegetation from 1/3 to 2/3 of area points = 3 Wetland has persistent, ungrazed vegetation from 1/10 to < 1/3 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 1 5
D	D 1.4 Characteristics of seasonal ponding or inundation. *This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.* Area seasonally ponded is > ½ total area of wetland points = 3 Area seasonally ponded is ¼ - ½ total area of wetland [✓ points = 1] Area seasonally ponded is < ¼ total area of wetland points = 0 NOTE: *See text for indicators of seasonal and permanent inundation/flooding.* Map of Hydroperiods	Figure 1 1
D	**Total for D 1** *Add the points in the boxes above*	9
D	**D 2. Does the wetland unit have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft [✓ — Untreated stormwater discharges to wetland] — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other ________________ [✓ **YES** multiplier is 2] **NO** multiplier is 1	multiplier 2
D	**<u>TOTAL</u> - Water Quality Functions** Multiply the score from D1 by the multiplier in D2 ***Record score on p. 1 of field form***	18

Wetland name or number Roadside Depressional / PMRA

D	**Depressional Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream erosion	**Points** (only 1 score per box)
D	**D 3.0 Does the wetland unit have the <u>potential</u> to reduce flooding and stream erosion?**	***(see p. 39)***
D	D 3.1 Characteristics of surface water flows out of the wetland unit: Wetland has no surface water outlet points = 8 Wetland has an intermittently flowing outlet [✓ points = 4] Wetland has a highly constricted permanently flowing outlet points = 4 Wetland has a permanently flowing surface outlet points = 0	4
D	D 3.2 Depth of storage during wet periods: *Estimate the height of ponding above the surface of the wetland (see text for description of measuring height). In wetlands with permanent ponding, the surface is the lowest elevation of "permanent" water)* Marks of ponding are at least 3 ft above the surface points = 8 The wetland is a "headwater" wetland" *(see p. 39)* points = 6 Marks are 2 ft to < 3 ft from surface points = 6 Marks are 1 ft to < 2 ft from surface points = 4 Marks are 6 in to < 1 ft from surface [✓ points = 2] No marks above 6 in. or wetland has only saturated soils points = 0	2
D	**Total for D 3** *Add the points in the boxes above*	6
D	**D 4.0 Does the wetland unit have the <u>opportunity</u> to reduce flooding and erosion?** *Answer NO if the major source of water is groundwater, irrigation return flow, or water levels in the wetland are controlled by a reservoir.* Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* — Wetland is in a headwater of a river or stream that has flooding problems X Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other ____________________ [✓ **YES** multiplier is **2**] **NO** multiplier is **1**	*(see p. 42)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D3 by the multiplier in D4 ***Record score on p. 1 of field form***	12

Comments

Wetland name or number Roadside Depressional / PMRA

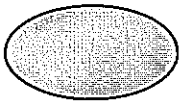
These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat	**Points** (only 1 score per box)
H 1. Does the wetland unit have the <u>potential</u> to provide habitat for many species?	
H 1.1 <u>Categories of vegetation structure</u> ***(see p.62)*** *Check the vegetation classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is ¼ acre or more than 10% of the area if unit is < 2.5 acres.* ____Aquatic bed ____Emergent plants 0-12 in. (0 – 30 cm) high are the highest layer and have > 30% cover _X_ Emergent plants >12 – 40 in.(>30 – 100cm) high are the highest layer with >30% cover _X_ Emergent plants > 40 in.(> 100cm) high are the highest layer with >30% cover ____Scrub/shrub (areas where shrubs have >30% cover) ____Forested (areas where trees have >30% cover) *Add the number of vegetation types that qualify. If you have:* 4-6 types points = 3 3 types points = 2 2 types [✓ points = 1] 1 type points = 0 Map of Cowardin vegetation classes and areas with different heights of emergents	Figure 1 1
H 1.2. Is one of the vegetation types "aquatic bed?" ***(see p .64)*** YES = 1 point [✓ NO = 0 points]	0
H 1.3. <u>Surface Water</u> ***(see p.65)*** H 1.3.1 Does the unit have areas of "open" water (without herbaceous or shrub plants) over at least ¼ acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? *Note: answer YES for Lake-fringe wetlands* YES = 3 points & **go to H 1.4** [✓ NO = go to H 1.3.2] H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least ¼ acre or 10% of its area, AND that has an unvegetated bottom (*answer yes only if H 1.3.1 is NO*)? YES = 3 points [✓ NO = 0 points] Map showing areas of open water	Figure 1 0
H 1.4. <u>Richness of Plant Species</u> ***(see p. 66)*** Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasean Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites ,Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)* If you counted: > 9 species points = 2 [✓ 4-9 species] [✓ points = 1] # of species 4 <4 species points = 0 points *List species below if you wish* cattails, willow, teasel, baltic rush	1

Wetland name or number Roadside Depressional / PMRA

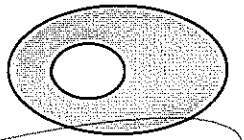
H 1.5. Interspersion of habitats *(see p. 67)*

Figure ___

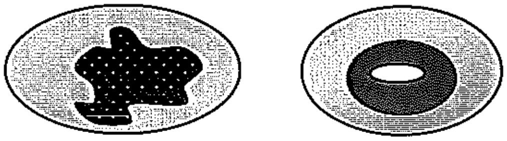
Decided from the diagrams below whether interspersion between categories of vegetation (described in H 1.1), or categories and un-vegetated areas (can include open water or mudflats) is high, medium, low, or none.



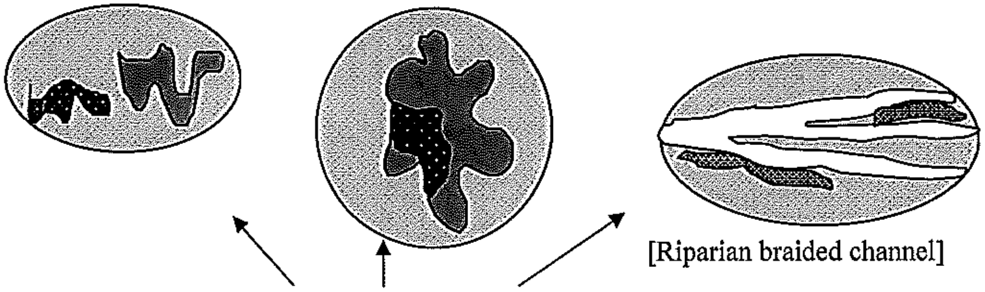
None = 0 points



[✓ Low = 1 point]



Moderate = 2 points



[Riparian braided channel]

High = 3 points

NOTE: If you have four or more vegetation categories or three vegetation categories and open water the rating is always "high". Use maps from H1.1 and H1.3

1

H 1.6. Special Habitat Features: *(see p. 68)*

Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.

____Loose rocks larger than 4" or large, downed, woody debris (>4in. diameter) within the area of surface ponding or in stream.

X Cattails or bulrushes are present within the unit.

____Standing snags (diameter at the bottom > 4 inches) in the wetland unit or within 30 m (100ft) of the edge.

____Emergent or shrub vegetation in areas that are permanently inundated/ponded. *The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.*

____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>45 degree slope) OR signs of recent beaver activity

____Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*

Maximum score possible = 6 1

TOTAL Potential to provide habitat
Add the scores in the column above 4

Comments

Wetland name or number Roadside Depressional / PMRA

H 2.0 Does the wetland have the opportunity to provide habitat for many species?

H 2.1 Buffers *(see p. 71)*

Figure 1

Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed." Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.

- 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference **Points = 5**
- 330 ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4**
- 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4**
- 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3**
- 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3**

If buffer does not meet any of the criteria above

- X No paved areas (except paved trails) or buildings within 80ft (25 m) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. [✓ **Points = 2**]
- No paved areas or buildings within 170ft (50m) of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2**
- Heavy grazing in buffer. **Points = 1**
- Vegetated buffers are <6.6ft wide (2m) for more than 95% of the circumference (e.g . tilled fields, paving, basalt bedrock extend to edge of wetland). **Points = 0**
- Buffer does not meet any of the criteria above. **Points = 1**

Aerial photo showing buffers

2

H 2.2 Wet Corridors *(see p. 72)*

H 2.2.1 Is the wetland unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor at least ¼ mile long with surface water or flowing water throughout most of the year (> 9 months/yr)? (*dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor*).

YES = 4 points (go to H 2.3) NO = go to H 2.2.2

H 2.2.2 Is the unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor, at least ¼ mile long with water flowing seasonally, **OR** a lake-fringe wetland without a "wet" corridor, **OR** a riverine wetland without a surface channel connecting to the stream?

YES = 2 points (go to H 2.3) NO go to H 2.2.3

H 2.2.3 Is the wetland within a 1/2 mile of any permanent stream, seasonal stream, or lake (*do not include man-made ditches*)?

[✓ YES = 1 point] NO = 0 points

1

Wetland name or number Roadside Depressional / PMRA

H 2.3 <u>Near or adjacent to other priority habitats listed by WDFW</u> ***(see p. 74)*** Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections **do not** have to be relatively undisturbed. These are DFW definitions. Check with your local DFW biologist if there are any questions.* ____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Aspen Stands:** Pure or mixed stands of aspen greater than 2 acres. ____**Cliffs:** Greater than 25 ft high and occurring below 5000 ft. ____**Old-growth forests:** (east of Cascade crest): In general, stands will be >150 years of age, with 10 trees/acre that are > 21 in dbh, and 1 - 3 snags/acre > 12-14 in diameter. ____**Mature forests:** Stands with average diameters exceeding 21 in dbh; crown cover may be less that 100%; decay, 80 - 160 years old east of the Cascade crest. ____**Prairies and Steppe:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community. ____**Shrub-steppe:** Tracts of land consisting of plant communities with one or more layers of perennial grasses and a conspicuous but discontinuous layer of shrubs. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft, composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%. ____**Urban Natural Open Space**: A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development. ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres). If wetland has **2 or more** Priority Habitats = **4 points** If wetland has **1** Priority Habitat = **2 points** No Priority habitats = **0 points** *ote: All vegetated wetlands are by definition a priority habitat but are not included in this list. <u>Nearby wetlands are addressed in question H 2.4)</u>*	0

Comments

Wetland name or number Roadside Depressional/PMRA

H 2.4 Landscape *(choose the* ***one*** *description of the landscape around the wetland that best fits)* ***(see p. 76)*** — The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (*Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs*) **points = 5** — There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development) **points = 5** — There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed? [✓ **points = 2**] — There is at least 1 wetland within ½ mile. **points = 1** — Does not meet any of the four criteria above **points = 0**	2
H 2. TOTAL Score - opportunity for providing habitat *Add the scores in the column above*	5
H 3.0 Does the wetland unit have indicators that its ability to provide habitat is reduced?	
H 3.1 Indicator of reduced habitat functions ***(see p. 75)*** Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? *(NOTE: This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers)* YES = **- 5 points** NO = 0 points	*Points will be subtracted* 0
Total Score for Habitat Functions *– add the points for H 1, H 2, and H 3 and record the result on p. 1*	9

Comments

Wetland name or number PMRA - sloped

WETLAND RATING FORM – EASTERN WASHINGTON

Version 2 - Updated June 2006 to increase accuracy and reproducibility among users

Name of wetland (if known): Sloped Wetlands and Ephemeral channels/ditches on PMRA Date of site visit: 4/22/09

Rated by Vince Barthels (J-V-B) Trained by Ecology? Yes X No___ Date of training 10/31/07

SEC: 35 TWNSHP: 15 RNGE: 45 Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure 1 Estimated size 6.4 Acres

Figure 1 = See Wetland Delineation Maps (Sheets 1 through 4)

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III___ IV X

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for "Water Quality" Functions	14
Score for Hydrologic Functions	4
Score for Habitat Functions	6
TOTAL score for functions	24

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ III___ Does not Apply X

Final Category **(choose the "highest" category from above)** IV

Summary of basic information about the wetland unit

Wetland Type		Wetland Class	
Vernal Pool		**Depressional**	
Alkali		**Riverine**	
Natural Heritage Wetland		**Lake-fringe**	
Bog		**Slope**	X
Forest			
None of the above		Check if unit has multiple HGM classes present	

6-15-09

Wetland name or number PMRA -Sloped

S	**Slope Wetlands** WATER QUALITY FUNCTIONS - Indicators that wetland functions to improve water quality	**Points** (only 1 score per box)
S	**S 1.0 Does the wetland have the <u>potential</u> to improve water quality?**	*(see p.56)*
S	S 1.1 Characteristics of average slope of wetland: Slope is1% or less *(a 1% slope has a 1 foot vertical drop in elevation for every 100 ft horizontal distance)* points = 3 Slope is between 1% and 2% points = 2 Slope is more than 2% but less than 5% [✓ points = 1] Slope is 5% or greater points = 0	1
S	S 1.2 The soil 2 inches below the surface is clay or organic *(use NRCS definitions of soil types)* YES = 3 points [✓ NO = 0 points]	0
S	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: *Choose the points appropriate for the description that best fits the vegetation in the wetland.* ***Dense*** *vegetation means you have trouble seeing the soil surface (>75% cover), and* ***uncut*** *means not grazed or mowed and plants are higher than 6 inches.* Dense, ungrazed, herbaceous vegetation > 90% of the wetland unit [✓ points = 6] Dense, ungrazed, herbaceous vegetation > 1/2 of unit points = 3 Dense, woody, vegetation > ½ of unit points = 2 Dense, ungrazed, herbaceous vegetation > 1/4 of unit points = 1 Does not meet any of the criteria above for herbaceous vegetation points = 0 Aerial photo or map with vegetation polygons	Figure 1 6
S	**Total for S 1** *Add the points in the boxes above*	7
S	**S 2.0 Does the wetland have the <u>opportunity</u> to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150ft — Wetland is a groundwater seep within the Reclamation Area — Untreated stormwater flows through the wetland X Tilled fields or orchards within 150 feet of wetland — Residential, urban areas, or golf courses are within 150 ft upslope of wetland — Other____________________ [✓ **YES** multiplier is **2**] **NO** multiplier is **1**	*(see p.58)* multiplier 2
S	**<u>TOTAL</u> - Water Quality Functions** Multiply the score from S1 by the multiplier in S2 ***Record score on p. 1 of field form***	14

Wetland name or number PMRA - sloped

S	**Slope Wetlands** HYDROLOGIC FUNCTIONS - Indicators that wetland functions to reduce flooding and stream degradation	**Points** (only 1 score per box)
S	**S 3.0 Does the wetland unit have the potential to reduce flooding and stream erosion?**	*(see p.59)*
S	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms. *Choose the points appropriate for the description that best fit conditions in the wetland. See question S 1.3 for definition of dense and uncut.* ***Rigid*** *means that the stems of plants should be thick enough (usually > 1/8in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** vegetation covers > 90% of the area of the unit points = 6 Dense, uncut, **rigid** vegetation > 1/2 – 90% area of unit points = 3 Dense, uncut, **rigid** vegetation > 1/4 – 1/2 of unit points = 1 More than 1/4 of area is grazed, mowed, tilled or vegetation is not rigid [✓ points = 0]	0
S	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows: The slope wetland has small surface depressions that can retain water over at least 10% of its area. YES [✓ points = 2] NO points = 0	2
S	**Total for S3** *Add the points in the boxes above*	2
S	**S 4. 0 Does the wetland unit have the opportunity to reduce flooding and erosion?** ***(see p.61)*** *Answer NO if the major source of water is irrigation return flow (e.g. a seep that is on the downstream side of a dam or at the base of an irrigated field.* Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. *Note which of the following conditions apply.* ✓ Wetland has surface runoff that can cause flooding problems downgradient — Other [✓ **YES** multiplier is **2**] **NO** multiplier is **1**	multiplier 2
S	**TOTAL - Hydrologic Functions** Multiply the score from S3 by the multiplier in S4 ***Record score on p. 1 of field form***	4

Comments

Wetland name or number PMRA -sloped

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that wetland functions to provide important habitat

Points (only 1 score per box)

H 1. Does the wetland unit have the potential to provide habitat for many species?

H 1.1 Categories of vegetation structure *(see p.62)*

Figure 1

Check the vegetation classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is ¼ acre or more than 10% of the area if unit is < 2.5 acres.

____Aquatic bed
__x__Emergent plants 0-12 in. (0 – 30 cm) high are the highest layer and have > 30% cover
__x__Emergent plants >12 – 40 in.(>30 – 100cm) high are the highest layer with >30% cover
____Emergent plants > 40 in.(> 100cm) high are the highest layer with >30% cover
____Scrub/shrub (areas where shrubs have >30% cover)
____Forested (areas where trees have >30% cover)

Add the number of vegetation types that qualify. If you have:

4-6 types	points = 3
3 types	points = 2
2 types	[✓ points = 1]
1 type	points = 0

Map of Cowardin vegetation classes and areas with different heights of emergents

1

H 1.2. Is one of the vegetation types "aquatic bed?" ***(see p .64)***

YES = 1 point [✓ NO = 0 points]

0

H 1.3. Surface Water *(see p.65)*

Figure 1

H 1.3.1 Does the unit have areas of "open" water (without herbaceous or shrub plants) over at least ¼ acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? *Note: answer YES for Lake-fringe wetlands*

YES = 3 points & **go to H 1.4** [✓ NO = go to H 1.3.2]

H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least ¼ acre or 10% of its area, AND that has an unvegetated bottom (*answer yes only if H 1.3.1 is NO*)?

YES = 3 points [✓ NO = 0 points]

Map showing areas of open water

0

H 1.4. Richness of Plant Species ***(see p. 66)***

Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)*

You do not have to name the species.

Do not include Eurasean Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites ,Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)

If you counted:	> 9 species	points = 2
	4-9 species	points = 1
# of species 2	< 4 species	points = 0 points

List species below if you wish

Meadow foxtail, teasel

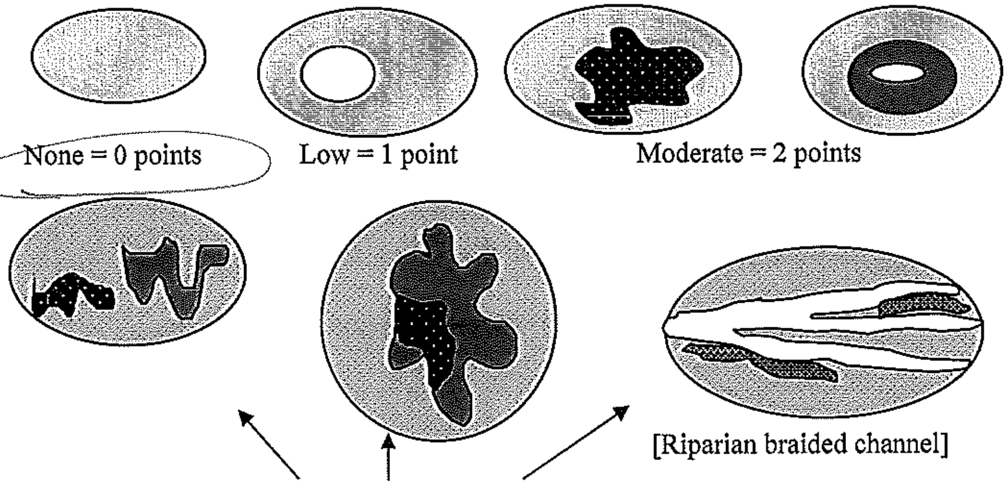
0

Wetland name or number PMRA - sloped

H 1.5. Interspersion of habitats *(see p. 67)*

Decided from the diagrams below whether interspersion between categories of vegetation (described in H 1.1), or categories and un-vegetated areas (can include open water or mudflats) is high, medium, low, or none.

Figure 1



[✓ None = 0 points] Low = 1 point Moderate = 2 points

[Riparian braided channel]

High = 3 points

NOTE: If you have four or more vegetation categories or three vegetation categories and open water the rating is always "high". Use maps from H1.1 and H1.3

0

H 1.6. Special Habitat Features: *(see p. 68)*

Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.

____Loose rocks larger than 4" **or** large, downed, woody debris (>4in. diameter) within the area of surface ponding or in stream.

____Cattails or bulrushes are present within the unit.

____Standing snags (diameter at the bottom > 4 inches) in the wetland unit or within 30 m (100ft) of the edge.

____Emergent or shrub vegetation in areas that are permanently inundated/ponded. *The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.*

____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>45 degree slope) OR signs of recent beaver activity

____ Invasive species cover less than 20% in each stratum of vegetation *(canopy, sub-canopy, shrubs, herbaceous, moss/ground cover)*

0

Maximum score possible = 6

TOTAL Potential to provide habitat
Add the scores in the column above

1

Comments

Wetland name or number PMRA - sloped

H 2.0 Does the wetland have the opportunity to provide habitat for many species?

Figure 1

H 2.1 Buffers *(see p. 71)*

Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed." Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.

— 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference **Points = 5**

— 330 ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4**

— 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4**

— 330ft (100 m) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3**

— 170ft (50 m) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3**

If buffer does not meet any of the criteria above

X No paved areas (except paved trails) or buildings within 80ft (25 m) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2**

— No paved areas or buildings within 170ft (50m) of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2**

— Heavy grazing in buffer. **Points = 1**

— Vegetated buffers are <6.6ft wide (2m) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland). **Points = 0**

— Buffer does not meet any of the criteria above. **Points = 1**

Aerial photo showing buffers

2

H 2.2 Wet Corridors *(see p. 72)*

H 2.2.1 Is the wetland unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor at least ¼ mile long with surface water or flowing water throughout most of the year (> 9 months/yr)? (*dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor*).

YES = 4 points (go to H 2.3) [✓ NO = go to H 2.2.2]

H 2.2.2 Is the unit part of a relatively undisturbed and unbroken, > 30 ft wide, vegetated corridor, at least ¼ mile long with water flowing seasonally, **OR** a lake-fringe wetland without a "wet" corridor, **OR** a riverine wetland without a surface channel connecting to the stream?

YES = 2 points (go to H 2.3) [✓ NO go to H 2.2.3]

H 2.2.3 Is the wetland within a 1/2 mile of any permanent stream, seasonal stream, or lake (*do not include man-made ditches*)?

[✓ YES = 1 point] NO = 0 points

1

Wetland name or number PMRA - sloped

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see p. 74)*

Which of the following priority habitats are within 330ft (100m) of the wetland unit?

*NOTE: the connections **do not** have to be relatively undisturbed. These are DFW definitions. Check with your local DFW biologist if there are any questions.*

____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

____**Aspen Stands:** Pure or mixed stands of aspen greater than 2 acres.

____**Cliffs:** Greater than 25 ft high and occurring below 5000 ft.

____**Old-growth forests:** (east of Cascade crest): In general, stands will be >150 years of age, with 10 trees/acre that are > 21 in dbh, and 1 - 3 snags/acre > 12-14 in diameter.

____**Mature forests:** Stands with average diameters exceeding 21 in dbh; crown cover may be less that 100%; decay, 80 - 160 years old east of the Cascade crest.

____**Prairies and Steppe:** Relatively undisturbed areas (as indicated by dominance of native plants) where grasses and/or forbs form the natural climax plant community.

____**Shrub-steppe:** Tracts of land consisting of plant communities with one or more layers of perennial grasses and a conspicuous but discontinuous layer of shrubs.

____**Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft, composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages

____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component of the stand is 25%.

____**Urban Natural Open Space**: A priority species resides within or is adjacent to the open space and uses it for breeding and/or regular feeding; and/or the open space functions as a corridor connecting other *priority habitats*, especially those that would otherwise be isolated; and/or the open space is an isolated remnant of natural habitat larger than 4 ha (10 acres) and is surrounded by urban development.

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.8 ha (2 acres).

0

If wetland has **2 or more** Priority Habitats = **4 points**
If wetland has **1** Priority Habitat = **2 points**
No Priority habitats = **0 points**

ote: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

Comments

Wetland name or number PMRA - sloped

H 2.4 Landscape *(choose the **one** description of the landscape around the wetland that best fits)* ***(see p. 76)*** — The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (*Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs*) **points = 5** — There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development) **points = 5** — There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed? [✓ **points = 2**] — There is at least 1 wetland within ½ mile. **points = 1** — Does not meet any of the four criteria above **points = 0**	2
H 2. TOTAL Score - opportunity for providing habitat *Add the scores in the column above*	5
H 3.0 Does the wetland unit have indicators that its ability to provide habitat is reduced?	
H 3.1 Indicator of reduced habitat functions ***(see p. 75)*** Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? *(NOTE: This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers)* YES = **- 5 points** [✓ NO = 0 points]	*Points will be subtracted* 0
Total Score for Habitat Functions *– add the points for H 1, H 2, and H 3 and record the result on p. 1*	6

Comments

Date: July 28, 2006

Action: Modification of Design Standard
Pullman-Moscow Regional Airport; Pullman, WA.

From: Civil Engineer, Seattle Airports District Office, SEA-633

To: The Files

1. Facility Standard Affected: Federal Aviation Administration (FAA) Advisory Circular AC: 150/5300-13, Airport Design.

   a. Runway Safety Area (RSA), paragraph 305
   b. Runway to Parallel Taxiway, paragraph 209
   c. Runway Object Free Area Width, paragraph 307
   d. Runway Centerline to Holdline, table 2-1

2. Extent of Modification: The RSA between runway ends on the north side of the runway does not meet RSA standards for approach categories B and C aircraft and airport design group (ADG) II and III. The full width and length of RSA's off the ends of the runway meet standards. The existing parallel taxiway is within the runway safety area, thus violating the runway separation design standard. The following separations from the runway centerline are required. The Q400 is a CIII aircraft, which is the critical aircraft.

Runway 5-23 Design Standard	Existing Condition	Public NP Vis. Min. ≥ 3/4 mi Approach Cat B		Special Precision Vis. Min. ≥ ¾ mi ADG-III	
		ADG-II	ADG-III	Cat B	Cat C
a. Runway Safety Area Width (partial) North side of the runway centerline	150'	75'	150'	150'	250'
b. Runway to Parallel Taxiway	200'	240'	300'	300'	400'
c. Runway Object Free Area Width (partial North side of the runway centerline)	150'	250'	400'	400'	400'
d. Runway Centerline to holdline	150'	200'	200'	250'	250'

The Pullman-Moscow Regional Airport's (PUW) Ground Operations Mitigation Plan (Plan) proposes to mitigate the above non-standard conditions affected by the airport's existing airfield configuration (see attached Plan). The Plan requires pilots to consider precautionary actions on the ground, when larger aircraft land or are taking-off from PUW. The objective of PUW's Plan is to enhance safety related to large aircraft operations on Runway 5-23 and parallel Taxiway A.

3. Discussion of Conditions Requiring Modification: Federal Aviation Administration (FAA) Flight Standards - All Weather Operations (ANM-230) conducted an on-site inspection of PUW's ground operations July 18-19, 2006. ANM–230 evaluated the provisions of PUW's Plan, which were intended to mitigate the design standards being affected. ANM-230's investigation of PUW's Plan concluded that, when implemented, the Plan will provide an acceptable level of safety and guidance to pilots for safe ground operations, and recommended approval of the proposed Modification to Design Standards.

4. Effect and Duration of Modification: Based on ANM-230's determination, we have concluded that the proposed Modification of Design Standards will provide an acceptable level of safety, economy, durability, and workmanship. This Modification of Design Standards is approved with a limitation to aircraft with approach Category C (speed less than 141 knots) and Group III (airplanes with a wingspan up to but not including 118-feet). In addition, this approval is conditioned on:

a. ANM-230's periodic reevaluation of PUW's Ground Operations Mitigation Plan.

b. The airport owner taking appropriate action within a reasonable time by way of implementation of the following actions.

1) The airport owner shall produce an Airport Layout Plan (ALP), approved by the FAA, which will show ARC C-III Airport Design standards. In addition, the airport owner shall make satisfactory progress implementing development shown on the ALP, as soon as federal grant aid is available to start this work.

2) The airport owner shall implement the "Ground Operations Mitigation Plan" (attached) as approved by FAA Flight Standards (ANM-230).

3) All major airport rehabilitation and development will be programmed to meet C-III Airport Design standards.

c. Approval and continuance of this Modification of Design Standards is conditioned on the effectiveness of PUW's "Ground Operations Mitigation Plan", as determined by ANM-230, and includes periodic reevaluation by ANM-230.

d. The existing Modification of Design Standards for the De Havilland Dash 8 is withdrawn, and is replaced by this approved action.

CONCUR: DATE: 8/11/06
Manager, Northwest Mountain Flight Standards Division, (ANM-200)

CONCUR: DATE: 9/15/06
Manager, Western Flight Procedures Office, (AJW-327B/SEA FPO)

CONCUR: Stephen A. Collins DATE: 8/15/06
for Director, Technical Operations, Western Service Area, (ANM-400)

CONCUR: DATE: 8/14/06
Group Manager, System Support, Western Service Area (AJO2-W2)

CONCUR: Matt Cavanaugh DATE: 8/11/06
Manager, Safety and Standards Branch, (ANM-620)

APPROVED: J. Wade Bryant DATE: 8/16/06
Manager, Seattle Airports District Office, (SEA-600)

Pullman-Moscow Regional Airport

3200 Airport Complex North • Pullman, WA 99163
(509) 338-3223 • Fax (509) 334-5217

Robb Parish
Airport Manager

July 27, 2006

Ms. Mary Vargas
Seattle Airports District Office, SEA-633
Federal Aviation Administration
1601 Lind Ave. S.W.
Renton, WA 98055-4056

Dear Mary:

This letter presents the most recent actions taken to mitigate non-standard conditions at the Pullman-Moscow Regional Airport in order to facilitate changing the Airport Referenced Code from design category BII to CIII aircraft. These actions are based on recommendations from FAA and the airports primary air carrier, Horizon Air. Following are the specific elements that have been completed:

- The south-side runway safety area has been graded to 250 feet;
- The runway 5 threshold has been displaced 290 feet and distances declared to provide for 600 foot approach safety areas and 1,000 foot departure safety areas for both runways;
- The Transponder Landing System has been removed and all associated obstacles inside the safety area eliminated;
- Intermediate hold-short lines have been painted on the general aviation ramps 65 feet north of the taxiway centerline providing 265 feet of clearance from the runway centerline;
- A Pilot education brochure has been developed and distributed to based-pilots. This brochure is also displayed in the FBO office for transient pilots;
- Proper communication procedures are taught by the FBO and by Horizon Air. In addition, the pilot information brochure instructs pilots on communication protocol ;
- PPR documents have been revised to include required CTAF procedures for design group III and approach category C unscheduled aircraft as well as disclosing non-standard conditions;
- Non-standard conditions and taxiway restrictions will be published in the next available edition of the Airport/Facility Directory;
- The airport web site has an ALERT link to an operational notice with specific taxiing instructions;
- Taxiing instructions are posted in the FBO office;

- The airport has coordinated this process with Horizon Air and they have developed special PUW operational procedures for flight crews;
- The airport is requesting a modification to standards be issued by FAA for those design conditions that cannot be corrected by the above actions;
- The airport master plan update contract has been awarded and the scope of work is directed toward planning for bringing the airport into compliance with CIII design standards.

The Pullman-Moscow Regional Airport and its primary air carrier, Horizon Air, believe these actions will ensure an acceptable level of safety for CIII aircraft while the airport completes its upgrades from BII to CIII design standards. If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Robb Parish

Robb Parish
Airport Manager

Attachments: CIII Mitigation Actions
Airport Use Request Form
Airport Facility Directory Disclosures
Pilot Information Brochure
Photographs
Web Site Home Page and Alert Page
Taxiing instructions poster
Horizon Air Operational Procedures

CIII Mitigation Actions

Runway Safety Areas and Declared Distances

The south side runway safety area has been expanded to 250 feet. In order to lengthen the runway end safety areas, thresholds have been relocated as required by Advisory Circular 5300/13 for CIII aircraft. The runway 5 PAPI has also been lowered and runway markings and runway lights and modified as necessary. The Microwave Landing System (MLS) remains in place and has been successfully retained by a wall outside the safety area. The Transponder Landing System (TLS) equipment has been removed and is no longer a factor inside the safety area. Declared distances have been recalculated and have been published in the airport facility directory. Intermediate hold-short lines have been painted on the general aviation ramps to provide a visual indicator to aircraft preparing to taxi. This line is 65 feet north of the taxiway centerline providing an effective 265 foot runway safety area on the north side of the runway when the taxiway is clear of aircraft.

Pilot Education and Awareness

Because the parallel taxiway is within the 250 foot runway safety area, a pilot education program has been implemented to make based and transient pilots aware of limitations on taxiing aircraft during ARC CIII aircraft operations. An information brochure has been developed and distributed (see attached). In addition, the airport manager will participate in general aviation safety programs sponsored by the FBO and FAA. The airport is also working with Horizon Air flight operations to ensure that their flight crews are fully familiar with operating procedures at the Pullman-Moscow Regional Airport.

Communication Procedures on the Common Traffic Advisory Frequency (CTAF)

The Pullman-Moscow Regional Airport has well established communications procedures that are used by both general aviation and air carrier pilots. Because PUW is a busy uncontrolled airport, the FBO, Horizon Air, and the based corporate flight departments have previously implemented strict communications protocols that ensure safe operations at the airport. The FBO has a Part 141 flight school that teaches proper communications techniques and Horizon Air has established a remote observer program that includes a formal communication protocol for both air crews and ground crews. Communications procedures already in place at PUW include announcing aircraft type and location and altitude relative to the airport, operating intentions with regard to arrival and departure (including direction of arrival or departure), position in the traffic pattern, and taxiing movements. This communication regimen has evolved over time and has become a formal part of airport operations. In order to emphasize the importance of communication procedures these communication protocols are included in the pilot education and awareness materials. We also include communications requirements in the PPR forms (copy attached) that we send to unscheduled carriers with large aircraft. Finally, we have worked with Horizon Air flight operations to ensure that the established communications protocols are consistently used for every operation into PUW.

Airport/Facility Directory

Non-standard conditions, taxiing procedures, and communications requirements will be published in the airport/facility directory. A copy of the language is attached.

Special Operating Instructions

The airport has published and posted taxiing instructions on the web site (www.pullman-wa.gov/airport) and in the FBO office. This information is shown on pages 11, 12 and 13 of this plan.

Modification To Standards

FAA will approve a modification to airport design standards allowing the airport to service ARC CIII aircraft. The airport agrees that this modification to standards is contingent on progress toward permanently resolving all design issues and further, that the modification to standards will be subject to periodic review and approval.

PULLMAN-MOSCOW REGIONAL AIRPORT
AIRPORT USE REQUEST

COMPANY MAKING REQUEST (OPERATOR)____

ARRIVAL DATE:____________________ TIME: in _______________out_______________

DEPARTURE DATE:__________________ TIME: in_______________out_______________

AIRCRAFT TO BE UTILIZED__________AIRCRAFT GROSS LANDING WEIGHT: ______

CONTACT PERSON__________________PHONE # __________________________________

FAX #______________________________________

OPERATOR AGREES TO:

1. **GIVE NOTICE OF ARRIVAL, DEPARTURE, & LAYOVER TIMES AND ANY CHANGES**
Operator will provide airport with arrival, departure, & any layovers at least 2 days prior to anticipated arrival date and will give at least 3 hours notice of any time change from those noted and 12 hours notice of any cancellations or date changes.

2. **CARRY INSURANCE**
Operator shall carry and maintain liability insurance covering property damage, death, bodily injury and fire liability with a limit of at least $2,000,000.00. Additionally, operator must carry a combined single limit, bodily injury and property damage coverage for aircraft in motion claims, whether on airport property or in flight in amounts/limits meeting FAA requirements.

3. **ARRANGE GROUND HANDLING**
Operator is responsible for, and has arranged appropriate ground handling equipment and personnel while at airport.

4. **PAY LANDING AND FACILITY USE FEES (AS NECESSARY)**
Operator acknowledges and agrees to pay to airport a landing fee of 90 cents per 1,000 lbs maximum gross landing weight per landing at airport. Furthermore, operator agrees to pay fees for use of various airport facilities if utilized or needed. As indicated below, please note needed/requested services. Note: for flights between 0100 and 0500 a $75.00/hr ARFF callout fee will apply. Furthermore, if during actual operation services or facilities are needed or utilized a fee will be assessed whether requested or not.

5. **COLLECT PFC**
Operator acknowledges that they are responsible for collecting and submitting to airport appropriate passenger facility charges ($4.50 per passenger) if applicable.

6. **ACKNOWLEDGE OWN RISK**
Operator acknowledges that they are utilizing the airport at their own risk and have appropriately planned the flight considering airport non-standard design conditions as published in the Airport/Facility Directory, runway length, airport elevation, terrain surrounding airport, weather, and aircraft & crew capabilities. Furthermore, operator acknowledges that they are responsible for any damage to the airport, its facilities and structures caused as a result of their aircraft and/or operation on the airport.

7. COMPLY WITH AIRPORT OPERATING AND COMMUNICATIONS PROCEDURES

NOTE: due to the proximity of the parallel taxiway to the runway, the following procedures for large (78 foot wingspan or greater) or category C (approach speed 120 knots or greater) aircraft are in effect for PUW:

Arrival:

Announce on CTAF (122.8) that you are a large and/or category C aircraft inbound. Include an estimated time to landing. This is to allow any aircraft on the parallel taxiway time to exit or proceed to the run-up area near either end.

Departure:

1. Prior to taxiing onto the parallel taxiway:
- Announce on CTAF that you are a large and/or category C aircraft intending to takeoff. Include an estimated time to takeoff.
- Attempt to determine whether there are any large and/or category C aircraft inbound or preparing for takeoff.
- If there are other large and/or category C aircraft operations,
  - Delay taxi until the aircraft has cleared the runway or,
  - Determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.

2. Immediately prior to takeoff:
- Check for aircraft on the parallel taxiway.
- If an aircraft is on the parallel taxiway,
  - Delay takeoff until the aircraft has exited the taxiway or,
  - The aircraft has proceeded to the run-up area at either end.
- If an aircraft is on the parallel taxiway but is not exiting or proceeding to the run-up area at a reasonable speed,
  - Takeoff is authorized if the Captain has determined the other aircraft does not present a hazard.

8. HOLD AIRPORT HARMLESS

Operator will indemnify and hold the Pullman-Moscow airport, airport board, cities of Moscow and Pullman, port of Whitman county, Latah county, University of Idaho, and Washington State University, their agents, governing bodies, employees, and officers harmless against liability, costs and expense arising out of any and all claims or for loss or damage to property and for injuries to or deaths of any and all persons arising out of any and all claims of any negligent act or omission on the part of operator or the operators negligent use or occupancy of all portions of the airport, except a loss, liability or expense caused by the negligence or willful misconduct of the airport, its agents or employees.

I hereby understand, agree, accept, and will comply to the above stated terms, conditions, & fees as noted.

ACCEPTED: ______________________________
Signature of authorized agent of Operator

Date: ________________

The following services/facilities are requested and it is understood that the noted fees will be assessed (please initial after each service/facility needed/requested).

TERMINAL GATE ($ 50.00)__________
RAMP PARKING (FREE)______
TERMINAL PARKING (FREE)________
FIRE SERVICES (FREE)_

TICKET COUNTER ($100.00)________________
DESIGNATED RAMP OBSERVER (15.00/HR)____

Airport/Facility Directory Corrections and Proposed Remarks

RWY 05-23: H6730X100 (ASPH-GRVD) S-57, D-75, DT-135 HIRL

RWY 05: REIL PAPI (P2L)—GA 3.0 TCH 55’, Thld dsplcd 290’
TORA 6730 TODA 6730 ASDA 6490 LDA 6200
Fence

RWY 23: REIL PAPI (P4L)—GA 4.0 THC 60’ Thld dsplcd 800’
TORA 6730 TODA 6730 ASDA 6040 LDA 5240
Ground

AIRPORT REMARKS Attended 1600-0200Z. Closed to unscheduled air carrier ops with more than 30 passenger seats except PPR call arpt manager 509-338-3223. Non-paved areas soft. No parking between rwy and taxiway and within 35’ of taxiway to the north. Landing fee. Pilots of aircraft with greater than a 78 foot wingspan or with a category C approach speed must include in arrival or departure communications that they are a large aircraft and/or category C aircraft. Pilots of all aircraft must delay taxiing and remain behind intermediate hold short line when large and/or approach category C aircraft operations are in progress. Activate HIRL Rwy 05-23—CTAF.

Tri-Fold Pilot Information Brochure

ALWAYS BE PREPARED!

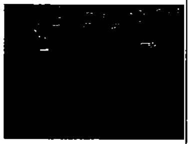
Information Resources

- **AOPA Air Safety Foundation: Operations at Non-towered Airports**
- **FAR 91.113**
  91.126
  91.127
- **AIM**
- **Advisory Circular 90-66A**
- **Airport/Facility Directory (Northwest US)**

Pullman-Moscow Regional Airport at a Glance

[illegible]

Pilot Information for the Pullman-Moscow Regional Airport



What you need to know about safe aircraft operations at the Pullman-Moscow Regional Airport

Airport Operating Procedures

Communications

Pilots should always communicate position and intentions via the CTAF 122.8. Arriving aircraft should make initial communications 10 miles from the airport and continue providing position information including calls for downwind, base, and final.

Arrival

Inbound aircraft should adhere to the airports standard traffic pattern to the maximum extent possible. Straight-in approaches are not encouraged except for instrument and large aircraft operations.

Taxi

Aircraft must delay taxiing when large aircraft operations are in progress. Aircraft on the general aviation ramp should remain until the large aircraft arrival or departure is completed. Aircraft in the run-up areas should hold in those positions until any large aircraft landing is completed and the aircraft is clear of the runway.

Departure

Standard departure procedures are in effect.

Airport Operating Environment

Terrain

The airport is surrounded by rolling hills creating a narrow approach with frequent cross winds. The runway 23 approach is steep (4 degrees) and the runway 5 approach is directly over the WSU campus.

Aircraft

The Pullman-Moscow Regional Airport has a wide variety of aircraft operating into and out of the airport ranging from Cessna 152 training aircraft to Airbus A319 and Boeing 737.

- Horizon Air operates Bombardier Q200 and Q400 aircraft multiple times each day.
- Corporate turbojets, both based and transient, operate daily. These are unscheduled operations that pilots should monitor closely.
- Charter aircraft such as Airbus A319 and Boeing 737 operate weekly, particularly during the fall football season.

The operating characteristics of these aircraft vary greatly and all pilots should maintain situational awareness and be alert to airport operating procedures required for large aircraft.

Safe Pilots

Safe Skies

LISTEN!

LOOK!

ANNOUNCE!

KNOW BEFORE YOU GO

FLY DEFENSIVELY

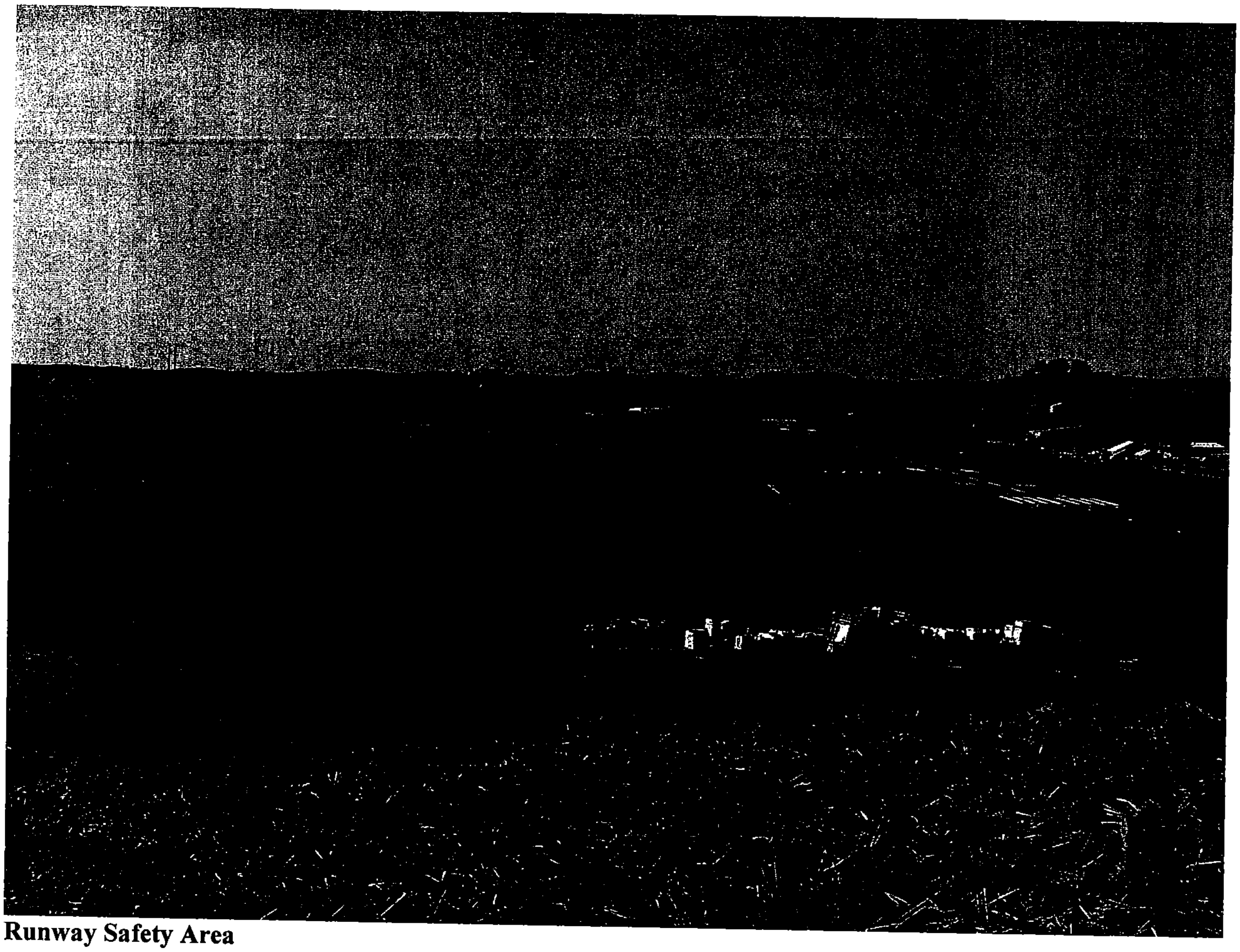
FLY THE PATTERN

USE THE CTAF

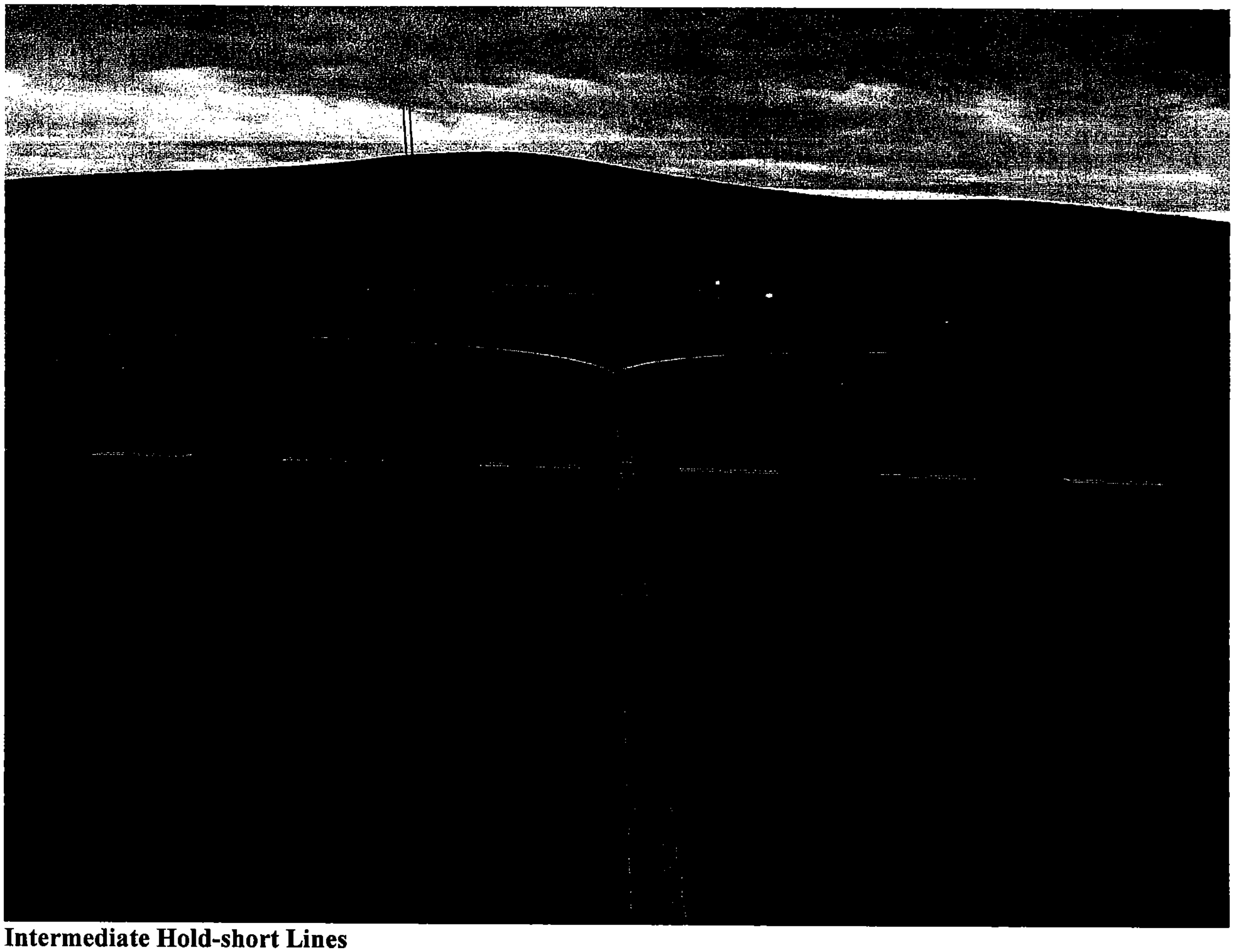
USE LANDING LIGHTS

For additional information contact
Airport manager Robb Parish
3200 Airport Complex North
Pullman, WA 99163

Phone: (509) 338-3223
Fax: (509) 334-5217
E-mail: robb.parish@ci.pullman.wa.us

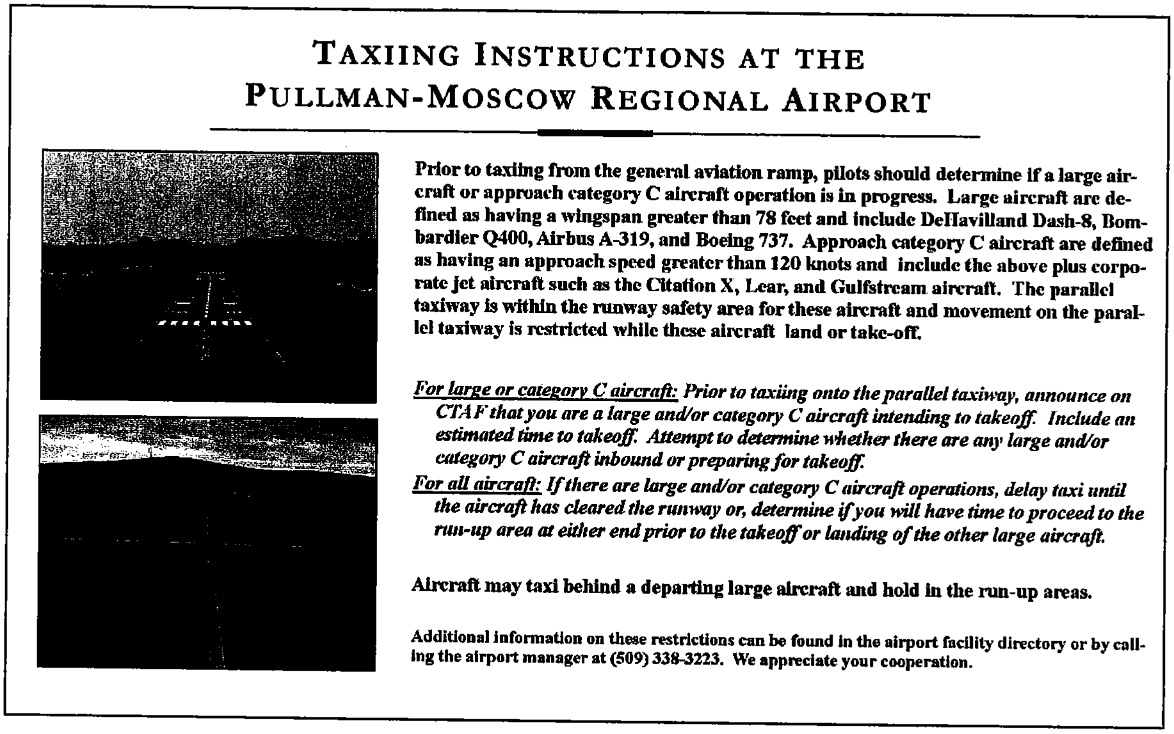


Runway Safety Area



Intermediate Hold-short Lines

Poster on Display in the FBO Office



TAXIING INSTRUCTIONS AT THE PULLMAN-MOSCOW REGIONAL AIRPORT

Prior to taxiing from the general aviation ramp, pilots should determine if a large aircraft or approach category C aircraft operation is in progress. Large aircraft are defined as having a wingspan greater than 78 feet and include DeHavilland Dash-8, Bombardier Q400, Airbus A-319, and Boeing 737. Approach category C aircraft are defined as having an approach speed greater than 120 knots and include the above plus corporate jet aircraft such as the Citation X, Lear, and Gulfstream aircraft. The parallel taxiway is within the runway safety area for these aircraft and movement on the parallel taxiway is restricted while these aircraft land or take-off.

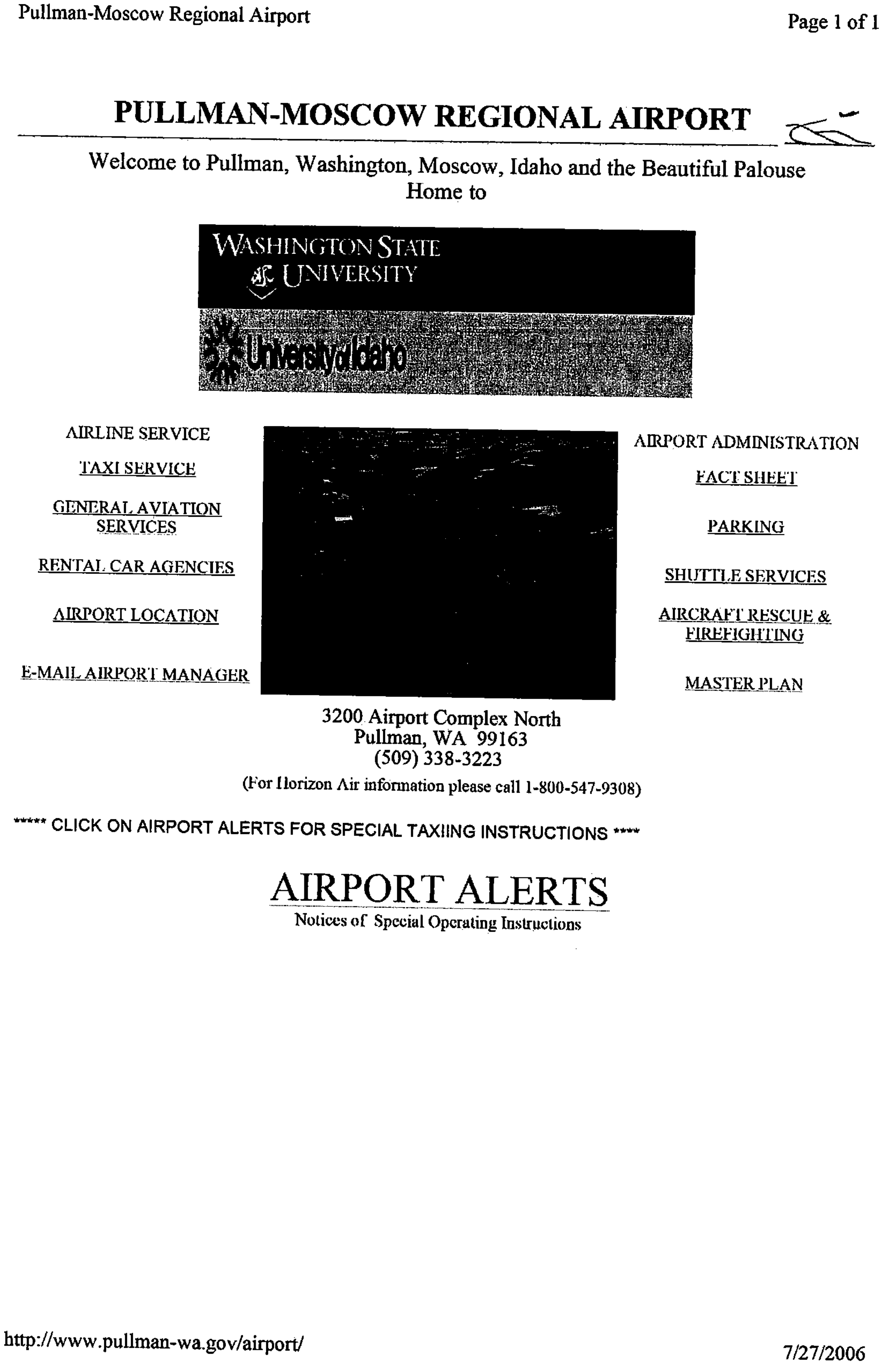
For large or category C aircraft: *Prior to taxiing onto the parallel taxiway, announce on CTAF that you are a large and/or category C aircraft intending to takeoff. Include an estimated time to takeoff. Attempt to determine whether there are any large and/or category C aircraft inbound or preparing for takeoff.*

For all aircraft: *If there are large and/or category C aircraft operations, delay taxi until the aircraft has cleared the runway or, determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.*

Aircraft may taxi behind a departing large aircraft and hold in the run-up areas.

Additional information on these restrictions can be found in the airport facility directory or by calling the airport manager at (509) 338-3223. We appreciate your cooperation.

Airport Web Page with Link to Taxiing Instructions



PULLMAN-MOSCOW REGIONAL AIRPORT

Welcome to Pullman, Washington, Moscow, Idaho and the Beautiful Palouse
Home to

WASHINGTON STATE UNIVERSITY

University of Idaho

AIRLINE SERVICE

TAXI SERVICE

GENERAL AVIATION SERVICES

RENTAL CAR AGENCIES

AIRPORT LOCATION

E-MAIL AIRPORT MANAGER

AIRPORT ADMINISTRATION

FACT SHEET

PARKING

SHUTTLE SERVICES

AIRCRAFT RESCUE & FIREFIGHTING

MASTER PLAN

3200 Airport Complex North
Pullman, WA 99163
(509) 338-3223

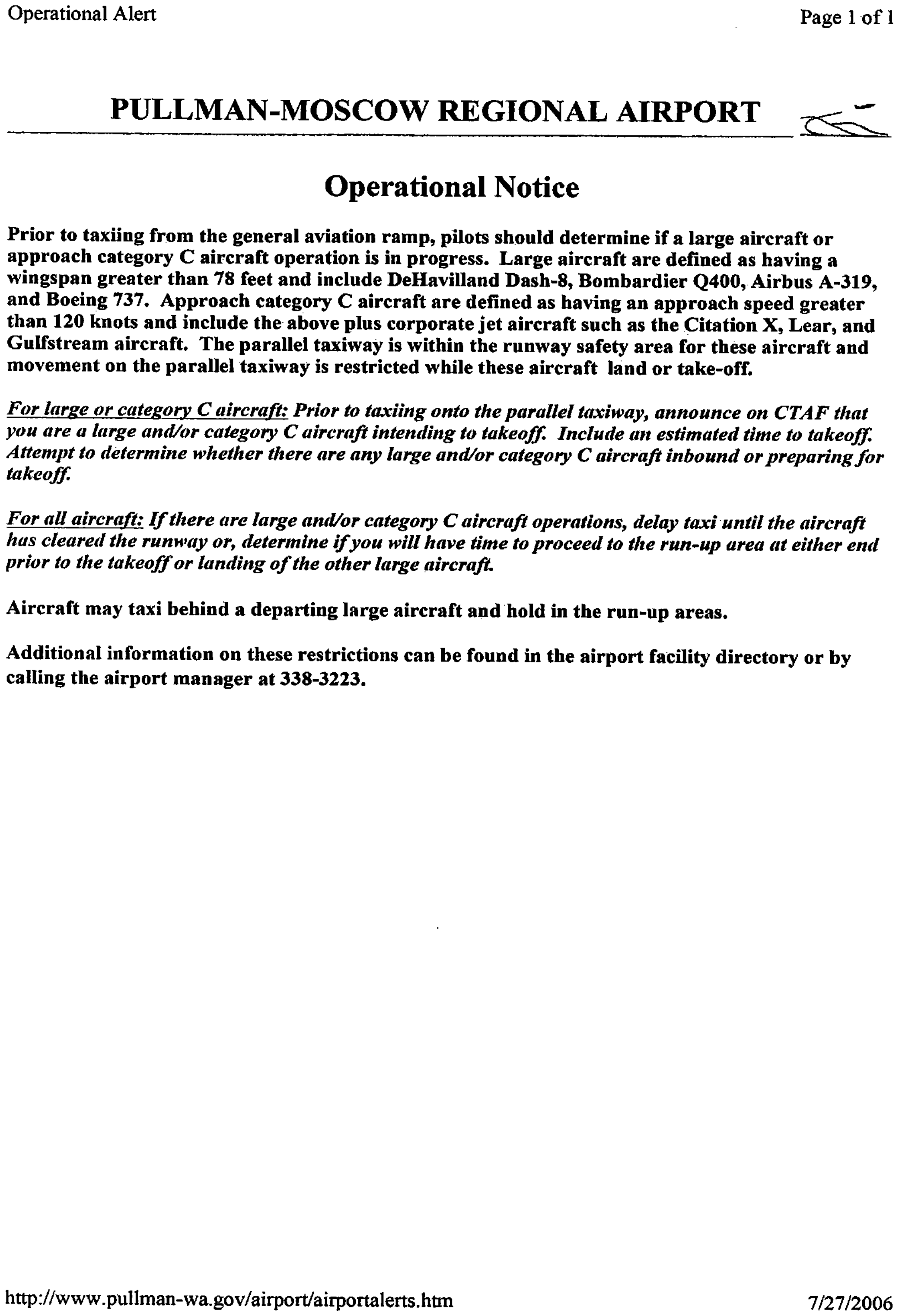
(For Horizon Air information please call 1-800-547-9308)

****** CLICK ON AIRPORT ALERTS FOR SPECIAL TAXIING INSTRUCTIONS ****

AIRPORT ALERTS

Notices of Special Operating Instructions

Airport Alerts links to the document shown on this page. The Operational Notice will be a permanent display on this page.



Operational Alert Page 1 of 1

PULLMAN-MOSCOW REGIONAL AIRPORT

Operational Notice

Prior to taxiing from the general aviation ramp, pilots should determine if a large aircraft or approach category C aircraft operation is in progress. Large aircraft are defined as having a wingspan greater than 78 feet and include DeHavilland Dash-8, Bombardier Q400, Airbus A-319, and Boeing 737. Approach category C aircraft are defined as having an approach speed greater than 120 knots and include the above plus corporate jet aircraft such as the Citation X, Lear, and Gulfstream aircraft. The parallel taxiway is within the runway safety area for these aircraft and movement on the parallel taxiway is restricted while these aircraft land or take-off.

***For large or category C aircraft:* Prior to taxiing onto the parallel taxiway, announce on CTAF that you are a large and/or category C aircraft intending to takeoff. Include an estimated time to takeoff. Attempt to determine whether there are any large and/or category C aircraft inbound or preparing for takeoff.**

***For all aircraft:* If there are large and/or category C aircraft operations, delay taxi until the aircraft has cleared the runway or, determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.**

Aircraft may taxi behind a departing large aircraft and hold in the run-up areas.

Additional information on these restrictions can be found in the airport facility directory or by calling the airport manager at 338-3223.

http://www.pullman-wa.gov/airport/airportalerts.htm 7/27/2006

Horizon Air Operational Procedures (Draft)

Specific Airport Procedures

Pullman (KPUW)

Due to the proximity of the parallel taxiway to the runway, procedures in addition to normal Radio Remote communications outlined in section 4 of the FOM are necessary during arrival and departure at KPUW.

For the purposes of this procedure large aircraft means those with a wingspan greater than 80 feet.

Arrival

- An announcement shall be made on CTAF that you are a large aircraft inbound.
  Include an estimated time to landing.
  - This is to allow any aircraft on the parallel taxiway time to exit or proceed to the run-up area near either end.

Departure

3. Prior to taxiing onto the parallel taxiway:
   - Announce on CTAF that you are a large aircraft intending to takeoff.
     Include an estimated time to takeoff.
   - Attempt to determine whether there are any large aircraft inbound or preparing for takeoff.
   - If there are other large aircraft operations,
     - Delay taxi until the aircraft has cleared the runway or,
     - Determine if you will have time to proceed to the run-up area at either end prior to the takeoff or landing of the other large aircraft.
4. Immediately prior to takeoff:
   - Check for aircraft on the parallel taxiway.
   - If an aircraft is on the parallel taxiway,
     - Delay takeoff until the aircraft has exited the taxiway or,
     - The aircraft has proceeded to the run-up area at either end.
   - If an aircraft is on the parallel taxiway but is not exiting or proceeding to the run-up area at a reasonable speed,
     - Takeoff is authorized if the Captain has determined the other aircraft does not present a hazard.

The existence of any aircraft on the parallel taxiway does not constitute the need for a go-around, missed approach or aborted takeoff.

There is no requirement for the flight crew to monitor the status of the parallel taxiway during takeoff or landing.

Station personnel shall monitor and advise of any aircraft activity on the parallel taxiway prior to takeoff operations.

Integrated Noise Model Inputs

FAA Integrated Noise Model (INM) 7.0 software is used to produce noise contours for the Pullman-Moscow Regional Airport (PUW). Inputs into INM include aviation activity forecasts, included in **Chapter 2**, and a new runway configuration, included in **Chapter 3**. Three noise models have been run: 2010, 2015, and 2020. 2010 uses recorded operations, and the existing runway alignment. 2015 uses forecasted aircraft operations, and a realigned 7,100 foot long runway. 2020 uses forecasted aircraft operations, and a realigned 8,000 foot long runway. The INM produced the noise contours included in **Chapter 6**.

Average arrival, departure, and touch and go flight tracks were generated to model noise disperson. Existing and forecasted aircraft operations were broken down by aircraft type, then by flight track. A map of the flight tracks in included in **Exhibit 1**, and flight track operational breakdowns are included on the following pages.

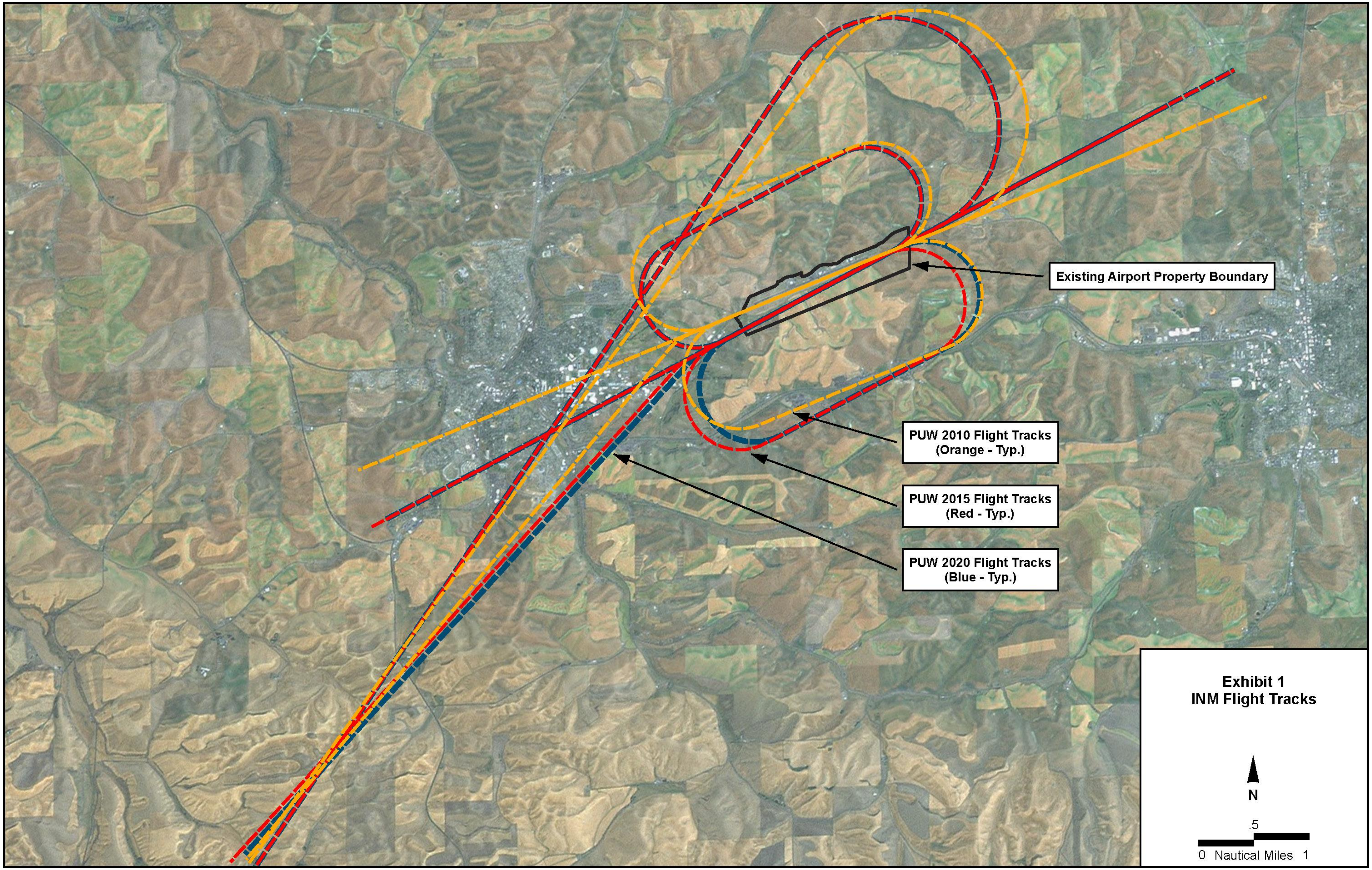


Exhibit 1
INM Flight Tracks

2010 Operations Division

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
737800	Approach	STANDARD	5	A-1-STRT	0.0296	0.0296
737800	Approach	STANDARD	23	A1-STRT	0.0074	0.0074
737800	Departure	STANDARD	5	D-2 LFT	0.0296	0.0296
737800	Departure	STANDARD	23	D-2 VOR	0.0074	0.0074
A319-131	Approach	STANDARD	5	A-1-STRT	0.0099	0.0099
A319-131	Approach	STANDARD	23	A1-STRT	0.0025	0.0025
A319-131	Departure	STANDARD	5	D-2 LFT	0.0099	0.0099
A319-131	Departure	STANDARD	23	D-2 VOR	0.0025	0.0025
C130HP	Approach	NOISEMAP	5	A-1-STRT	0.0548	0.0000
C130HP	Approach	NOISEMAP	23	A1-STRT	0.0548	0.0000
C130HP	Departure	NOISEMAP	5	D-1	0.0548	0.0000
C130HP	Departure	NOISEMAP	23	D-1	0.0548	0.0000
CIT3	Approach	STANDARD	5	A-1-STRT	0.0526	0.0132
CIT3	Approach	STANDARD	23	A1-STRT	0.0789	0.0197
CIT3	Departure	STANDARD	5	D-1	0.0079	0.0020
CIT3	Departure	STANDARD	5	D-2 LFT	0.0447	0.0112
CIT3	Departure	STANDARD	23	D-1	0.0118	0.0030
CIT3	Departure	STANDARD	23	D-2 VOR	0.0671	0.0168
CL601	Approach	STANDARD	5	A-1-STRT	0.0228	0.0057
CL601	Approach	STANDARD	23	A1-STRT	0.0342	0.0085
CL601	Departure	STANDARD	5	D-1	0.0034	0.0009
CL601	Departure	STANDARD	5	D-2 LFT	0.0194	0.0048
CL601	Departure	STANDARD	23	D-1	0.0051	0.0013
CL601	Departure	STANDARD	23	D-2 VOR	0.0291	0.0073
CNA172	Approach	STANDARD	5	A-1-STRT	3.6803	0.1937
CNA172	Approach	STANDARD	23	A1-STRT	3.6803	0.1937
CNA172	Departure	STANDARD	5	D-1	1.8401	0.0968
CNA172	Departure	STANDARD	5	D-2 LFT	1.8401	0.0968
CNA172	Departure	STANDARD	23	D-1	1.8401	0.0968
CNA172	Departure	STANDARD	23	D-2 VOR	1.8401	0.0968
CNA172	Touch and Go	STANDARD	5	TG-1	9.4193	0.4958
CNA172	Touch and Go	STANDARD	23	TG-1	9.4193	0.4958
CNA182	Approach	STANDARD	5	A-1-STRT	1.7571	0.0925
CNA182	Approach	STANDARD	23	A1-STRT	1.7571	0.0925
CNA182	Departure	STANDARD	5	D-1	0.8785	0.0462
CNA182	Departure	STANDARD	5	D-2 LFT	0.8785	0.0462
CNA182	Departure	STANDARD	23	D-1	0.8785	0.0462
CNA182	Departure	STANDARD	23	D-2 VOR	0.8785	0.0462
CNA182	Touch and Go	STANDARD	5	TG-1	3.6818	0.1938
CNA182	Touch and Go	STANDARD	23	TG-1	3.6818	0.1938
CNA208	Approach	STANDARD	5	A-1-STRT	0.4274	0.1068
CNA208	Approach	STANDARD	23	A1-STRT	0.4271	0.1068
CNA208	Departure	STANDARD	5	D-1	0.0641	0.0160
CNA208	Departure	STANDARD	5	D-2 LFT	0.3633	0.0908
CNA208	Departure	STANDARD	23	D-1	0.2137	0.0534
CNA208	Departure	STANDARD	23	D-2 VOR	0.2137	0.0534
CNA500	Approach	STANDARD	5	A-1-STRT	0.0833	0.0208

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
CNA500	Approach	STANDARD	23	A1-STRT	0.1249	0.0312
CNA500	Departure	STANDARD	5	D-1	0.0125	0.0031
CNA500	Departure	STANDARD	5	D-2 LFT	0.0708	0.0177
CNA500	Departure	STANDARD	23	D-1	0.0187	0.0047
CNA500	Departure	STANDARD	23	D-2 VOR	0.1062	0.0265
CNA55B	Approach	STANDARD	5	A-1-STRT	0.1490	0.0373
CNA55B	Approach	STANDARD	23	A1-STRT	0.2236	0.0559
CNA55B	Departure	STANDARD	5	D-1	0.2240	0.0056
CNA55B	Departure	STANDARD	5	D-2 LFT	0.1267	0.0317
CNA55B	Departure	STANDARD	23	D-1	0.0335	0.0084
CNA55B	Departure	STANDARD	23	D-2 VOR	0.1900	0.0475
CNA750	Approach	STANDARD	5	A-1-STRT	0.1596	0.0399
CNA750	Approach	STANDARD	23	A1-STRT	0.2393	0.0598
CNA750	Departure	STANDARD	5	D-1	0.0239	0.0060
CNA750	Departure	STANDARD	5	D-2 LFT	0.1356	0.0339
CNA750	Departure	STANDARD	23	D-1	0.0359	0.0090
CNA750	Departure	STANDARD	23	D-2 VOR	0.2034	0.0509
DHC830	Approach	STANDARD	5	A-1-STRT	4.1644	0.2192
DHC830	Approach	STANDARD	23	A1-STRT	1.0411	0.0548
DHC830	Departure	STANDARD	5	D-2 LFT	4.1644	0.2192
DHC830	Departure	STANDARD	23	D-2 VOR	1.0411	0.0548
FAL20	Approach	STANDARD	5	A-1-STRT	0.0132	0.0033
FAL20	Approach	STANDARD	23	A1-STRT	0.0197	0.0049
FAL20	Departure	STANDARD	5	D-1	0.0020	0.0005
FAL20	Departure	STANDARD	5	D-2 LFT	0.0112	0.0028
FAL20	Departure	STANDARD	23	D-1	0.0030	0.0007
FAL20	Departure	STANDARD	23	D-2 VOR	0.0168	0.0042
HS748A	Approach	STANDARD	5	A-1-STRT	0.0132	0.0033
HS748A	Approach	STANDARD	23	A1-STRT	0.0197	0.0049
HS748A	Departure	STANDARD	5	D-1	0.0020	0.0005
HS748A	Departure	STANDARD	5	D-2 LFT	0.0112	0.0028
HS748A	Departure	STANDARD	23	D-1	0.0030	0.0007
HS748A	Departure	STANDARD	23	D-2 VOR	0.0168	0.0042
LEAR35	Approach	STANDARD	5	A-1-STRT	0.0544	0.0136
LEAR35	Approach	STANDARD	23	A1-STRT	0.0815	0.2040
LEAR35	Departure	STANDARD	5	D-1	0.0082	0.0020
LEAR35	Departure	STANDARD	5	D-2 LFT	0.0462	0.0116
LEAR35	Departure	STANDARD	23	D-1	0.0122	0.0031
LEAR35	Departure	STANDARD	23	D-2 VOR	0.0693	0.0173
MU3001	Approach	STANDARD	5	A-1-STRT	0.0473	0.0118
MU3001	Approach	STANDARD	23	A1-STRT	0.0710	0.0178
MU3001	Departure	STANDARD	5	D-1	0.0071	0.0018
MU3001	Departure	STANDARD	5	D-2 LFT	0.0402	0.0101
MU3001	Departure	STANDARD	23	D-1	0.0107	0.0027
MU3001	Departure	STANDARD	23	D-2 VOR	0.0604	0.0151
PA28	Approach	STANDARD	5	A-1-STRT	2.3138	0.1218
PA28	Approach	STANDARD	23	A1-STRT	2.3138	0.1218

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
PA28	Departure	STANDARD	5	D-1	1.1569	0.0609
PA28	Departure	STANDARD	5	D-2 LFT	1.1569	0.0609
PA28	Departure	STANDARD	23	D-1	1.1569	0.0609
PA28	Departure	STANDARD	23	D-2 VOR	1.1569	0.0609
PA31	Approach	STANDARD	5	A-1-STRT	0.5859	0.0308
PA31	Approach	STANDARD	23	A1-STRT	0.5859	0.0308
PA31	Departure	STANDARD	5	D-1	0.2930	0.0154
PA31	Departure	STANDARD	5	D-2 LFT	0.2930	0.0154
PA31	Departure	STANDARD	23	D-1	0.2930	0.0154
PA31	Departure	STANDARD	23	D-2 VOR	0.2930	0.0154

2015 Operations Division

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
737800	Approach	STANDARD	5	A-1-STRT	0.3730	0.3730
737800	Approach	STANDARD	23	A1-STRT	0.0093	0.0093
737800	Departure	STANDARD	5	D-2 LFT	0.0373	0.0373
737800	Departure	STANDARD	23	D-2 VOR	0.0093	0.0093
A319-131	Approach	STANDARD	5	A-1-STRT	0.0121	0.0121
A319-131	Approach	STANDARD	23	A1-STRT	0.0030	0.0030
A319-131	Departure	STANDARD	5	D-2 LFT	0.0121	0.0121
A319-131	Departure	STANDARD	23	D-2 VOR	0.0030	0.0030
C130HP	Approach	NOISEMAP	5	A-1-STRT	0.0548	0.0000
C130HP	Approach	NOISEMAP	23	A1-STRT	0.0548	0.0000
C130HP	Departure	NOISEMAP	5	D-1	0.0548	0.0000
C130HP	Departure	NOISEMAP	23	D-1	0.0548	0.0000
CIT3	Approach	STANDARD	5	A-1-STRT	0.0658	0.0164
CIT3	Approach	STANDARD	23	A1-STRT	0.0986	0.0247
CIT3	Departure	STANDARD	5	D-1	0.0099	0.0025
CIT3	Departure	STANDARD	5	D-2 LFT	0.0559	0.0140
CIT3	Departure	STANDARD	23	D-1	0.0148	0.0037
CIT3	Departure	STANDARD	23	D-2 VOR	0.0838	0.0210
CL601	Approach	STANDARD	5	A-1-STRT	0.0333	0.0083
CL601	Approach	STANDARD	23	A1-STRT	0.0500	0.0125
CL601	Departure	STANDARD	5	D-1	0.0050	0.0012
CL601	Departure	STANDARD	5	D-2 LFT	0.0283	0.0071
CL601	Departure	STANDARD	23	D-1	0.0075	0.0019
CL601	Departure	STANDARD	23	D-2 VOR	0.0425	0.0106
CNA172	Approach	STANDARD	5	A-1-STRT	4.1136	0.2165
CNA172	Approach	STANDARD	23	A1-STRT	4.1136	0.2165
CNA172	Departure	STANDARD	5	D-1	2.0568	0.1083
CNA172	Departure	STANDARD	5	D-2 LFT	2.0568	0.1083
CNA172	Departure	STANDARD	23	D-1	2.0568	0.1083
CNA172	Departure	STANDARD	23	D-2 VOR	2.0568	0.1083
CNA172	Touch and Go	STANDARD	5	TG-1	9.9225	0.5222
CNA172	Touch and Go	STANDARD	23	TG-1	9.9225	0.5222
CNA182	Approach	STANDARD	5	A-1-STRT	1.8719	0.2165
CNA182	Approach	STANDARD	23	A1-STRT	1.8719	0.0985
CNA182	Departure	STANDARD	5	D-1	0.9359	0.0493
CNA182	Departure	STANDARD	5	D-2 LFT	0.9359	0.0493
CNA182	Departure	STANDARD	23	D-1	0.9359	0.0493
CNA182	Departure	STANDARD	23	D-2 VOR	0.9359	0.0493
CNA182	Touch and Go	STANDARD	5	TG-1	3.5713	0.1880
CNA182	Touch and Go	STANDARD	23	TG-1	3.5713	0.1880
CNA208	Approach	STANDARD	5	A-1-STRT	0.5479	0.1370
CNA208	Approach	STANDARD	23	A1-STRT	0.5479	0.1370
CNA208	Departure	STANDARD	5	D-1	0.0822	0.0205
CNA208	Departure	STANDARD	5	D-2 LFT	0.4658	0.1164
CNA208	Departure	STANDARD	23	D-1	0.2740	0.0685
CNA208	Departure	STANDARD	23	D-2 VOR	0.2740	0.0685

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
CNA500	Approach	STANDARD	5	A-1-STRT	0.1078	0.0270
CNA500	Approach	STANDARD	23	A1-STRT	0.1618	0.0404
CNA500	Departure	STANDARD	5	D-1	0.0162	0.0040
CNA500	Departure	STANDARD	5	D-2 LFT	0.0917	0.0229
CNA500	Departure	STANDARD	23	D-1	0.0243	0.0061
CNA500	Departure	STANDARD	23	D-2 VOR	0.1375	0.0344
CNA55B	Approach	STANDARD	5	A-1-STRT	0.1973	0.0493
CNA55B	Approach	STANDARD	23	A1-STRT	0.2959	0.0740
CNA55B	Departure	STANDARD	5	D-1	0.0296	0.0074
CNA55B	Departure	STANDARD	5	D-2 LFT	0.1677	0.0419
CNA55B	Departure	STANDARD	23	D-1	0.0444	0.0111
CNA55B	Departure	STANDARD	23	D-2 VOR	0.2515	0.0629
CNA750	Approach	STANDARD	5	A-1-STRT	0.2113	0.0528
CNA750	Approach	STANDARD	23	A1-STRT	0.3169	0.0792
CNA750	Departure	STANDARD	5	D-1	0.0317	0.0079
CNA750	Departure	STANDARD	5	D-2 LFT	0.1796	0.0449
CNA750	Departure	STANDARD	23	D-1	0.0475	0.0119
CNA750	Departure	STANDARD	23	D-2 VOR	0.2674	0.0673
DHC830	Approach	STANDARD	5	A-1-STRT	4.2602	0.2242
DHC830	Approach	STANDARD	23	A1-STRT	1.0650	0.0561
DHC830	Departure	STANDARD	5	D-2 LFT	4.2602	0.2242
DHC830	Departure	STANDARD	23	D-2 VOR	1.0650	0.0561
FAL20	Approach	STANDARD	5	A-1-STRT	0.0175	0.0044
FAL20	Approach	STANDARD	23	A1-STRT	0.0263	0.0066
FAL20	Departure	STANDARD	5	D-1	0.0026	0.0007
FAL20	Departure	STANDARD	5	D-2 LFT	0.0149	0.0037
FAL20	Departure	STANDARD	23	D-1	0.0039	0.0010
FAL20	Departure	STANDARD	23	D-2 VOR	0.0224	0.0056
HS748A	Approach	STANDARD	5	A-1-STRT	0.0175	0.0044
HS748A	Approach	STANDARD	23	A1-STRT	0.0263	0.0066
HS748A	Departure	STANDARD	5	D-1	0.0026	0.0007
HS748A	Departure	STANDARD	5	D-2 LFT	0.0149	0.0037
HS748A	Departure	STANDARD	23	D-1	0.0039	0.0010
HS748A	Departure	STANDARD	23	D-2 VOR	0.0224	0.0056
LEAR35	Approach	STANDARD	5	A-1-STRT	0.0666	0.0167
LEAR35	Approach	STANDARD	23	A1-STRT	0.0999	0.0250
LEAR35	Departure	STANDARD	5	D-1	0.0100	0.0025
LEAR35	Departure	STANDARD	5	D-2 LFT	0.0566	0.0142
LEAR35	Departure	STANDARD	23	D-1	0.0150	0.0037
LEAR35	Departure	STANDARD	23	D-2 VOR	0.0850	0.0212
MU3001	Approach	STANDARD	5	A-1-STRT	0.0552	0.0138
MU3001	Approach	STANDARD	23	A1-STRT	0.0828	0.0207
MU3001	Departure	STANDARD	5	D-1	0.0083	0.0021
MU3001	Departure	STANDARD	5	D-2 LFT	0.0469	0.0117
MU3001	Departure	STANDARD	23	D-1	0.0124	0.0031
MU3001	Departure	STANDARD	23	D-2 VOR	0.0704	0.0176
PA28	Approach	STANDARD	5	A-1-STRT	2.7376	0.1441

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
PA28	Approach	STANDARD	23	A1-STRT	2.7376	0.1441
PA28	Departure	STANDARD	5	D-1	1.3688	0.0720
PA28	Departure	STANDARD	5	D-2 LFT	1.3688	0.0720
PA28	Departure	STANDARD	23	D-1	1.3688	0.0720
PA28	Departure	STANDARD	23	D-2 VOR	1.3688	0.0720
PA31	Approach	STANDARD	5	A-1-STRT	0.5940	0.0313
PA31	Approach	STANDARD	23	A1-STRT	0.5940	0.0313
PA31	Departure	STANDARD	5	D-1	0.2970	0.0156
PA31	Departure	STANDARD	5	D-2 LFT	0.2970	0.0156
PA31	Departure	STANDARD	23	D-1	0.2970	0.0156
PA31	Departure	STANDARD	23	D-2 VOR	0.2970	0.0156

2020 Operations Division						
Aircraft	**Operation Type**	**Profile**	**Runway End**	**Flight Track**	**Daytime Operations**	**Nighttime Operations**
737800	Approach	STANDARD	5	A-1-STRT	0.0921	0.0921
737800	Approach	STANDARD	23	A1-STRT	0.0230	0.0230
737800	Departure	STANDARD	5	D-2 LFT	0.0921	0.0921
737800	Departure	STANDARD	23	D-2 VOR	0.0230	0.0230
A319-131	Approach	STANDARD	5	A-1-STRT	0.0285	0.0285
A319-131	Approach	STANDARD	23	A1-STRT	0.0071	0.0071
A319-131	Departure	STANDARD	5	D-2 LFT	0.0285	0.0285
A319-131	Departure	STANDARD	23	D-2 VOR	0.0071	0.0071
C130HP	Approach	NOISEMAP	5	A-1-STRT	0.0548	0.0000
C130HP	Approach	NOISEMAP	23	A1-STRT	0.0548	0.0000
C130HP	Departure	NOISEMAP	5	D-1	0.0548	0.0000
C130HP	Departure	NOISEMAP	23	D-1	0.0548	0.0000
CIT3	Approach	STANDARD	5	A-1-STRT	0.0807	0.0202
CIT3	Approach	STANDARD	23	A1-STRT	0.1210	0.0302
CIT3	Departure	STANDARD	5	D-1	0.0121	0.0030
CIT3	Departure	STANDARD	5	D-2 LFT	0.0686	0.0171
CIT3	Departure	STANDARD	23	D-1	0.0181	0.0045
CIT3	Departure	STANDARD	23	D-2 VOR	0.1028	0.0257
CL601	Approach	STANDARD	5	A-1-STRT	0.0403	0.0101
CL601	Approach	STANDARD	23	A1-STRT	0.0605	0.0151
CL601	Departure	STANDARD	5	D-1	0.0060	0.0015
CL601	Departure	STANDARD	5	D-2 LFT	0.0343	0.0086
CL601	Departure	STANDARD	23	D-1	0.0091	0.0023
CL601	Departure	STANDARD	23	D-2 VOR	0.0514	0.0129
CNA172	Approach	STANDARD	5	A-1-STRT	3.9432	0.2075
CNA172	Approach	STANDARD	23	A1-STRT	3.9432	0.2075
CNA172	Departure	STANDARD	5	D-1	1.9716	0.1038
CNA172	Departure	STANDARD	5	D-2 LFT	1.9716	0.1038
CNA172	Departure	STANDARD	23	D-1	1.9716	0.1038
CNA172	Departure	STANDARD	23	D-2 VOR	1.9716	0.1038
CNA172	Touch and Go	STANDARD	5	TG-1	8.5630	0.4507
CNA172	Touch and Go	STANDARD	23	TG-1	8.5630	0.4507
CNA182	Approach	STANDARD	5	A-1-STRT	1.8826	0.0991
CNA182	Approach	STANDARD	23	A1-STRT	1.8826	0.0991
CNA182	Departure	STANDARD	5	D-1	0.9413	0.0495
CNA182	Departure	STANDARD	5	D-2 LFT	0.9413	0.0495
CNA182	Departure	STANDARD	23	D-1	0.9413	0.0495
CNA182	Departure	STANDARD	23	D-2 VOR	0.9413	0.0495
CNA182	Touch and Go	STANDARD	5	TG-1	3.3471	0.1762
CNA182	Touch and Go	STANDARD	23	TG-1	3.3471	0.1762
CNA208	Approach	STANDARD	5	A-1-STRT	0.4274	0.1068
CNA208	Approach	STANDARD	23	A1-STRT	0.4274	0.1068
CNA208	Departure	STANDARD	5	D-1	0.0641	0.0160
CNA208	Departure	STANDARD	5	D-2 LFT	0.3633	0.0908
CNA208	Departure	STANDARD	23	D-1	0.2137	0.0863
CNA208	Departure	STANDARD	23	D-2 VOR	0.3452	0.0863

Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
CNA500	Approach	STANDARD	5	A-1-STRT	0.1298	0.0324
CNA500	Approach	STANDARD	23	A1-STRT	0.1946	0.0487
CNA500	Departure	STANDARD	5	D-1	0.0195	0.0049
CNA500	Departure	STANDARD	5	D-2 LFT	0.1103	0.0276
CNA500	Departure	STANDARD	23	D-1	0.0292	0.0073
CNA500	Departure	STANDARD	23	D-2 VOR	0.1654	0.0414
CNA55B	Approach	STANDARD	5	A-1-STRT	0.2446	0.0612
CNA55B	Approach	STANDARD	23	A1-STRT	0.3669	0.0917
CNA55B	Departure	STANDARD	5	D-1	0.0367	0.0092
CNA55B	Departure	STANDARD	5	D-2 LFT	0.2079	0.0520
CNA55B	Departure	STANDARD	23	D-1	0.0550	0.0138
CNA55B	Departure	STANDARD	23	D-2 VOR	0.3119	0.0780
CNA750	Approach	STANDARD	5	A-1-STRT	0.2393	0.0598
CNA750	Approach	STANDARD	23	A1-STRT	0.3590	0.0898
CNA750	Departure	STANDARD	5	D-1	0.0359	0.0090
CNA750	Departure	STANDARD	5	D-2 LFT	0.2034	0.0509
CNA750	Departure	STANDARD	23	D-1	0.0539	0.0135
CNA750	Departure	STANDARD	23	D-2 VOR	0.3052	0.0763
DHC830	Approach	STANDARD	5	A-1-STRT	4.3580	0.2294
DHC830	Approach	STANDARD	23	A1-STRT	1.0895	0.0573
DHC830	Departure	STANDARD	5	D-1	4.3580	0.2294
DHC830	Departure	STANDARD	23	D-2 VOR	1.0895	0.0573
FAL20	Approach	STANDARD	5	A-1-STRT	0.0219	0.0055
FAL20	Approach	STANDARD	23	A1-STRT	0.0329	0.0082
FAL20	Departure	STANDARD	5	D-1	0.0033	0.0008
FAL20	Departure	STANDARD	5	D-2 LFT	0.0186	0.0047
FAL20	Departure	STANDARD	23	D-1	0.0049	0.0012
FAL20	Departure	STANDARD	23	D-2 VOR	0.0279	0.0070
HS748A	Approach	STANDARD	5	A-1-STRT	0.0129	0.0055
HS748A	Approach	STANDARD	23	A1-STRT	0.0329	0.0082
HS748A	Departure	STANDARD	5	D-1	0.0033	0.0008
HS748A	Departure	STANDARD	5	D-2 LFT	0.0186	0.0047
HS748A	Departure	STANDARD	23	D-1	0.0049	0.0279
HS748A	Departure	STANDARD	23	D-2 VOR	0.0012	0.0070
LEAR35	Approach	STANDARD	5	A-1-STRT	0.0798	0.0199
LEAR35	Approach	STANDARD	23	A1-STRT	0.1197	0.0299
LEAR35	Departure	STANDARD	5	D-1	0.0120	0.0030
LEAR35	Departure	STANDARD	5	D-2 LFT	0.0678	0.0170
LEAR35	Departure	STANDARD	23	D-1	0.0180	0.0045
LEAR35	Departure	STANDARD	23	D-2 VOR	0.1017	0.0254
MU3001	Approach	STANDARD	5	A-1-STRT	0.0666	0.0167
MU3001	Approach	STANDARD	23	A1-STRT	0.0999	0.0250
MU3001	Departure	STANDARD	5	D-1	0.0100	0.0025
MU3001	Departure	STANDARD	5	D-2 LFT	0.0566	0.0142
MU3001	Departure	STANDARD	23	D-1	0.0150	0.0037
MU3001	Departure	STANDARD	23	D-2 VOR	0.0850	0.0212
PA28	Approach	STANDARD	5	A-1-STRT	2.4791	0.1305

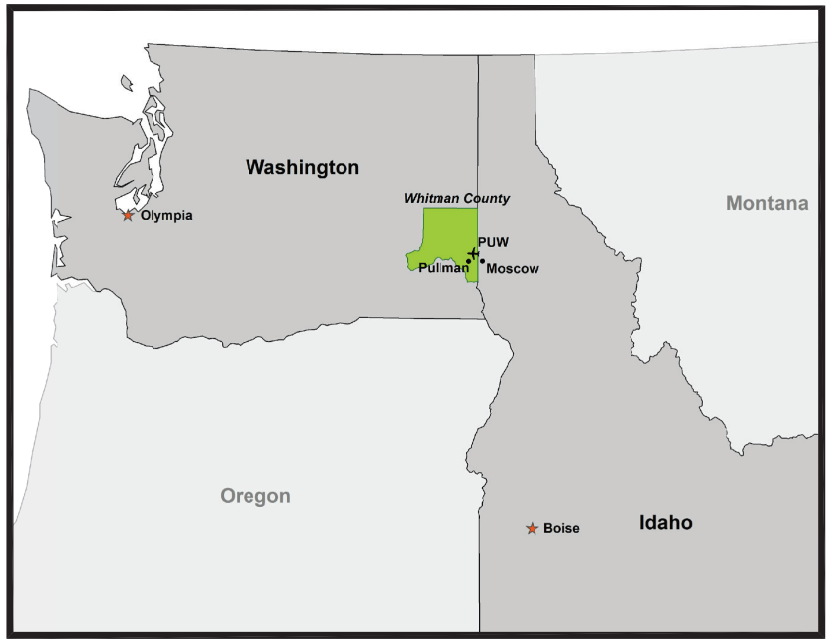
Aircraft	Operation Type	Profile	Runway End	Flight Track	Daytime Operations	Nighttime Operations
PA28	Approach	STANDARD	23	A1-STRT	2.4791	0.1305
PA28	Departure	STANDARD	5	D-1	1.2396	0.0652
PA28	Departure	STANDARD	5	D-2 LFT	1.2396	0.0652
PA28	Departure	STANDARD	23	D-1	0.3139	0.0165
PA28	Departure	STANDARD	23	D-2 VOR	0.3139	0.0165
PA31	Approach	STANDARD	5	A-1-STRT	0.6278	0.0330
PA31	Approach	STANDARD	23	A1-STRT	0.6278	0.0330
PA31	Departure	STANDARD	5	D-1	0.3139	0.0165
PA31	Departure	STANDARD	5	D-2 LFT	0.3139	0.0165
PA31	Departure	STANDARD	23	D-1	0.3139	0.0165
PA31	Departure	STANDARD	23	D-2 VOR	0.3139	0.0165

AIRPORT LAYOUT PLAN

FOR THE

PULLMAN MOSCOW REGIONAL AIRPORT

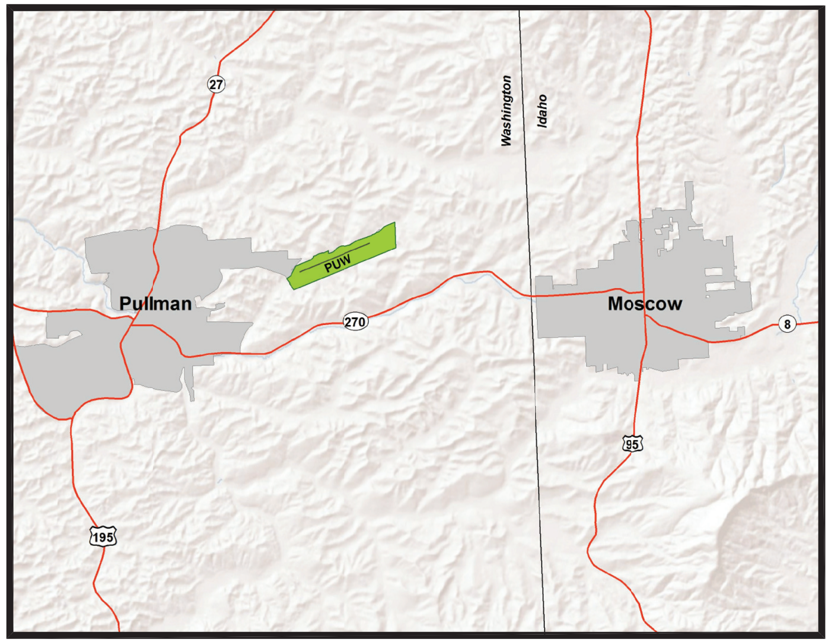
PULLMAN, WASHINGTON



LOCATION MAP

FEBRUARY 1, 2014

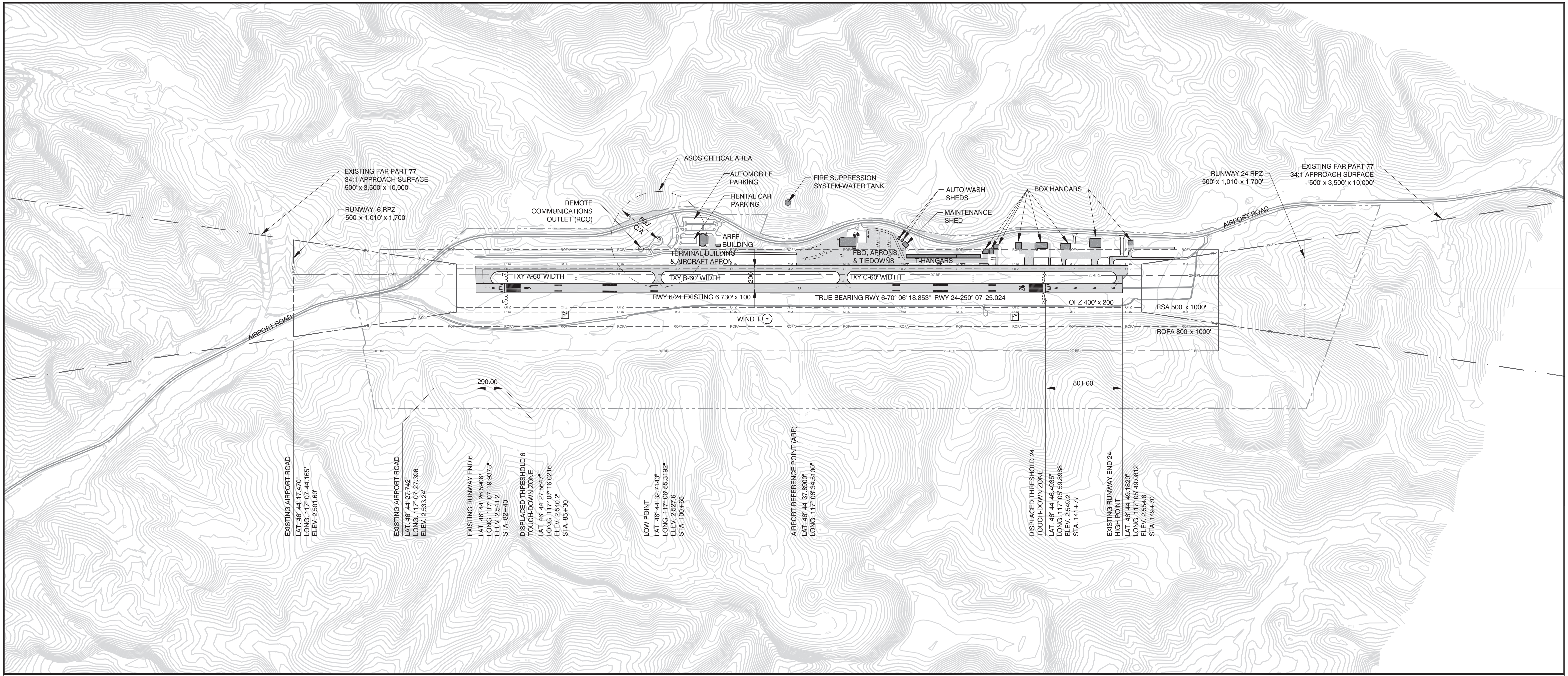
INDEX TO SHEETS



VICINITY MAP

Mead & Hunt

The preparation of these documents was supported, in part, by the Federal Aviation Administration Airport Improvement Program (Project Numbers 3-53-0051-029 and 3-53-0051-034) as provided under Title 49, United States Code, Section 47104. The contents do not necessarily reflect the official views or policy of the FAA. Acceptance of this document by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted therein nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public laws.



EXISTING	LEGEND	FUTURE
— — - -	AIRPORT PROPERTY LINE	— - - —
▭	PAVEMENT	
▬	BUILDINGS	⊠
☼	AIRPORT REFERENCE POINT (ARP)	✱
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
Ⓟ	WIND CONE	
○	WEATHER OBSERVATION (ASOS)	●
□□□□	PRECISION APPROACH PATH INDICATOR (PAPI)	■■■■
—16' BRL— —35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — RSA — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — —	RUNWAY OBJECT FREE AREA (ROFA)	
- - - - TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

NON-STANDARD CONDITIONS (1)(2)	EXISTING	REQUIRED FOR C-III
1. RUNWAY SAFETY AREA (RSA) LENGTH & WIDTH	1,000' x 391'(3)	1,000' x 500'
2. RUNWAY OBJECT FREE AREA (ROFA) LENGTH & WIDTH	1,000' x 593'(3)	1,000' x 800'
3. RUNWAY OBSTACLE FREE ZONE (OFZ) LENGTH & WIDTH	200' x 341'(3)	200' x 400'
4. RUNWAY CENTERLINE TO TAXIWAY CENTERLINE DISTANCE	200'(3)	400'
5. RUNWAY CENTERLINE TO AIRCRAFT HOLD-LINE DISTANCE	150'(3)	250'
6. RUNWAY CENTERLINE TO AIRCRAFT PARKING DISTANCE	265'	500'
7. BUILDING RESTRICTION LINE (BRL) 35' DISTANCE	394'	745'

NOTES:

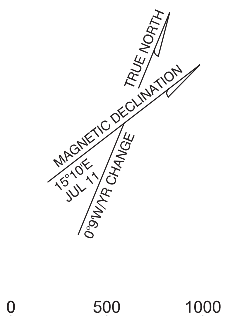
(1) EXISTING CONDITIONS ARE DRAWN AS C-III TO ILLUSTRATE NON-STANDARD CONDITIONS.

(2) CONDITIONAL SAFETY AREA MODIFICATION GRANTED FOR C-III OPERATIONS. (MODIFICATION OF DESIGN STANDARD LETTER DATED JULY 28, 2006)

(3) SAFETY AREAS ARE ACHIEVED BY DECLARED DISTANCES.

EXISTING DECLARED DISTANCES

	RUNWAY 6	RUNWAY 24
TAKEOFF RUN AVAILABLE (TORA)	6,730'	6,730'
TAKEOFF DISTANCE AVAILABLE (TODA)	6,730'	6,730'
ACCELERATE / STOP DISTANCE AVAILABLE (ASDA)	6,490'	6,040'
LANDING DISTANCE AVAILABLE (LDA)	6,200'	5,240'



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

EXISTING AIRPORT LAYOUT PLAN

Mead & Hunt FINAL Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 2 OF 15

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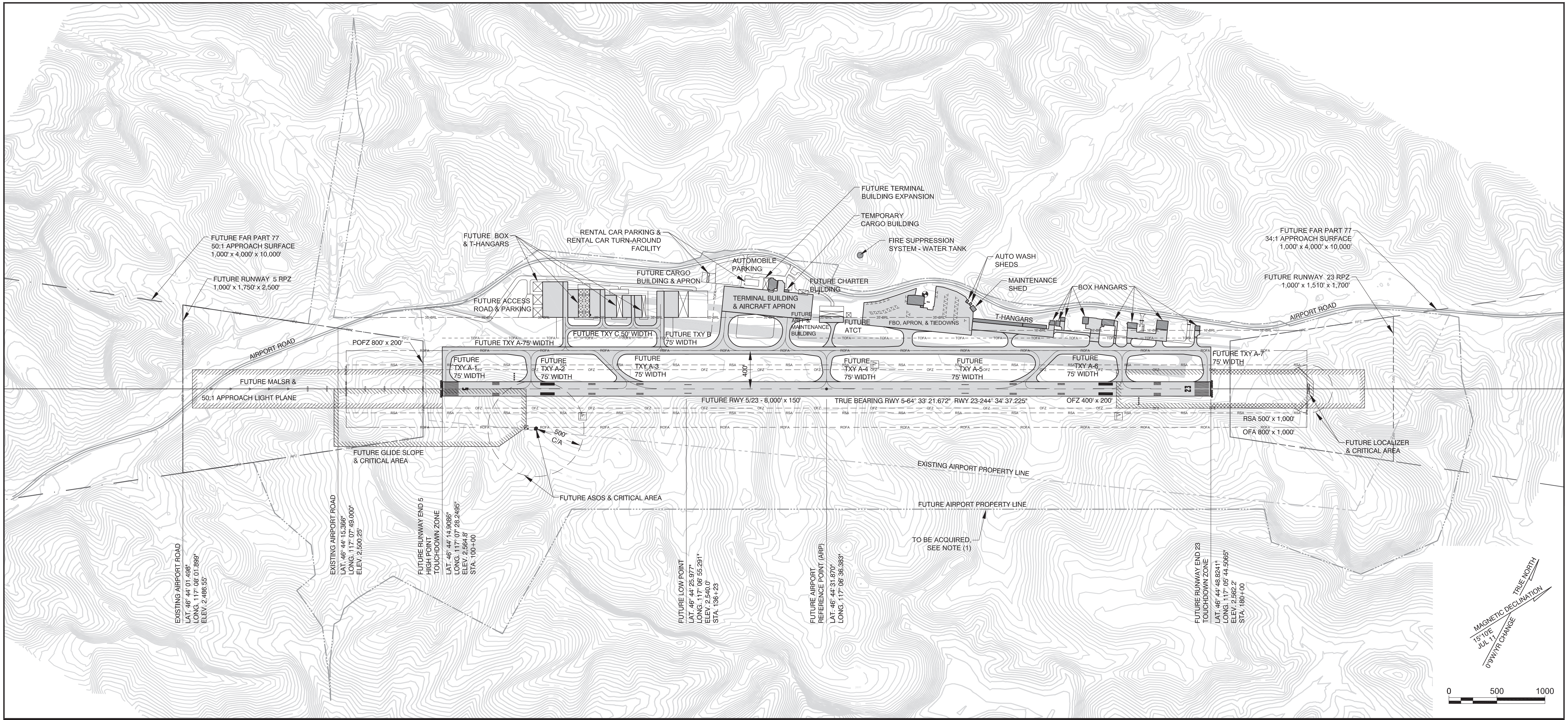

NOTES:

(1) PROPERTY WITHIN FUTURE AIRPORT PROPERTY LINE THAT IS OUTSIDE OF EXISTING AIRPORT PROPERTY LINE WILL NEED TO BE ACQUIRED. TYPE OF ACQUISITION TO BE DETERMINED DURING ENVIRONMENTAL PROCESS.

(2) MAGNETIC DECLINATION OF FUTURE RUNWAY WAS EVALUATED AND IT WAS DETERMINED TO REMAIN SITE.

EXISTING	LEGEND	FUTURE
— - - —	AIRPORT PROPERTY LINE	— · · —
▨	PAVEMENT	
■	BUILDINGS	☒
☼	AIRPORT REFERENCE POINT (ARP)	✸
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
▢	WIND CONE	
○	WEATHER OBSERVATION (ASOS)	●
▢▢▢▢	PRECISION APPROACH PATH INDICATOR (PAPI)	■■■■
—16' BRL— —35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — RSA — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

FEDERAL AVIATION ADMINISTRATION

FEDERAL AVIATION ADMINISTRATION
NORTHWEST MOUNTAIN REGION
SEATTLE AIRPORTS DISTRICT OFFICE

DATE

PULLMAN MOSCOW REGIONAL AIRPORT BOARD

AIRPORT BOARD CHAIR
PULLMAN-MOSCOW REGIONAL AIRPORT

DATE

DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

FUTURE AIRPORT LAYOUT PLAN

FINAL

DESIGN: KTM DRAWN: ADC DATE: 01 FEBRUARY 2014 SHEET 3 OF 15

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EXISTING AIRPORT LOCATION

AIRPORT REFERENCE POINT (ARP)	LATITUDE 46° 44' 37.89"
	LONGITUDE 117° 06' 34.51"
ESTABLISHED AIRPORT ELEVATION	2,556 FT MSL

1. ARP DETERMINED USING FAA GEO83 PROGRAM.

EXISTING RUNWAY END COORDINATES

RUNWAY END	LATITUDE	LONGITUDE	STATION	ELEVATION	TRUE BEARING
6	46° 44' 26.5906"	117° 07' 19.9373"	82+40	2,541.2'	70° 06' 18.853"
24	46° 44' 49.1820"	117° 05' 49.0812"	149+70	2,554.8'	250° 07' 25.024"

1. EXISTING RUNWAY LATITUDE, LONGITUDE, & ELEVATION FROM FAA PUBLICATIONS.
2. TRUE BEARINGS DETERMINED USING GEO83 PROGRAM.

EXISTING RUNWAY DATA

RUNWAY	LENGTH	WIDTH	HIGH POINT STA/ELEV	LOW POINT STA/ELEV	EFF. GRAD.	SURFACE	STRENGTH
6/24	6,730'	100'	149+70 2,554.8	100+65 2527.6	0.4%	ASPHALT (GROOVED)	SNGL 57,000# DUAL 75,000# DUAL TANDEM 95,000# DBL DUAL TANDEM 135,000#

1. LENGTHS DETERMINED USING LAT/LONGS IN GEO83 PROGRAM.
2. PAVEMENT STRENGTH AS LISTED IN THE FAA AIRPORT FACILITIES DIRECTORY

EXISTING RUNWAY DESIGN STANDARDS

RUNWAY END	RUNWAY PROTECTION ZONE	SAFETY AREA		OBJECT FREE AREA		OBSTACLE FREE ZONE	
		LENGTH*	WIDTH	LENGTH*	WIDTH	LENGTH*	WIDTH
6	500' x 1,010' x 1,700'	1,000'	500'	1,000'	800'	200'	400'
24	500' x 1,010' x 1,700'						

* LENGTH BEYOND RUNWAY END. SURFACE EXTENDS FULL RUNWAY LENGTH.

EXISTING APPENDIX 2 SURFACES

RUNWAY END	CAT.	DIMENSIONS	DISTANCE FROM RUNWAY END	SLOPE
6	6	800' x 3,800' x 10,000'	200'	20:1
24	6	800' x 3,800' x 10,000'	200'	20:1
6/24	11	1,000' x 6,466' x 10,200'	0	40:1
6/24	12	600' x 21,273' x 12,000', CONTINUE 28,727' TO 50,000'	0	62.5:1

* PULLMAN-MOSCOW RGNL DEPARTURE PROCEDURE APPLIES TO BOTH RUNWAY ENDS.

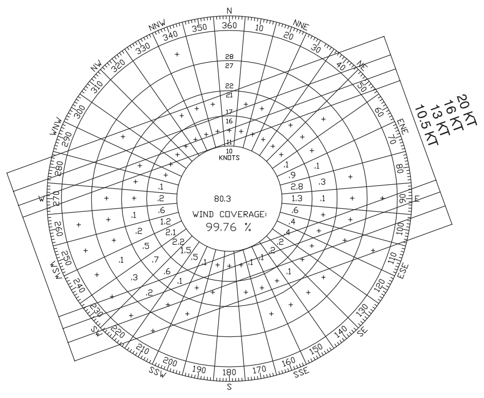
EXISTING TAXIWAY DATA

TAXIWAY	WIDTH (ARC)*	LENGTH	TSA	TOFA
"A"	60' (ADG III)	6,730'	118'	186'
"B"	60' (ADG III)	200'	118'	186'
"C"	60' (ADG III)	200'	118'	186'

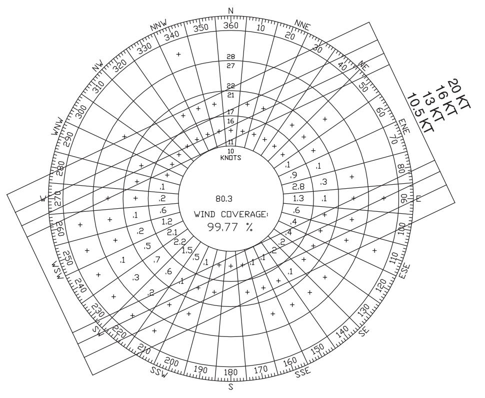
* ARC-AIRPORT REFERENCE CODE. DESIGN AIRCRAFT DESIGNATED BY:
WINGSPAN: III AT LEAST 79 FEET, LESS THAN 118 FEET.
TAXIWAY WIDTH: III 50 FEET.

GENERAL NOTES

1. EXISTING AIRFIELD MEETS ARC STANDARD OF B-II. HOWEVER, CURRENT AIRFIELD OPERATIONS REQUIRE THAT ARC C-III STANDARDS APPLY. ARC C-III STANDARDS ARE DEPICTED TO ILLUSTRATE SAFETY AREA DEFICIENCIES.
2. ALP PREPARED USING DESIGN CRITERIA FROM FAA ADVISORY CIRCULAR 150/5300-13 "AIRPORT DESIGN" CHANGE 17 AND FAR PART 77 "OBJECTS AFFECTING NAVIGABLE AIRSPACE".
3. ALP COMPARED TO FAA PUBLICATIONS, AIRPORT/FACILITY DIRECTORY, AND TERMINAL PROCEDURES, DATED 29 JUL 2011.
4. NO AERIAL MAPPING WAS PERFORMED, IMAGERY FROM ESRI STREAMING SERVICE.
5. ELEVATIONS (NAVD88) AND DISTANCES IN FEET, APPROXIMATE.
6. LATITUDES AND LONGITUDES (NAD83) CONVERTED TO STATE PLANE COORDINATES.
7. FUTURE OBJECTS TO BE SITED AS PART OF FUTURE PROJECTS.
8. THERE MAY EXIST OBJECTS NOT REPRESENTED.
9. OBJECTS MAY BE REMOVED, RELOCATED, AND LIT, AS PART OF FUTURE PROJECTS,
10. TO ACCOMMODATE AIRFIELD OPERATION AND DEVELOPMENT.
11. FENCING OMITTED FOR CLARITY.
    RUNWAY AND SOME TAXIWAYS ARE DRAWN TO ARC STANDARD FOR D-IV
12. GOAL FOR PRECISION APPROACH TO RUNWAY 5 IS A CAT-I ILS WITH 200' $\frac{1}{2}$ MILE VISIBILITY MINIMUMS SUPPORTED BY AN RVR, CENTERLINE LIGHTING, AND TOUCHDOWN ZONE LIGHTING.
13. THE ATCT SHOWN ON SHEET 3 IS FOR PLANNING PURPOSES ONLY. NO JUSTIFICATION OR SUPPORT HAS BEEN PROVIDED BY THE FAA. FURTHER STUDY AND JUSTIFICATION WOULD NEED TO BE COMPLETED PRIOR TO FAA SUPPORT AND CONSIDERATION FOR FUNDING.



EXISTING WIND ROSE ALL WEATHER CONDITIONS



FUTURE WIND ROSE ALL WEATHER CONDITIONS

AIRPORT DATA

AIRPORT IDENTIFIER CODE	PUW
AIRPORT-OWNING MUNICIPALITY	PULLMAN MOSCOW AIRPORT BOARD
COUNTY	WHITMAN
MEAN MAXIMUM TEMPERATURE OF THE HOTTEST MONTH (AUGUST)	82.2° F
MAGNETIC DECLINATION	15° 10' EAST OF NORTH
RATE OF CHANGE	0° 9' WEST OF NORTH/YEAR
AIRFIELD NAVAIDS	ASOS, ROTATING BEACON, WIND INDICATORS

1. TEMPERATURE FROM NATIONAL WEATHER SERVICE, JULY 2011
2. MAGNETIC DECLINATION FROM NOAA, JULY 2011

CRITICAL AIRCRAFT

RUNWAY	ARC*	DESIGN AIRCRAFT	APRCH SPEED	WING SPAN	LENGTH	TAIL HEIGHT	MAXIMUM T/O WEIGHT
5/23	C-II	CESSNA CITATION X	129	63.9	72.3	19.25	36,100#
	C-III	BOMBARDIER DASH 8-Q400	125	93.25	108.75	27.5	64,500#

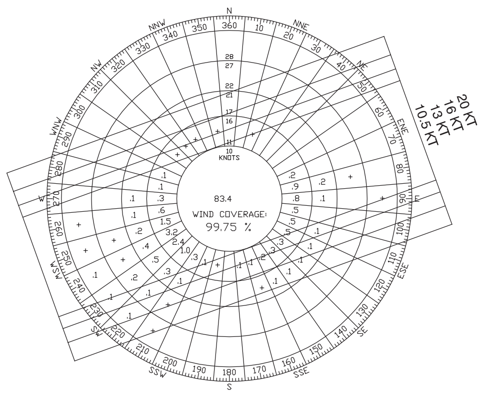
SEE GENERAL NOTES #1 & #11

* ARC-AIRPORT REFERENCE CODE. DESIGN AIRCRAFT DESIGNATED BY:
APPROACH SPEED: C AT LEAST 121 KNOTS, LESS THAN 141 KNOTS.
D AT LEAST 141 KNOTS, LESS THAN 166 KNOTS.
WINGSPAN: II AT LEAST 49 FEET, LESS THAN 79 FEET.
III AT LEAST 79 FEET, LESS THAN 118 FEET.
IV AT LEAST 118 FEET, LESS THAN 171 FEET.
TAIL HEIGHT: II AT LEAST 20 FEET, LESS THAN 30 FEET.
III AT LEAST 30 FEET, LESS THAN 45 FEET.
IV AT LEAST 45 FEET, LESS THAN 60 FEET.

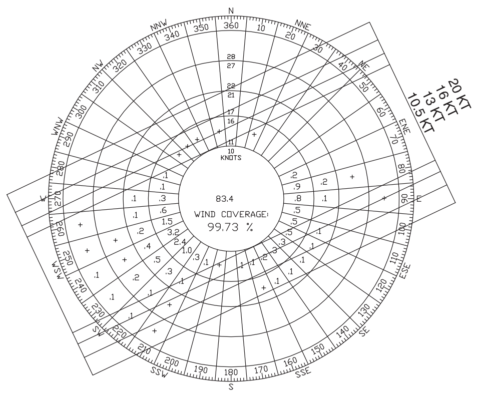
WIND COVERAGE

RUNWAY	ALL WEATHER				IFR			
	10.5KT	13KT	16KT	20KT	10.5KT	13KT	16KT	20KT
EXISTING 6/24	98.01%	99.15%	99.76%	99.96%	97.93%	99.04%	99.75%	99.97%
FUTURE 5/23	98.18%	99.17%	99.77%	99.95%	97.89%	98.94%	99.73%	99.97%

1. NOAA DATA FOR PULLMAN MOSCOW REGIONAL AIRPORT, 1995-2004
2. IFR CONDITIONS: CEILING <1000' AND/OR VISIBILITY <3 MILE, BUT CEILING >OR=200' AND VISIBILITY >OR=0.5 MILE.
3. CROSSWIND COMPONENTS PER AC 150/5300-13, PAGE 10, PARA 203 B.



EXISTING WIND ROSE IFR CONDITIONS



FUTURE WIND ROSE IFR CONDITIONS

EXISTING NAVIGATIONAL AIDS

RUNWAY END	MARKING	LIGHTING	VISUAL NAVAIDS	ELECTRONIC NAVAIDS
6	NON-PREC	HIRL	REIL, PAPI-2L	GPS
24	NON-PREC		REIL, PAPI-4I	GPS

EXISTING INSTRUMENT APPROACH PROCEDURES

RUNWAY END	APPROACH	VISIBILITY MINIMUMS	INSTRUMENTATION	TOUCHDOWN ZONE ELEV
6	NON-PREC	1-1/2 MILE	RNAV (GPS), VOR	2540.0'
24	NON-PREC	1-3/4 MILE	RNAV (GPS)	2549.0'

1. AIRPORT HAS VOR OR GPS APPROACH w/1-1/2 MILE VISIBILITY MINIMUM.

EXISTING FAR PART 77 APPROACH SURFACES

RUNWAY END	DIMENSIONS	DISTANCE FROM RUNWAY END	SLOPE
6	500' x 3,500' x 10,000'	200'	34:1
24	500' x 3,500' x 10,000'	200'	34:1

EXISTING PRECISION OBSTACLE FREE ZONE

RUNWAY END	INNER-APPROACH OFZ			INNER-TRANSITIONAL OFZ			PRECISION OFZ	
	LENGTH	WIDTH	SLOPE	FULL WIDTH	END WIDTH*	HEIGHT	LENGTH	WIDTH
6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24	N/A	N/A	N/A		N/A		N/A	N/A

1. INNER-APPROACH OFZ APPLIES TO RUNWAY END WITH AN APPROACH LIGHT SYSTEM.
2. INNER-TRANSITIONAL OFZ AND PRECISION OFZ APPLY TO RUNWAY END WITH A PRECISION APPROACH.

* DIMENSION REPRESENTS THE FAR END WIDTH OF THE INNER-TRANSITIONAL OFZ.

FUTURE NAVIGATIONAL AIDS

RUNWAY END	MARKING	LIGHTING	VISUAL NAVAIDS	ELECTRONIC NAVAIDS
5	PRECISION	HIRL	REIL, PAPI-4L, MALSR	RVR, CAT-I ILS, GPS
23	NON-PREC		REIL, PAPI-4L	GPS

FUTURE INSTRUMENT APPROACH PROCEDURES

RUNWAY END	APPROACH	VISIBILITY MINIMUMS	INSTRUMENTATION	TOUCHDOWN ZONE ELEV
5	PRECISION	1/2 MILE	CAT-I ILS, RNAV (GPS), VOR	2564.8'
5	PRECISION	N/A	RNP	N/A
23	NON-PREC	1 MILE	RNAV (GPS)	2562.2'

1. AIRPORT HAS VOR OR GPS APPROACH w/1-1/2 MILE VISIBILITY MINIMUM.
2. PERFORMANCE BASED NAVIGATION (RNP/RNAV), WAAS PROCEDURE IS EXPECTED FOR RUNWAY END 5. PROCEDURE BEING DEVELOPED BY ALASKA AIRLINES.
3. VISIBILITY MINIMUM AND TOUCHDOWN ELEVATIONS WILL BE DETERMINED DURING PROCEDURE DEVELOPMENT. OBJECTIVE: 200' 1/2 MILE.

FUTURE FAR PART 77 APPROACH SURFACES

RUNWAY END	DIMENSIONS	DISTANCE FROM RUNWAY END	SLOPE
5	1,000' x 4,000' x 10,000' *	200'	50:1
23	1,000' x 4,000' x 10,000'	200'	34:1

* PRECISION APPROACH CONSISTS OF ADDITIONAL SURFACES, SEE PART 77 SHEET.

FUTURE PRECISION OBSTACLE FREE ZONE

RUNWAY END	INNER-APPROACH OFZ			INNER-TRANSITIONAL OFZ			PRECISION OFZ	
	LENGTH	WIDTH	SLOPE	FULL WIDTH	END WIDTH*	HEIGHT	LENGTH	WIDTH
5	200' BEYOND LAST LIGHT	400'	50:1	1,696'	1,120'	42.3'	200'	800'
23	200' BEYOND LAST LIGHT	400'	50:1	N/A	N/A	N/A	N/A	N/A

1. INNER-APPROACH OFZ APPLIES TO RUNWAY END WITH AN APPROACH LIGHT SYSTEM.
2. INNER-TRANSITIONAL OFZ AND PRECISION OFZ APPLY TO RUNWAY END WITH A PRECISION APPROACH.

* DIMENSION REPRESENTS THE FAR END WIDTH OF THE INNER-TRANSITIONAL OFZ.

FUTURE AIRPORT LOCATION

AIRPORT REFERENCE POINT (ARP)	LATITUDE 46° 44' 31.870"
	LONGITUDE 117° 06' 36.383"
ESTABLISHED AIRPORT ELEVATION	2,565 FT MSL

1. ARP DETERMINED USING FAA GEO83 PROGRAM.

FUTURE RUNWAY END COORDINATES

RUNWAY END	LATITUDE	LONGITUDE	STATION	ELEVATION	TRUE BEARING
5	46° 44' 14.9086"	117° 07' 28.2495"	100+00	2,564.8'	64° 33' 21.672"
23	46° 44' 48.8241"	117° 05' 44.5065"	180+00	2,562.2'	244° 34' 37.225"

1. EXISTING RUNWAY LATITUDE, LONGITUDE, & ELEVATION FROM FAA PUBLICATIONS.
2. TRUE BEARINGS DETERMINED USING GEO83 PROGRAM.

FUTURE RUNWAY DATA

RUNWAY	LENGTH	WIDTH	HIGH POINT STA/ELEV	LOW POINT STA/ELEV	EFF. GRAD.	SURFACE	STRENGTH
5/23	8,000'	150'	100+00 2564.8	136+23 2540.0	1.4%	ASPHALT (GROOVED)	SNGL 92,500# DUAL 149,000# DUAL TANDEM 275,500# DBL DUAL TANDEM 621,000#

1. LENGTHS DETERMINED USING LAT/LONGS IN GEO83 PROGRAM.
2. PAVEMENT STRENGTH AS CALCULATED USING FAA FAARFIELD

FUTURE RUNWAY DESIGN STANDARDS

RUNWAY END	RUNWAY PROTECTION ZONE	SAFETY AREA		OBJECT FREE AREA		OBSTACLE FREE ZONE	
		LENGTH*	WIDTH	LENGTH*	WIDTH	LENGTH*	WIDTH
5	1,000' x 1,750' x 2,500'	1,000'	500'	1,000'	800'	200'	400'
23	1,000' x 1,510' x 1,700'						

* LENGTH BEYOND RUNWAY END. SURFACE EXTENDS FULL RUNWAY LENGTH.

FUTURE APPENDIX 2 SURFACES

RUNWAY END	CAT.	DIMENSIONS	DISTANCE FROM RUNWAY END	SLOPE
5	9	800' x 3,800' x 10,000'	200'	34:1
23	8	800' x 3,800' x 10,000'	200'	20:1
5/23	11	1,000' x 6,466' x 10,200'	0	40:1
5/23	12	600' x 21,273' x 12,000', CONTINUE 28,727' TO 50,000'	0	62.5:1

* PULLMAN-MOSCOW RGNL DEPARTURE PROCEDURE APPLIES TO BOTH RUNWAY ENDS.

FUTURE TAXIWAY DATA

TAXIWAY	WIDTH (ARC)*	LENGTH	TSA	TOFA
"A"	75' (ADG IV)	8,000'	171'	259'
"B"	75' (ADG IV)	580'	171'	259'
"C"	50' (ADG III)	1,000'	118'	186'

* ARC-AIRPORT REFERENCE CODE. DESIGN AIRCRAFT DESIGNATED BY:
WINGSPAN: III AT LEAST 79 FEET, LESS THAN 118 FEET.
IV AT LEAST 118 FEET, LESS THAN 171 FEET.
TAXIWAY WIDTH: III 50 FEET.
IV 75 FEET.

DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

AIRPORT DATA SHEET

Mead & Hunt

FINAL

Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 4 OF 15

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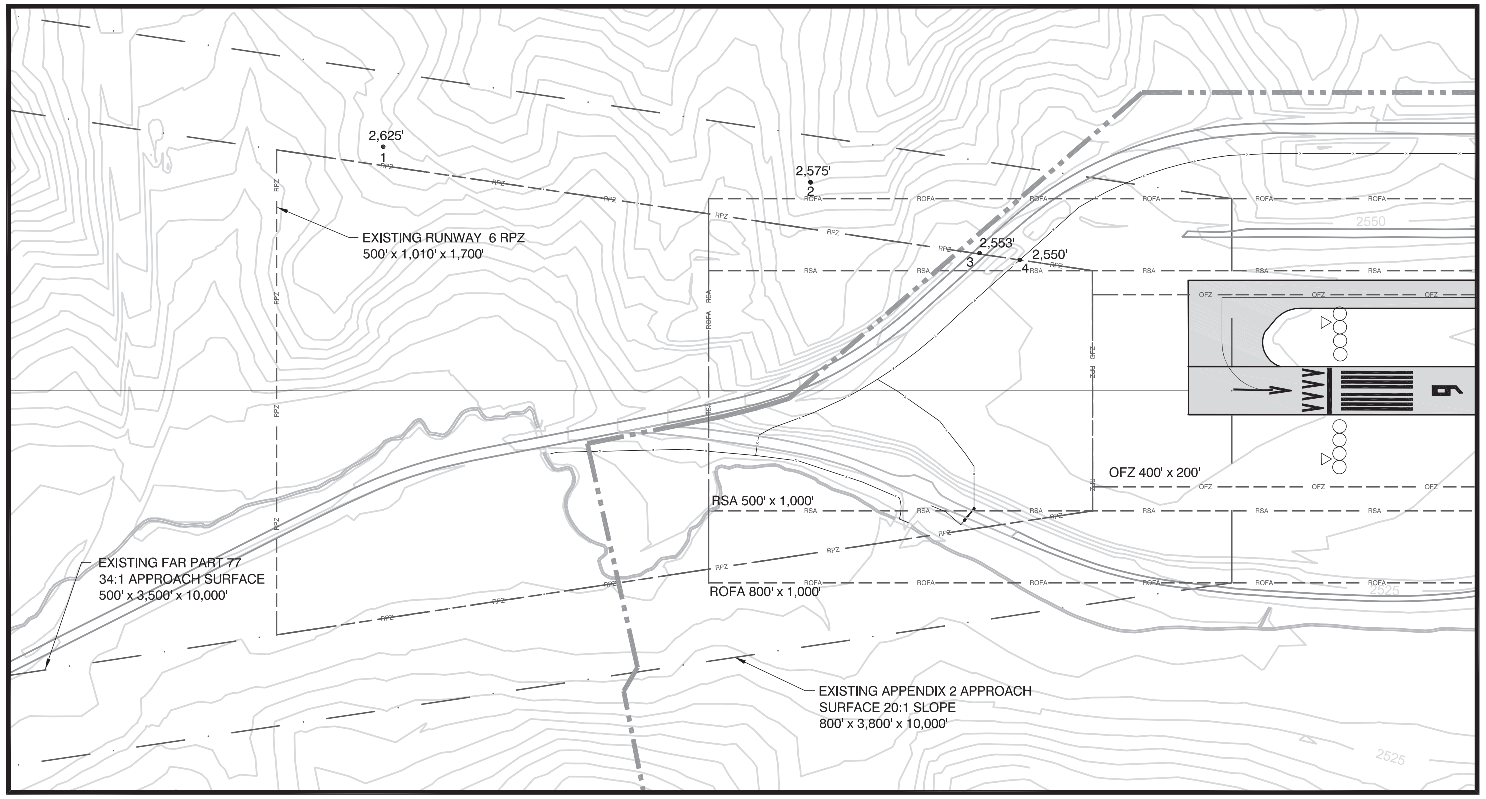
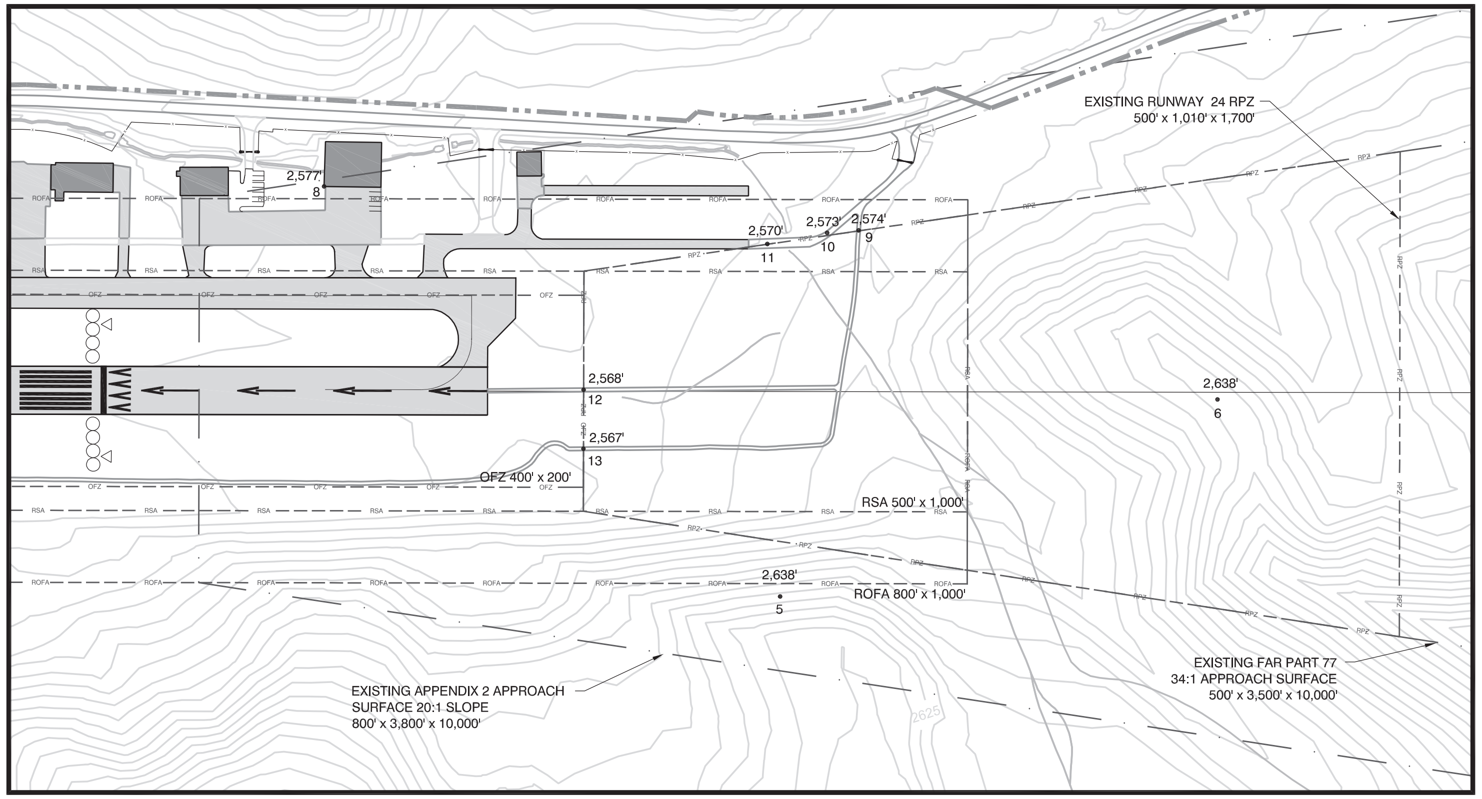
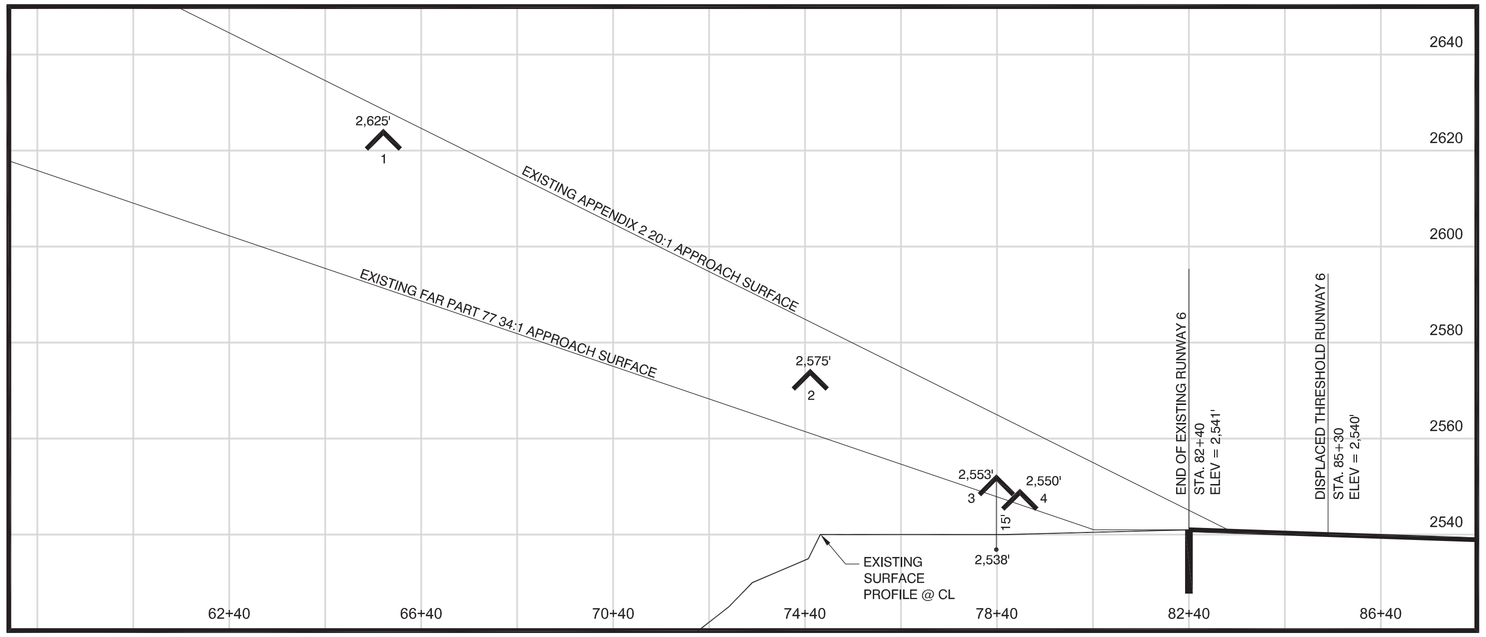


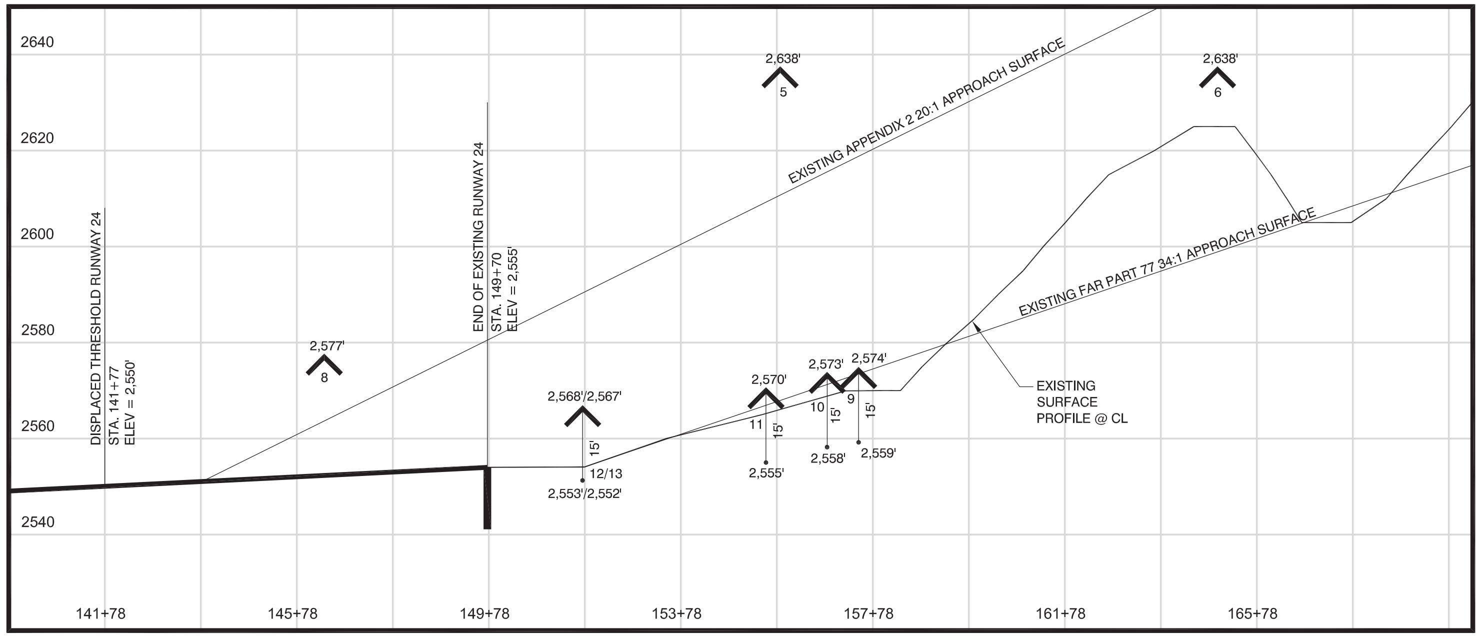
EXISTING RUNWAY END 6 - PLAN



EXISTING RUNWAY END 24 - PLAN



EXISTING RUNWAY END 6 - PROFILE



EXISTING RUNWAY END 24 - PROFILE

EXISTING	LEGEND	FUTURE
— — —	AIRPORT PROPERTY LINE	— · · · —
▭	PAVEMENT	
▬	BUILDINGS	☒
✵	AIRPORT REFERENCE POINT (ARP)	✸
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
⚑	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□ □ □ □	PRECISION APPROACH PATH INDICATOR (PAPI)	■ ■ ■ ■
— 16' BRL — 35' BRL —	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — RSA — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
—— · ——	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

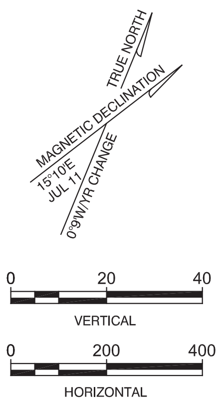
PT	RUNWAY 6 - OBSTRUCTIONS	ELEVATION*	DISPOSITION
1	TREE - 34' PENETRATION OF 34:1 APPROACH SURFACE	2,625'	TO REMAIN
2	TERRAIN - 17' PENETRATION OF 34:1 APPROACH SURFACE	2,575'	TO REMAIN
3	ROAD - 4' PENETRATION OF 34:1 APPROACH SURFACE	2,553'	TO REMAIN
4	FENCE - 4' PENETRATION OF 34:1 APPROACH SURFACE	2,550'	TO REMAIN

SOURCE: 2006 PUW MASTER PLAN UPDATE PHASE I SURVEY DATA AND OBSTRUCTION DATA SHEET, MAY 1993

PT	RUNWAY 24 - OBSTRUCTIONS	ELEVATION*	DISPOSITION
5	HAZARD LIGHT - 28' PENETRATION OF 20:1 APPROACH SURFACE	2,638'	TO REMAIN
6	HAZARD LIGHT - 39' PENETRATION OF 34:1 APPROACH SURFACE	2,638'	TO REMAIN
7	HAZARD LIGHT - 22' PENETRATION OF 34:1 APPROACH SURFACE	2,592'	TO REMAIN
8	BUILDING - 14' PENETRATION OF 20:1 APPROACH SURFACE	2,577'	TO REMAIN
9	ROAD - 1' PENETRATION OF 34:1 APPROACH SURFACE	2,574'	TO REMAIN
10	ROAD - 2' PENETRATION OF 34:1 APPROACH SURFACE	2,573'	TO REMAIN
11	ROAD - 3' PENETRATION OF 34:1 APPROACH SURFACE	2,570'	TO REMAIN
12	ROAD - 12' PENETRATION OF 34:1 APPROACH SURFACE	2,568'	TO REMAIN
13	ROAD - 11' PENETRATION OF 34:1 APPROACH SURFACE	2,567'	TO REMAIN

SOURCE: 2006 PUW MASTER PLAN UPDATE PHASE I SURVEY DATA AND OBSTRUCTION DATA SHEET, MAY 1993

* ALL ELEVATIONS REPRESENT TOP TOP OF OBSTRUCTION.



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

EXISTING RWY 6/24 INNER-APPROACH PLAN

Mead & Hunt

FINAL

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DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 5 OF 15

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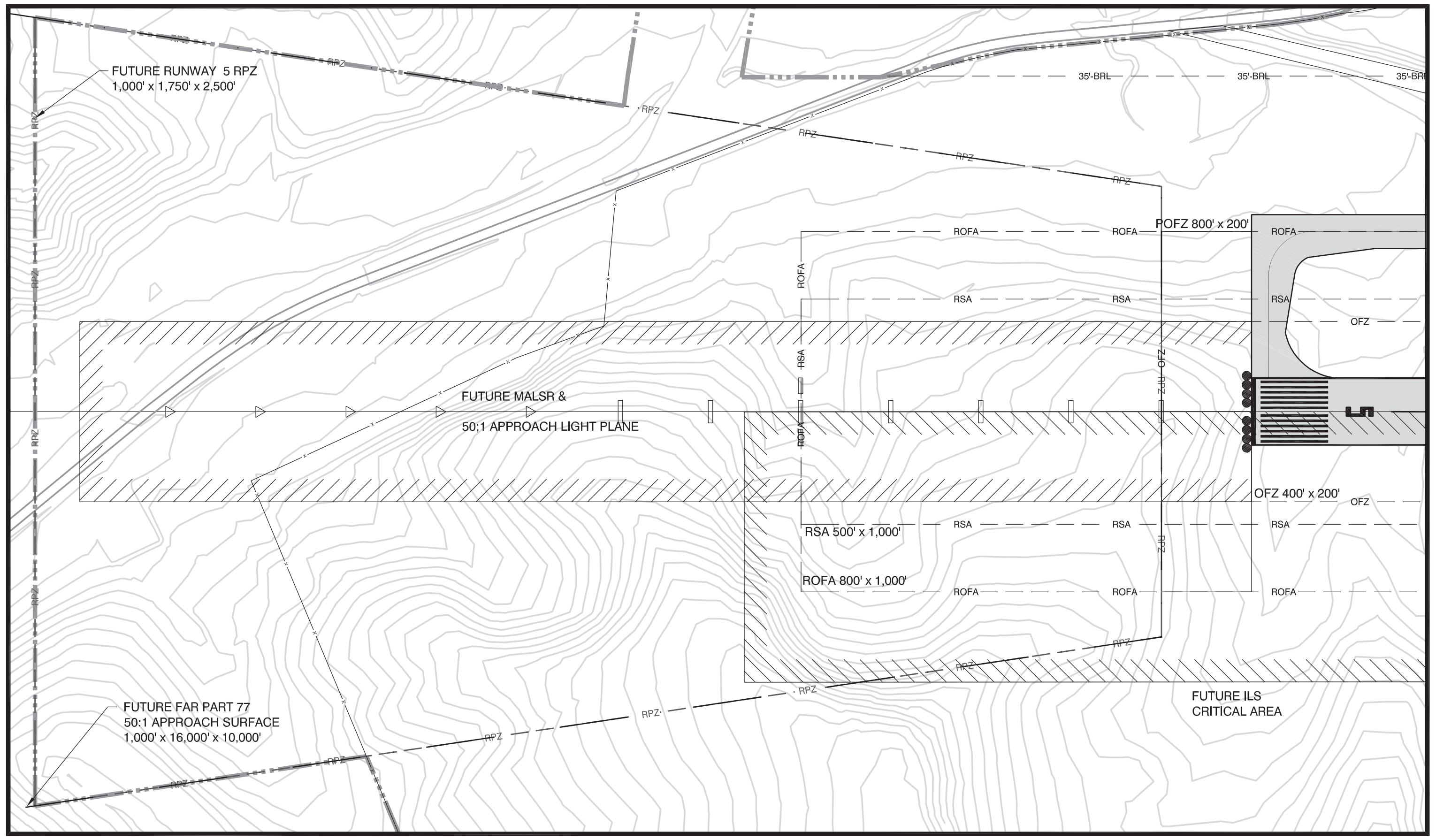
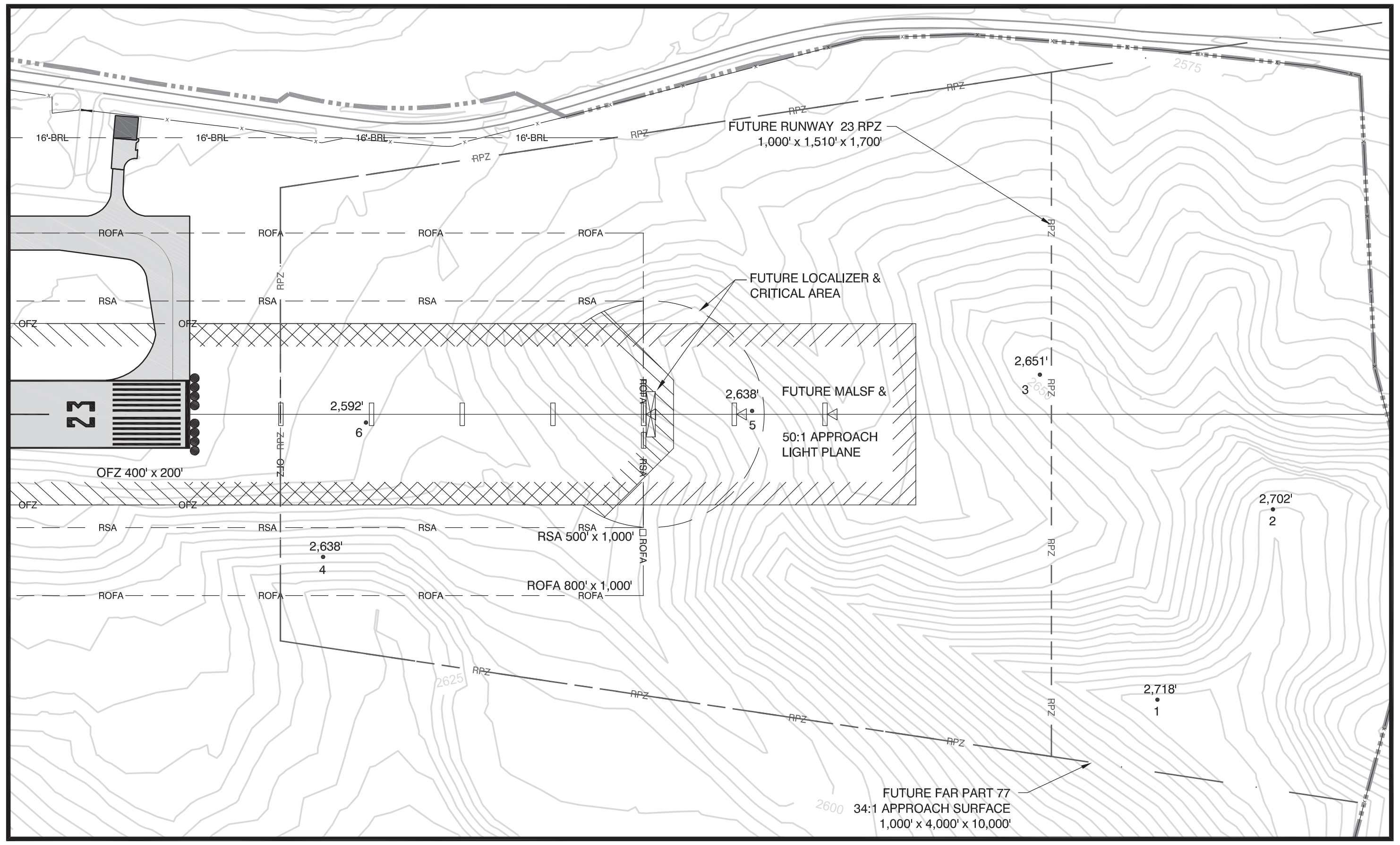
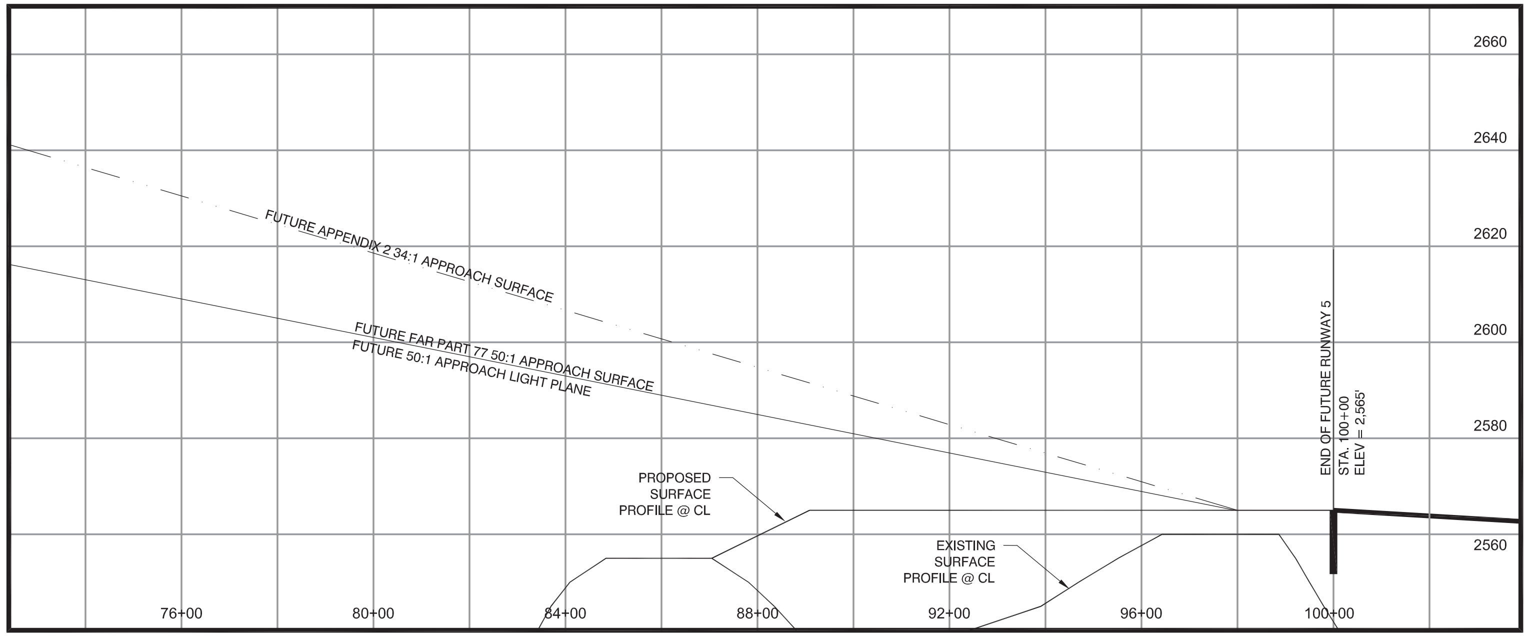


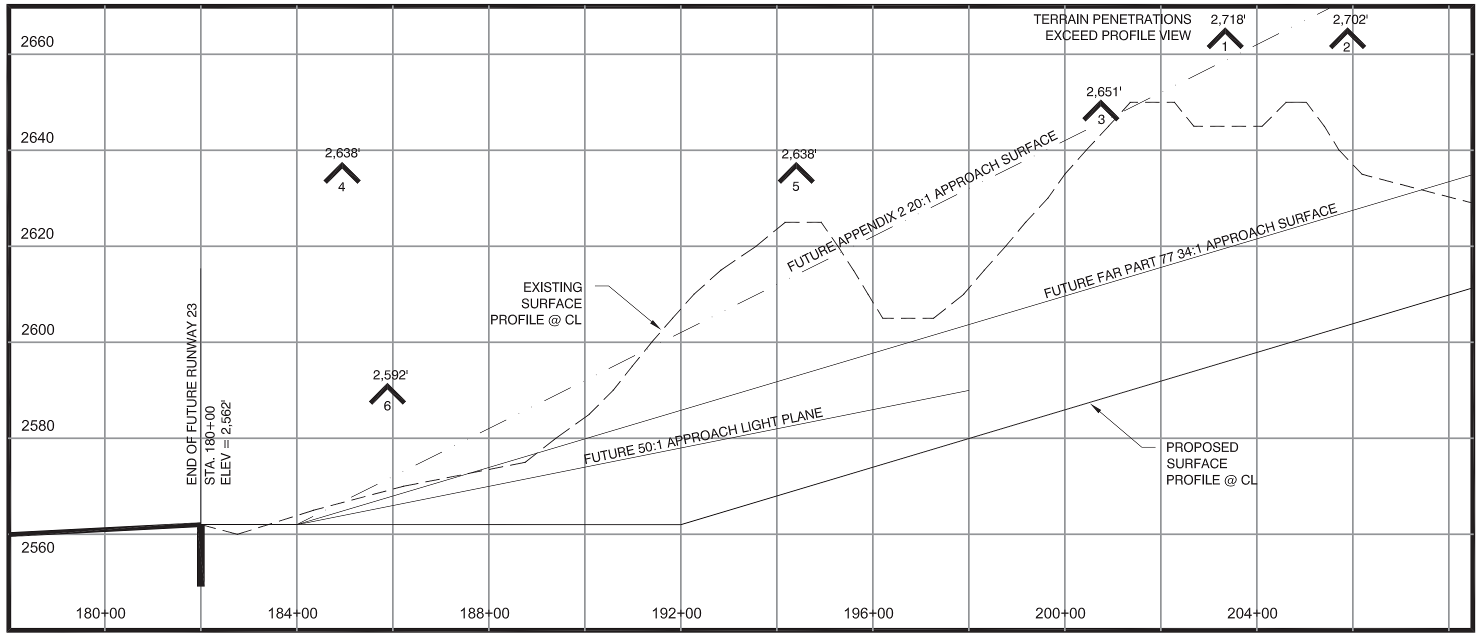
FUTURE RUNWAY END 5 - PLAN



FUTURE RUNWAY END 23 - PLAN



FUTURE RUNWAY END 5 - PROFILE

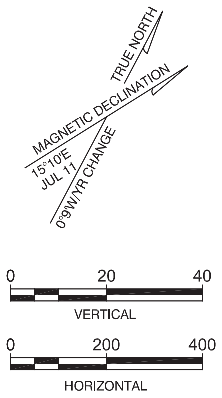


FUTURE RUNWAY END 23 - PROFILE

EXISTING	LEGEND	FUTURE
━	AIRPORT PROPERTY LINE	━
▭	PAVEMENT	
▬	BUILDINGS	☒
✡	AIRPORT REFERENCE POINT (ARP)	✸
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
⚐	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□ □ □ □	PRECISION APPROACH PATH INDICATOR (PAPI)	■ ■ ■ ■
—16' BRL — 35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — — RSA — — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — — — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — — — — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — — — — — — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

PT	RUNWAY 23 - OBSTRUCTIONS	ELEVATION	DISPOSITION
1	HAZARD LIGHT - 59' PENETRATION OF 20:1 APPROACH SURFACE	2,718'	TO BE REMOVED
2	HAZARD LIGHT - 31' PENETRATION OF 20:1 APPROACH SURFACE	2,702'	TO BE REMOVED
3	HAZARD LIGHT - 5' PENETRATION OF 20:1 APPROACH SURFACE	2,651'	TO BE REMOVED
4	HAZARD LIGHT - 71' PENETRATION OF 20:1 APPROACH SURFACE	2,638'	TO BE REMOVED
5	HAZARD LIGHT - 24' PENETRATION OF 20:1 APPROACH SURFACE	2,638'	TO BE REMOVED
6	HAZARD LIGHT - 21' PENETRATION OF 20:1 APPROACH SURFACE	2,592'	TO BE REMOVED

SOURCE: OBSTRUCTION DATA SHEET, MAY 1993



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

FUTURE RWY 5/23 INNER-APPROACH PLAN

Mead & Hunt

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DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 6 OF 15

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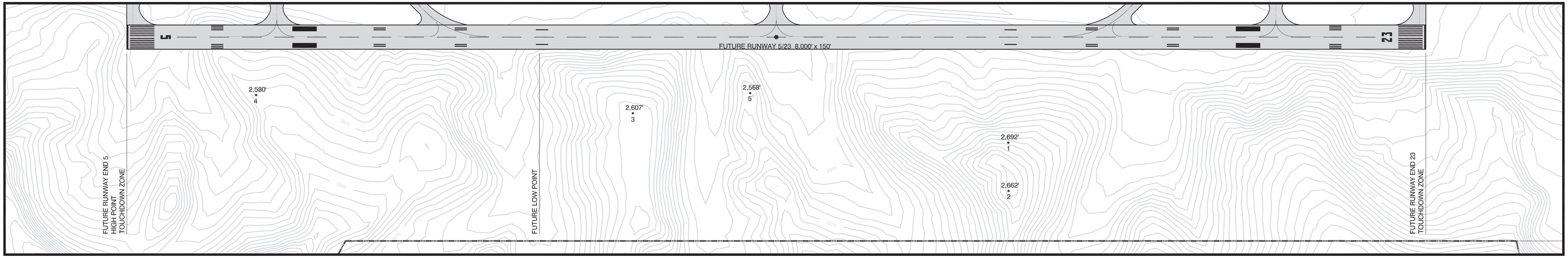
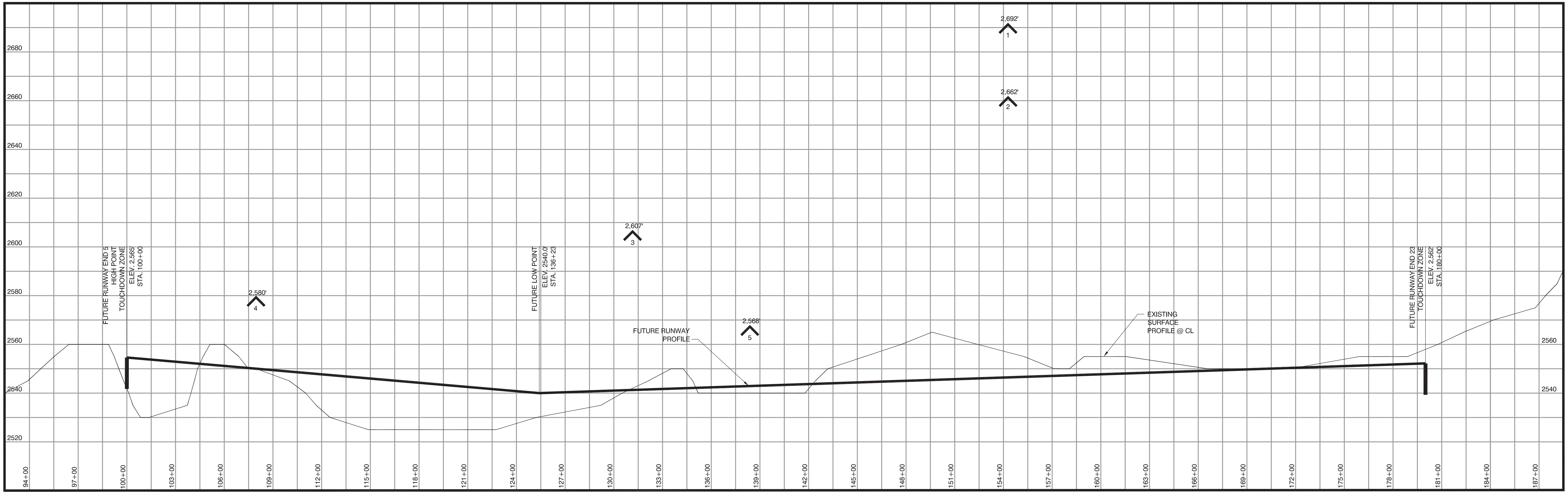


FUTURE RUNWAY 5/23 - PLAN

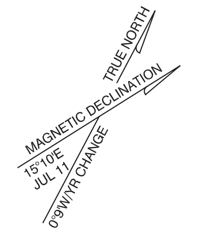


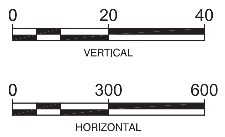
FUTURE RUNWAY 5/23 - PROFILE

EXISTING	LEGEND	FUTURE
— - - — - - —	AIRPORT PROPERTY LINE	— · · — · · —
▭	PAVEMENT	
■	BUILDINGS	⊠
☼	AIRPORT REFERENCE POINT (ARP)	✱
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
▣	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□□□□	PRECISION APPROACH PATH INDICATOR (PAPI)	■■■■
—16' BRL— —35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — — RSA — — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — — — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — — — — —	RUNWAY OBJECT FREE AREA (ROFA)	
- - - - - - - - TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
—— —— ——	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

PT	FUTURE RUNWAY 5/23 - OBSTRUCTIONS	ELEVATION	DISPOSITION
1	POLE - 124' PENETRATION OF 7:1 TRANSITIONAL SURFACE	2,692'	TO BE REMOVED
2	TERRAIN - 52' PENETRATION OF 7:1 TRANSITIONAL SURFACE	2,662'	TO BE REMOVED
3	TERRAIN - 66' PENETRATION OF FAR PART-77 PRIMARY SURFACE	2,607'	TO BE REMOVED
4	TERRAIN - 30' PENETRATION OF FAR PART-77 PRIMARY SURFACE	2,580'	TO BE REMOVED
5	TERRAIN - 25' PENETRATION OF FAR PART-77 PRIMARY SURFACE	2,568'	TO BE REMOVED

SOURCE: OBSTRUCTION DATA SHEET, MAY 1993





DATE	REVISION	SPONSOR	DATE

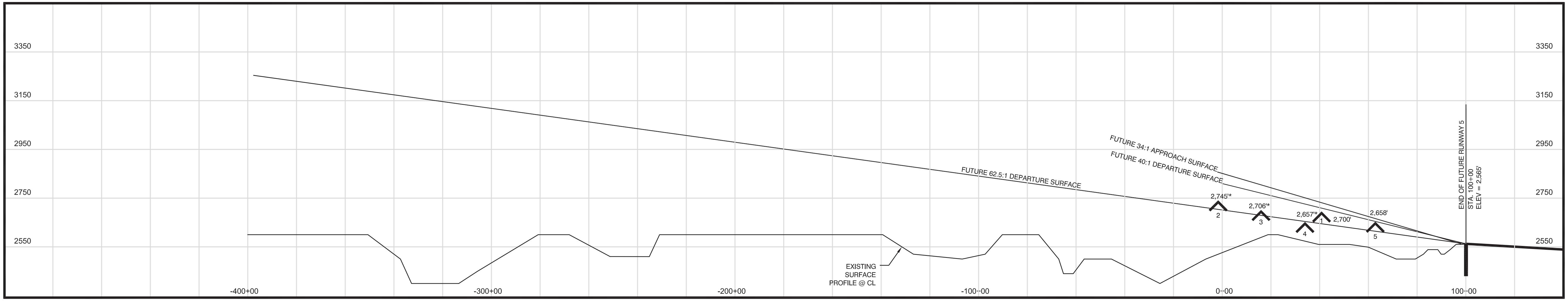
AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

FUTURE RUNWAY 5/23 - PLAN & PROFILE

Mead & Hunt FINAL Fly PUW

DESIGN: KTM DRAWN: ADC DATE: 01 FEBRUARY 2014 SHEET 7 OF 15

APPENDIX 2 SURFACES - FUTURE RUNWAY 5 - PLAN



APPENDIX 2 SURFACES - FUTURE RUNWAY 5 - PROFILE

EXISTING	LEGEND	FUTURE
— - - —	AIRPORT PROPERTY LINE	— - - — - - —
▭	PAVEMENT	
▬	BUILDINGS	☒
✧	AIRPORT REFERENCE POINT (ARP)	✸
◑	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
⚐	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□ □ □ □	PRECISION APPROACH PATH INDICATOR (PAPI)	■ ■ ■ ■
—16' BRL — 35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — — — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — — RSA — — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — — — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — — — — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — — — — — — — — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
——— · ———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

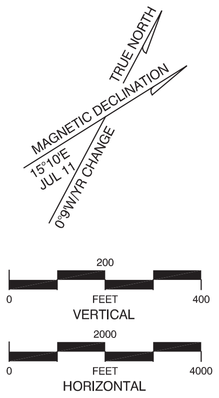
PT	FUTURE RUNWAY 5 - OBSTRUCTIONS	ELEVATION	34:1 SURFACE	40:1 SURFACE	62.5:1 SURFACE
1	ANTENNA - PENETRATES 62.5:1 SURFACE	2,700'	CLEAR	CLEAR	55'
2	ANTENNA - PENETRATES 62.5:1 SURFACE	2,745'*	CLEAR	CLEAR	46'
3	TANK - PENETRATES 62.5:1 SURFACE	2,706'*	CLEAR	CLEAR	27'
4	POLE - PENETRATES 62.5:1 SURFACE	2,657'*	CLEAR	CLEAR	1'
5	TREE - PENETRATES 62.5:1 SURFACE	2,658'	CLEAR	3'	44'

SOURCE: OBSTRUCTION DATA SHEET, MAY 1993

FUTURE APPENDIX 2 SURFACES

RUNWAY END	CAT.		DISTANCE FROM RUNWAY END	SLOPE
5	9	800' x 3,800' x 10,000'	200'	34:1
23	8	800' x 3,800' x 10,000'	200'	20:1
5/23	11	1,000' x 6,466' x 10,200'	0	40:1
5/23	12	600' x 21,273' x 12,000', CONTINUE 28,727' TO 50,000'	0	62.5:1

* PULLMAN-MOSCOW RGNL DEPARTURE PROCEDURE APPLIES TO BOTH RUNWAY ENDS.



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

FUTURE RUNWAY 5 - APP 2 SURFACES

Mead & Hunt

FINAL

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DESIGN: KTM	DRAWN: ADC	DATE: 01 FEBRUARY 2014	SHEET 8 OF 15

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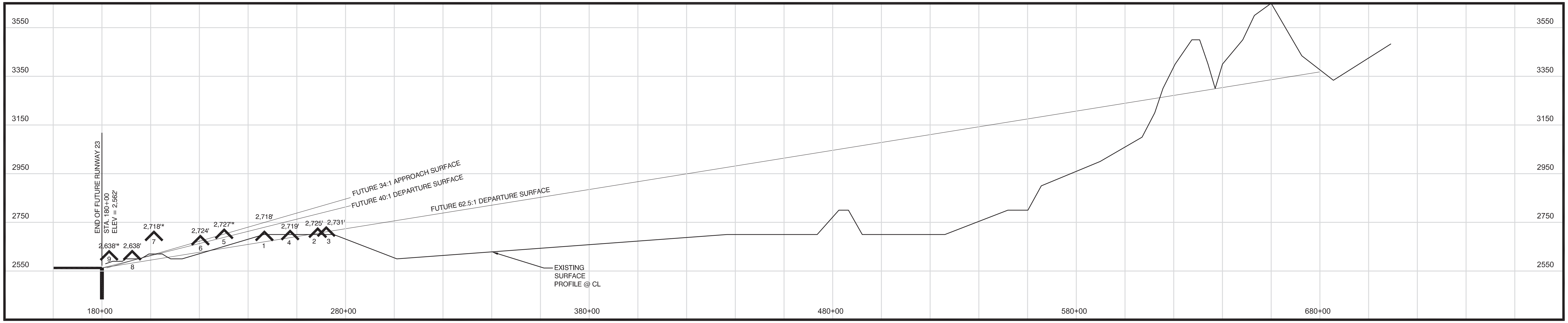
APPENDIX 2 SURFACES - FUTURE RUNWAY 23 - PLAN



APPENDIX 2 SURFACES - FUTURE RUNWAY 23 - PROFILE

EXISTING	LEGEND	FUTURE
— — - - — —	AIRPORT PROPERTY LINE	— - - - — - - - —
▭	PAVEMENT	
▬	BUILDINGS	☒
✡	AIRPORT REFERENCE POINT (ARP)	✸
◕	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
⚐	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□ □ □ □	PRECISION APPROACH PATH INDICATOR (PAPI)	■ ■ ■ ■
—16' BRL — 35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — — — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — — RSA — — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — — — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — — — — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — — — — — — — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
——— · ———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

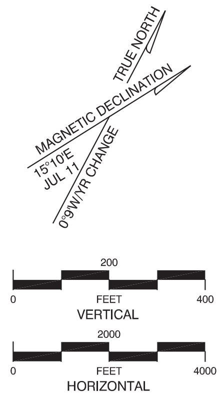
PT	RUNWAY 23 - OBSTRUCTIONS	ELEVATION	34:1 SURFACE	40:1 SURFACE	62.5:1 SURFACE
1	TERRAIN - PENETRATES 62.5:1 SURFACE	2,718'	CLEAR	CLEAR	48'
2	TERRAIN - PENETRATES 62.5:1 SURFACE	2,725'	CLEAR	CLEAR	24'
3	TERRAIN - PENETRATES 62.5:1 SURFACE	2,731'	CLEAR	CLEAR	20'
4	TERRAIN - PENETRATES 62.5:1 SURFACE	2,719'	CLEAR	CLEAR	32'
5	TERRAIN - PENETRATES 34:1 SURFACE	2,727'*	25'	40'	84'
6	HAZARD LIGHT - PENETRATES 34:1 SURFACE	2,724'	27'	36'	72'
7	HAZARD LIGHT - PENETRATES 62.5:1 SURFACE	2,718'*	100'	102'	121'
8	HAZARD LIGHT - PENETRATES 62.5:1 SURFACE	2,638'	45'	44'	56'
9	HAZARD LIGHT - PENETRATES 62.5:1 SURFACE	2,638'*	73'	68'	71'
10	TERRAIN - PENETRATES 62.5:1 SURFACE	4,235'	CLEAR	CLEAR	627'

SOURCE: OBSTRUCTION DATA SHEET, MAY 1993

FUTURE APPENDIX 2 SURFACES

RUNWAY END	CAT.	DIMENSIONS	DISTANCE FROM RUNWAY END	SLOPE
5	9	800' x 3,800' x 10,000'	200'	34:1
23	8	800' x 3,800' x 10,000'	200'	20:1
5/23	11	1,000' x 6,466' x 10,200'	0	40:1
5/23	12	600' x 21,273' x 12,000', CONTINUE 28,727' TO 50,000'	0	62.5:1

* PULLMAN-MOSCOW RGNL DEPARTURE PROCEDURE APPLIES TO BOTH RUNWAY ENDS.



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

FUTURE RUNWAY 23 - APP 2 SURFACES

Mead & Hunt   FINAL   Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 9 OF 15

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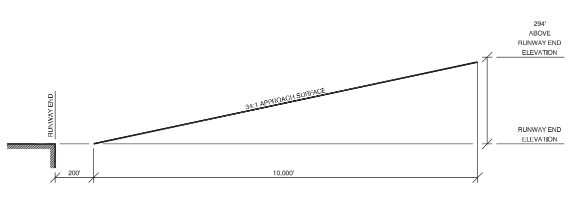
OBSTRUCTION TABLE		
PT	DESCRIPTION	TOP ELEV.
1	TOP OF TANK	2,752'
2	TREE	2,744'
3	TOP OF POLE	2,726'
4	ANTENNA	2,722'
5	VENT ON TANK	2,717'
6	TREE	2,763'
7	POLE	2,718'
8	TERRAIN	2,703'
9	TERRAIN	2,712'
10	TERRAIN	2,711'
11	TERRAIN	2,713'
12	TERRAIN	2,722'
13	TERRAIN	2,714'
14	TERRAIN	2,715'
15	TERRAIN	2,720'
16	BUILDING	2,733'
17	TERRAIN	2,718'
18	TERRAIN	2,721'
19	TERRAIN	2,715'
20	TERRAIN	2,721'
21	TERRAIN	2,710'
22	TERRAIN	2,707'
23	TERRAIN	2,711'
24	TERRAIN	2,711'
25	TERRAIN	2,727'
26	TERRAIN	2,713'
27	TERRAIN	2,736'
28	TERRAIN	2,715'
29	TERRAIN	2,723'
30	TERRAIN	2,713'
31	TERRAIN	2,719'

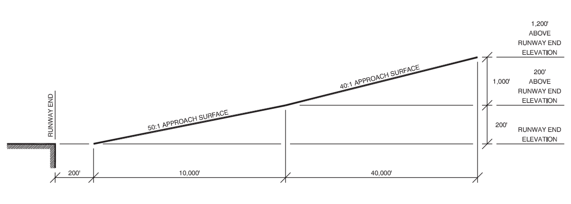
SOURCE: OBSTRUCTION DATA
SHEET, MAY 1993

CONTINUED - SEE SHEET 11



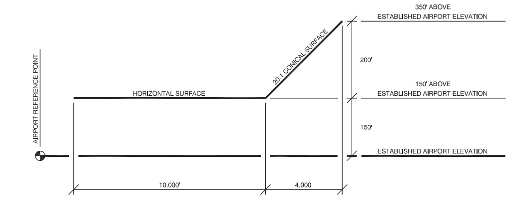
34:1 NON-PRECISION APPROACH SURFACE

NO SCALE



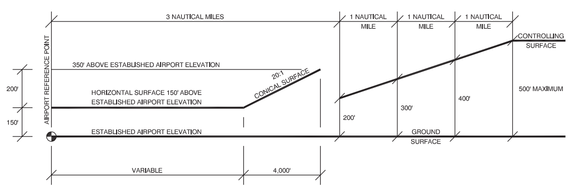
50:1 PRECISION APPROACH SURFACE

NO SCALE



HORIZONTAL AND CONICAL SURFACES

NO SCALE



HORIZONTAL, CONICAL AND CIRCLING SURFACES

NO SCALE

GENERAL NOTES

APPROACH SURFACE TO PAVED RUNWAY END BEGINS 200' BEYOND RUNWAY END.

ANY HEIGHT WITHIN A TERMINAL OBSTACLE CLEARANCE AREA, INCLUDING AN INITIAL APPROACH SEGMENT, A DEPARTURE AREA, AND A CIRCLING APPROACH AREA, WHICH WOULD RESULT IN THE VERTICAL DISTANCE BETWEEN ANY POINT ON THE OBJECT AND AN ESTABLISHED MINIMUM INSTRUMENT FLIGHT ALTITUDE WITHIN THAT AREA OR SEGMENT TO BE LESS THAN THE REQUIRED OBSTACLE CLEARANCE IS AN OBSTRUCTION TO AIR NAVIGATION.

SEE INNER-PORTION OF THE APPROACH PLAN VIEW FOR CLOSE-IN OBSTRUCTIONS.

DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

AIRPORT FAR PART 77 AIRSPACE DRAWING

Mead & Hunt FINAL Fly PUW

DESIGN: KTM DRAWN: ADC DATE: 01 FEBRUARY 2014 SHEET 10 OF 15

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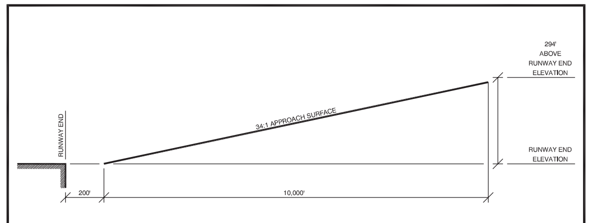
X:\16223-00\08001\Tech\CADD\ALP\Sheets\S-PULLMAN-11-Future Airspace Plan.dwg   Feb 03, 2014 - 8:57am

OBSTRUCTION TABLE

POINT #, DESCRIPTION, & TOP ELEVATION		

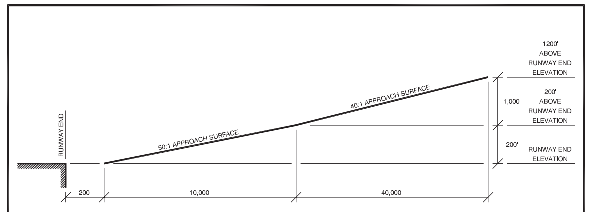
SOURCE: OBSTRUCTION DATA SHEET,
MAY 1993

CONTINUED: SEE SHEET 10



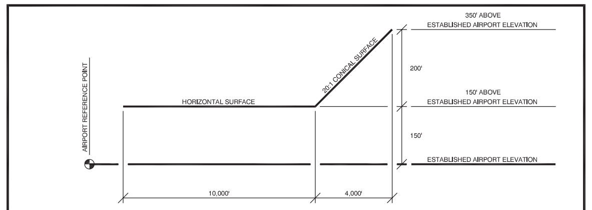
34:1 NON-PRECISION APPROACH SURFACE

NO SCALE



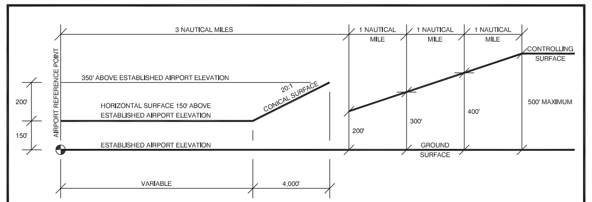
50:1 PRECISION APPROACH SURFACE

NO SCALE



HORIZONTAL AND CONICAL SURFACES

NO SCALE



HORIZONTAL, CONICAL AND CIRCLING SURFACES

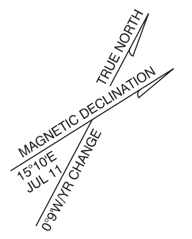
NO SCALE

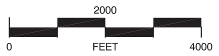
GENERAL NOTES

APPROACH SURFACE TO PAVED RUNWAY END BEGINS 200' BEYOND RUNWAY END.

ANY HEIGHT WITHIN A TERMINAL OBSTACLE CLEARANCE AREA, INCLUDING AN INITIAL APPROACH SEGMENT, A DEPARTURE AREA, AND A CIRCLING APPROACH AREA, WHICH WOULD RESULT IN THE VERTICAL DISTANCE BETWEEN ANY POINT ON THE OBJECT AND AN ESTABLISHED MINIMUM INSTRUMENT FLIGHT ALTITUDE WITHIN THAT AREA OR SEGMENT TO BE LESS THAN THE REQUIRED OBSTACLE CLEARANCE IS AN OBSTRUCTION TO AIR NAVIGATION.

SEE INNER-PORTION OF THE APPROACH PLAN VIEW FOR CLOSE-IN OBSTRUCTIONS.





DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

AIRPORT FAR PART 77 AIRSPACE DRAWING

Mead & Hunt   FINAL   Fly PUW

DESIGN: KTM	DRAWN: ADC	DATE: 01 FEBRUARY 2014	SHEET 11 OF 15

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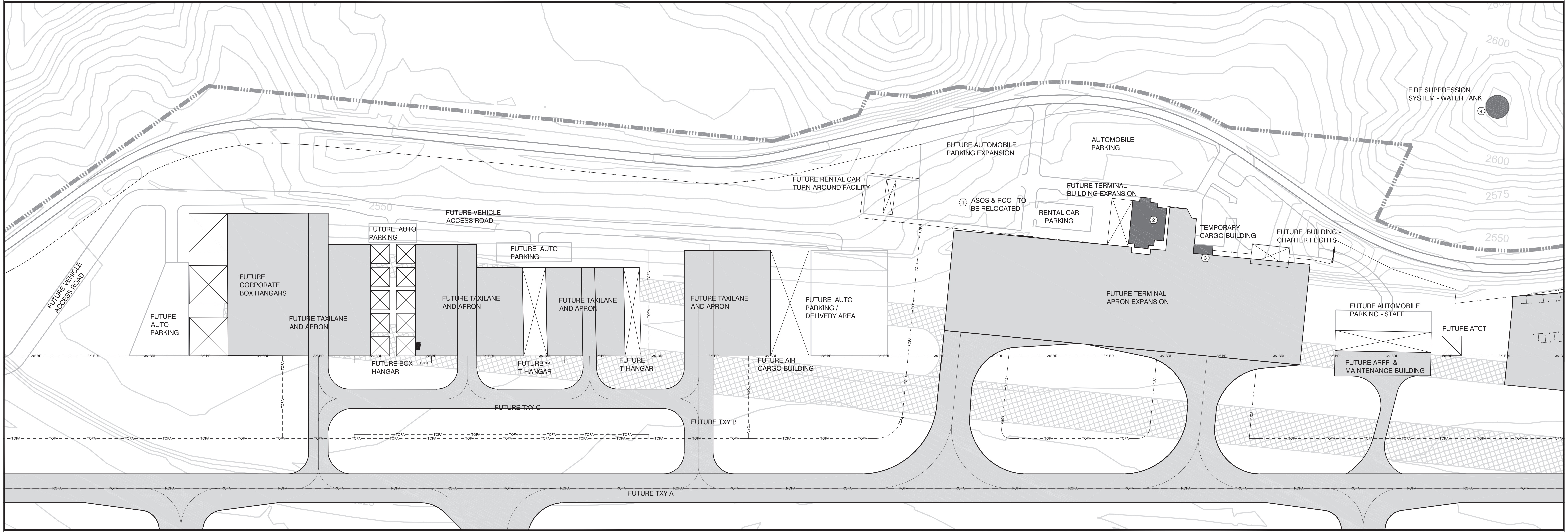
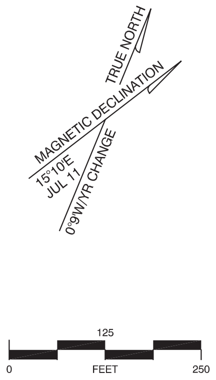


EXISTING	LEGEND	FUTURE
— - —	AIRPORT PROPERTY LINE	- · - · -
▭	PAVEMENT	
▬	BUILDINGS	☒
☼	AIRPORT REFERENCE POINT (ARP)	✸
◐	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
🄿	WIND CONE	
○	WEATHER OBSERVATION (ASOS)	●
□□□□	PRECISION APPROACH PATH INDICATOR (PAPI)	■■■■
—16' BRL— —35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — RSA — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — —	RUNWAY PROTECTION ZONE (RPZ)	
—ROFA— — —	RUNWAY OBJECT FREE AREA (ROFA)	
- - - - - TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
————	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

BUILDING TABLE

BUILDING NUMBER	BUILDING TYPE	OBJECT ELEVATION
①	ASOS (OBST-LT)	2,573'
②	TERMINAL BUILDING	2,563'
③	TEMPORARY CARGO BUILDING	2,551'
④	FIRE SUPPRESSION SYSTEM TANK	UKN

SOURCE: PUW 2006 MASTER PLAN UPDATE PHASE I SURVEY



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

TERMINAL AREA PLAN-WEST

Mead & Hunt FINAL Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 12 OF 15

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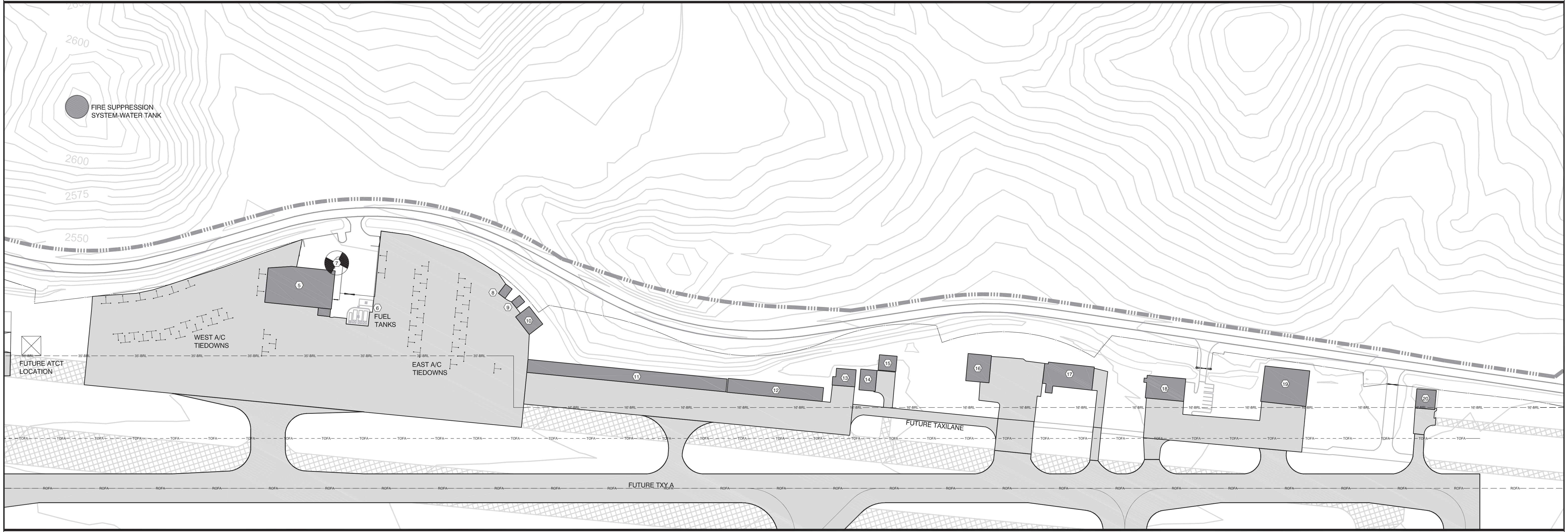
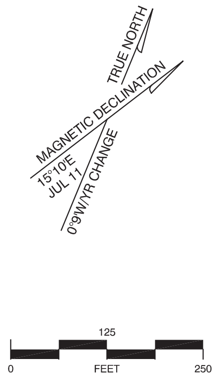


EXISTING	LEGEND	FUTURE
— - - —	AIRPORT PROPERTY LINE	— · · · — · · · —
▭	PAVEMENT	
▬	BUILDINGS	☒
✡	AIRPORT REFERENCE POINT (ARP)	✹
◐	ROTATING BEACON	
△ △	RUNWAY END IDENTIFIER LIGHTS (REIL)	▲ ▲
○○○○	THRESHOLD LIGHTS	●●●●
⚐	WIND CONE	
⬡	WEATHER OBSERVATION (ASOS)	⬢
□ □ □ □	PRECISION APPROACH PATH INDICATOR (PAPI)	■ ■ ■ ■
—16' BRL — 35' BRL—	16' OR 35' BUILDING RESTRICTION LINE (BRL)	
— — — — OFZ — —	RUNWAY OBSTACLE FREE ZONE (OFZ)	
— — — RSA — — —	RUNWAY SAFETY AREA (RSA)	
— — RPZ — — — —	RUNWAY PROTECTION ZONE (RPZ)	
— ROFA — — — — — —	RUNWAY OBJECT FREE AREA (ROFA)	
— — — — — — — — — TOFA —	TAXIWAY OBJECT FREE AREA (TOFA)	
——— · ———	FAR PART 77 SURFACE	
	ITEMS TO BE REMOVED	▨

BUILDING TABLE

BUILDING NUMBER	BUILDING TYPE	OBJECT ELEVATION
⑤	FIXED BASE OPERATOR (FBO)	2,562'
⑥	FUEL TANKS	UNKN
⑦	ROTATING BEACON	2,592'
⑧	AUTO WASH SHED	2,552'
⑨	AUTO WASH SHED	2,552'
⑩	MAINTENANCE BUILDING	2,564'
⑪	T-HANGAR	2,553'
⑫	T-HANGAR	2,556'
⑬	BOX HANGAR	2,559'
⑭	BOX HANGAR	2,557'
⑮	BOX HANGAR	2,563'
⑯	BOX HANGAR	2,571'
⑰	BOX HANGAR	2,573'
⑱	BOX HANGAR	2,573'
⑲	BOX HANGAR (OBS-LT)	2,578'
⑳	BOX HANGAR (OBS-LT)	2,579'

SOURCE: PUW 2006 MASTER PLAN UPDATE PHASE I SURVEY



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

TERMINAL AREA PLAN-EAST

Mead & Hunt   FINAL   Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 13 OF 15

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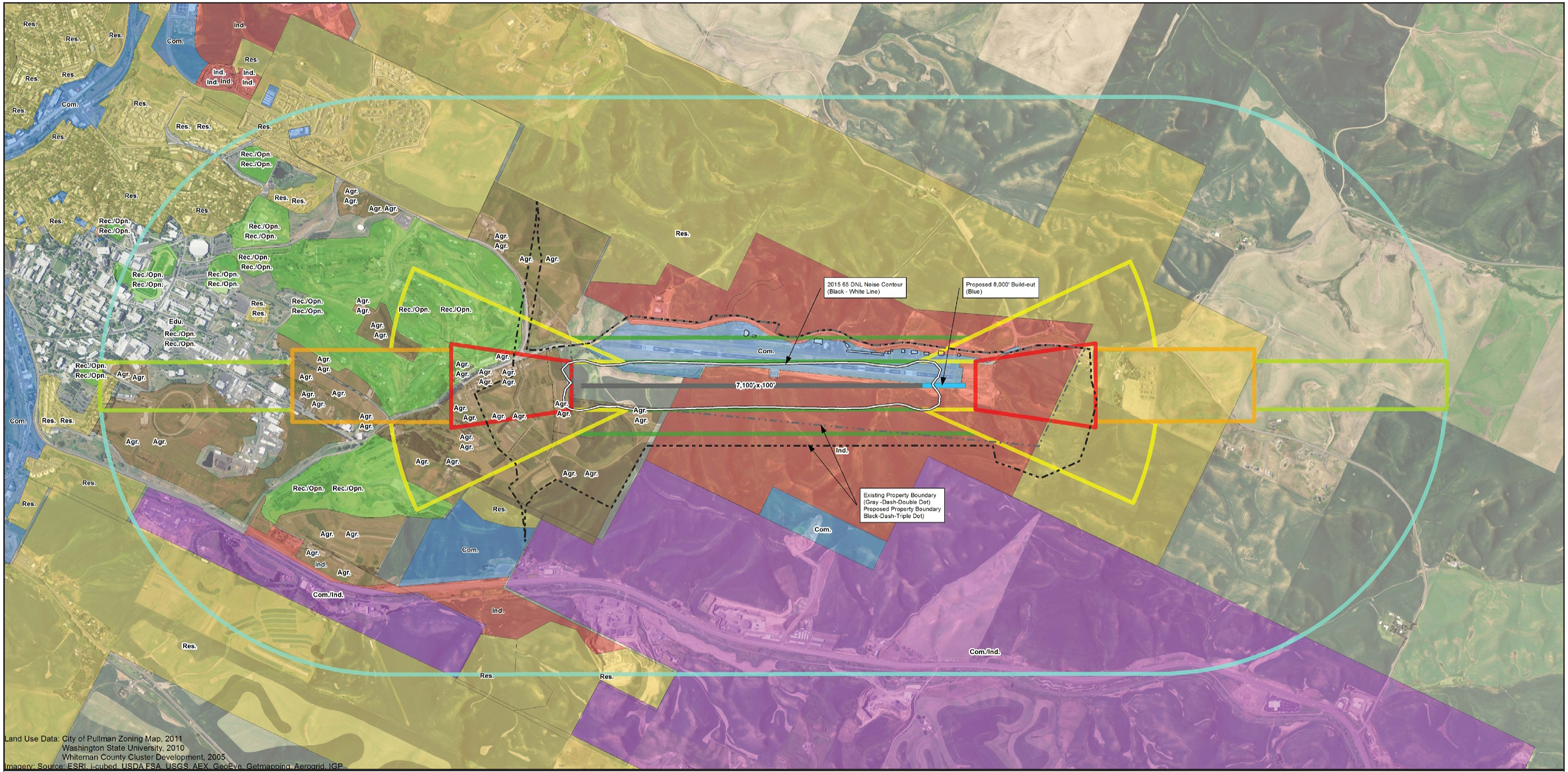


Land Use Data: City of Pullman Zoning Map, 2011
Washington State University, 2010
Whiteman County Cluster Development, 2005
Imagery: Source: ESRI, i-cubed, USDA FSA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGP

AIRPORT SAFETY COMPATIBILITY ZONE CRITERIA

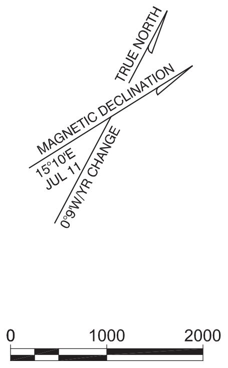
🟥	ZONE 1: LOCATED DIRECTLY OFF EACH RUNWAY END	AIRPORT OWNERSHIP OF PROPERTY ENCOURAGED. PROHIBIT ALL NEW STRUCTURES. PROHIBIT RESIDENTIAL LAND USES. AVOID NONRESIDENTIAL USES EXCEPT IF VERY LOW DENSITIES TO THE SIDES & OUTER END OF THE AREA.
🟧	ZONE 2: INNER APPROACH AND DEPARTURE ZONE	PROHIBIT RESIDENTIAL USES EXCEPT ON LARGE, AGRICULTURAL PARCELS. PROHIBIT SCHOOLS, DAY CARE CENTERS, HOSPITALS, NURSING HOMES. PROHIBIT HAZARDOUS USES (e.g. ABOVE GROUND FUEL STORAGE). LIMIT NONRESIDENTIAL ACTIVITIES (UNACCEPTABLE USES EXAMPLES: SHOPPING CENTERS, RESTAURANTS, THEATERS, MULTI-STORY OFFICE BUILDINGS)
🟨	ZONE 3: INNER TURNING ZONE	PROHIBIT SCHOOLS, LARGE DAYCARE CENTERS, HOSPITALS, NURSING HOMES. AVOID HAZARDOUS USES (e.g. ABOVE GROUND FUEL STORAGE). AVOID NONRESIDENTIAL USES HAVING MODERATE OR HIGH DENSITY USES (e.g. MAJOR SHOPPING CENTERS, RESTAURANTS, THEATER.).
🟩	ZONE 4: OUTER APPROACH AND DEPARTURE ZONE	PROHIBIT SCHOOLS, LARGE DAYCARE CENTERS, HOSPITALS, NURSING HOMES. LIMIT NONRESIDENTIAL USES AS IN ZONE 3. IN UNDEVELOPED AREAS, LIMIT RESIDENTIAL USES TO VERY LOW DENSITIES.
🟩	ZONE 5: SIDELINE ZONE	PROHIBIT SCHOOLS, LARGE DAYCARE CENTERS, HOSPITALS, NURSING HOMES. AVOID RESIDENTIAL USES UNLESS AIRPORT RELATED. LIMIT NONRESIDENTIAL USES AS IN ZONE 3, BUT WITH SLIGHTLY HIGHER DENSITIES. ALLOW ALL COMMON AVIATION RELATED ACTIVITIES PROVIDED THAT HEIGHT-LIMIT CRITERIA ARE MET.
🟦	ZONE 6: TRAFFIC PATTERN ZONE	PROHIBIT OUTDOOR STADIUMS AND SIMILAR USES WITH VERY HIGH DENSITIES. AVOID SCHOOLS, LARGE DAYCARE CENTERS, HOSPITALS, NURSING HOMES. ALLOW RESIDENTIAL USES AND MOST NONRESIDENTIAL USES.

SOURCE: 2011 WSDOT AIRPORT AND LAND USE COMPATIBILITY GUIDEBOOK

LAND USE

🟫	Agr.	AGRICULTURAL
🟦	Com.	COMMERCIAL
🟪	Com./Ind.	COMMERCIAL/INDUSTRIAL
⬜	Edu.	EDUCATIONAL
🟥	Ind.	INDUSTRIAL
🟩	Rec./Opn.	RECREATION/OPEN SPACE
🟨	Res.	RESIDENTIAL

NOTES
1. AIRPORT SAFETY COMPATIBILITY ZONES (ASCZ) ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY.
2. ASCZ'S ARE BASED ON WASHINGTON DEPARTMENT OF TRANSPORTATION DEPARTMENT OF AERONAUTICS LAND-USE GUIDEBOOK RECOMMENDATIONS AND ARE NOT LEGALLY ENFORCEABLE BY WSDOT OR THE FEDERAL AVIATION ADMINISTRATION (FAA).
3. ASCZ'S ARE PROVIDED IN THE CURRENT AIRPORT MASTER PLAN UPDATE AS RECOMMENDATIONS TO UPDATE THE CURRENT ZONING CODE.



DATE	REVISION	SPONSOR	DATE

AIRPORT LAYOUT PLAN
PULLMAN MOSCOW REGIONAL AIRPORT
PULLMAN, WASHINGTON

LAND USE DRAWING

Mead & Hunt FINAL Fly PUW

DESIGN: KTM | DRAWN: ADC | DATE: 01 FEBRUARY 2014 | SHEET 14 OF 15

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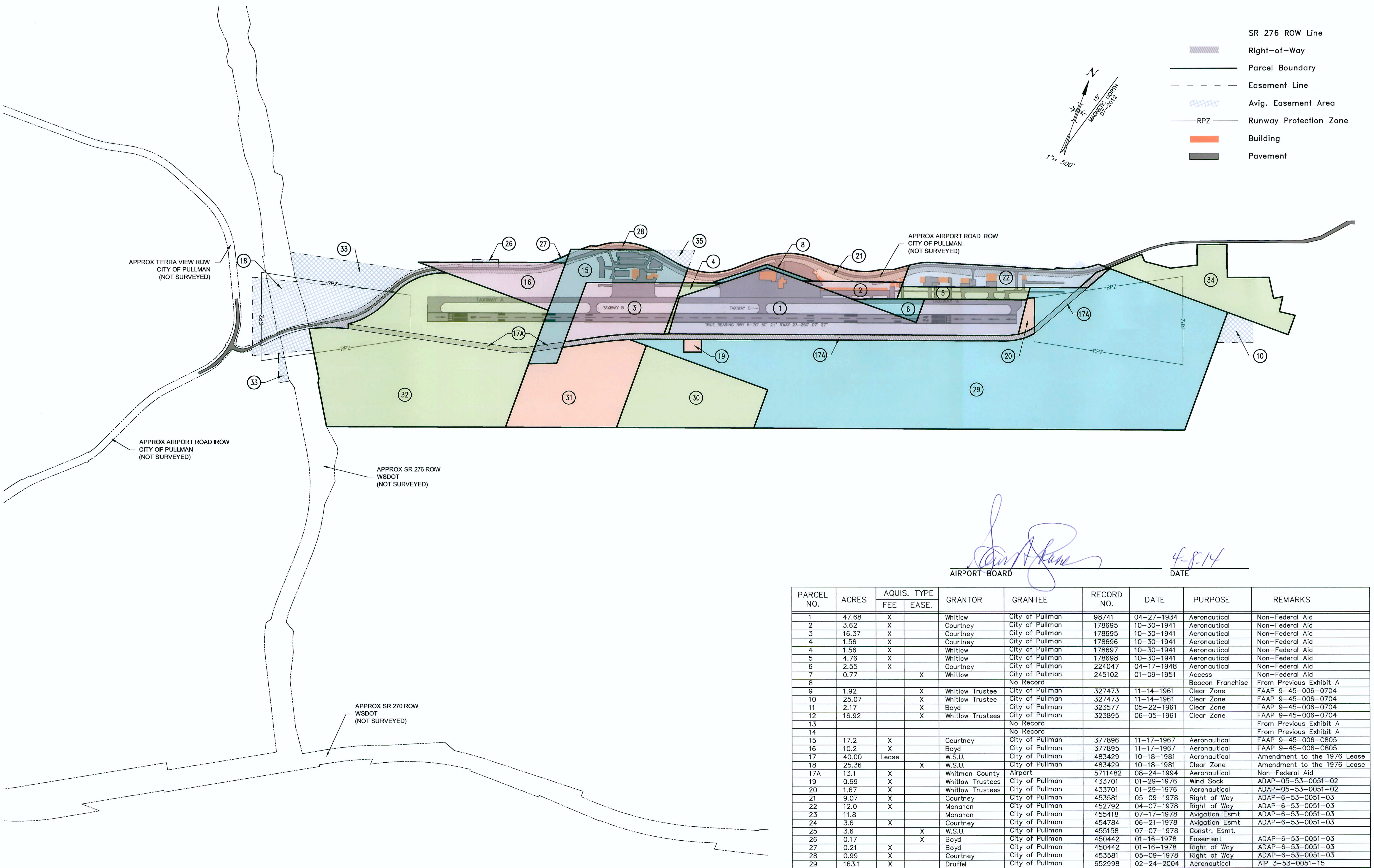


AIRPORT BOARD

4-8-14
DATE

PARCEL NO.	ACRES	AQUIS. TYPE		GRANTOR	GRANTEE	RECORD NO.	DATE	PURPOSE	REMARKS
		FEE	EASE.						
1	47.68	X		Whitlow	City of Pullman	98741	04-27-1934	Aeronautical	Non-Federal Aid
2	3.62	X		Courtney	City of Pullman	178695	10-30-1941	Aeronautical	Non-Federal Aid
3	16.37	X		Courtney	City of Pullman	178695	10-30-1941	Aeronautical	Non-Federal Aid
4	1.56	X		Courtney	City of Pullman	178696	10-30-1941	Aeronautical	Non-Federal Aid
4	1.56	X		Whitlow	City of Pullman	178697	10-30-1941	Aeronautical	Non-Federal Aid
5	4.76	X		Whitlow	City of Pullman	178698	10-30-1941	Aeronautical	Non-Federal Aid
6	2.55	X		Courtney	City of Pullman	224047	04-17-1948	Aeronautical	Non-Federal Aid
7	0.77		X	Whitlow	City of Pullman	245102	01-09-1951	Access	Non-Federal Aid
8					No Record			Beacon Franchise	From Previous Exhibit A
9	1.92		X	Whitlow Trustee	City of Pullman	327473	11-14-1961	Clear Zone	FAAP 9-45-006-0704
10	25.07		X	Whitlow Trustee	City of Pullman	327473	11-14-1961	Clear Zone	FAAP 9-45-006-0704
11	2.17		X	Boyd	City of Pullman	323577	05-22-1961	Clear Zone	FAAP 9-45-006-0704
12	16.92		X	Whitlow Trustees	City of Pullman	323895	06-05-1961	Clear Zone	FAAP 9-45-006-0704
13					No Record				From Previous Exhibit A
14					No Record				From Previous Exhibit A
15	17.2	X		Courtney	City of Pullman	377896	11-17-1967	Aeronautical	FAAP 9-45-006-C805
16	10.2	X		Boyd	City of Pullman	377895	11-17-1967	Aeronautical	FAAP 9-45-006-C805
17	40.00	Lease		W.S.U.	City of Pullman	483429	10-18-1981	Aeronautical	Amendment to the 1976 Lease
18	25.36		X	W.S.U.	City of Pullman	483429	10-18-1981	Clear Zone	Amendment to the 1976 Lease
17A	13.1	X		Whitman County	Airport	5711482	08-24-1994	Aeronautical	Non-Federal Aid
19	0.69	X		Whitlow Trustees	City of Pullman	433701	01-29-1976	Wind Sock	ADAP-05-53-0051-02
20	1.67	X		Whitlow Trustees	City of Pullman	433701	01-29-1976	Aeronautical	ADAP-05-53-0051-02
21	9.07	X		Courtney	City of Pullman	453581	05-09-1978	Right of Way	ADAP-6-53-0051-03
22	12.0	X		Monahan	City of Pullman	452792	04-07-1978	Right of Way	ADAP-6-53-0051-03
23	11.8			Monahan	City of Pullman	455418	07-17-1978	Avigation Esmt	ADAP-6-53-0051-03
24	3.6	X		Courtney	City of Pullman	454784	06-21-1978	Avigation Esmt	ADAP-6-53-0051-03
25	3.6		X	W.S.U.	City of Pullman	455158	07-07-1978	Constr. Esmt.	
26	0.17		X	Boyd	City of Pullman	450442	01-16-1978	Easement	ADAP-6-53-0051-03
27	0.21	X		Boyd	City of Pullman	450442	01-16-1978	Right of Way	ADAP-6-53-0051-03
28	0.99	X		Courtney	City of Pullman	453581	05-09-1978	Right of Way	ADAP-6-53-0051-03
29	163.1	X		Druffel	City of Pullman	652998	02-24-2004	Aeronautical	AIP 3-53-0051-15
30	25.7	X		Keith Kopf	City of Pullman	652997	02-24-2004	Aeronautical	AIP 3-53-0051-22
31	28	X		Keith Kopf	City of Pullman	717097	04-19-2013	Aeronautical	AIP 3-53-0051-19
32	82	X		W.S.U.	City of Pullman	655779	06-16-2004	Aeronautical	AIP 3-53-0051-19
33	20.5		X	W.S.U.	City of Pullman	722494	02-05-2014	RPZ	AIP 3-53-0051-19
34	18.51±	X		BOYD	City of Pullman	702411	12-14-2012	Aeronautical	AIP 3-53-0051-35
*	2.918	Lease		Druffel	USA (FAA)	614718	01-15-1999	MLS Runway 23	DTFA11-98-L-17222
35	1.184		X	Keith Kopf	City of Pullman	722299	01-23-2014	Avigation Esmt	

NOTES:

1. Parcel 12 was part of a 500'x 2000' clear zone easement off the old west end of the runway in the SE 1/4 of Section 34. It was included in the the Parcel 17 lease obtained for the 1968 runway extension project.

2. Parcel 13 is believed to be the remainder of the 500'x 2000' clear zone easement located in the NE 1/4 of Section 34 which also became included in the Parcel 17 lease.

3. Parcel 14 is believed to be remainder of the 500'x 2000' clear zone easement located in West 1/2 of Section 35 and included in the Parcel 15 purchase.

4. Parcel 17 was a lease obtained in 1967 for FAAP 9-15-006-7011 and amended in 1981 to allow extension of lease term to 2007. This lease parcel was included in the Parcel 32 Fee Purchase.

Date Created: 8/31/2012 \\CDAFILES\PUBLIC\PROJECTS\JUB\PULLMAN-MOSCOW REGIONAL AIRPORT\PUW - GENERAL SERVICES\EXHIBIT A\EXIHBIT A - 2014.DWG

J-U-B
J-U-B ENGINEERS, INC.

J-U-B ENGINEERS, INC.
W. 422 Riverside Ave.
Suite 304
Spokane, WA 99201
Phone: 509.458.3727
Fax: 509.458.3762
www.jub.com

REVISION			
NO.	DESCRIPTION	BY APR.	DATE

EXHIBIT A - AIRPORT PROPERTY MAP
PULLMAN-MOSCOW REGIONAL AIRPORT

In Part of Section 34, 35, & 36, T51N, R45E, W.M.
CITY OF PULLMAN
WHITMAN COUNTY, WASHINGTON

FILE : EXIHBIT A - 2014
JUB PROJ. # : PUW
DRAWN BY: BSN
DESIGN BY:
CHECKED BY:
ONE INCH
AT FULL SIZE, IF NOT ONE INCH, SCALE ACCORDINGLY
LAST UPDATED: 3/31/2014

SHEET NUMBER:
1

Technical Memorandum

To: Deepa Parashar, Planner
FAA Seattle Airports District Office
deepeka.parashar@faa.gov
(425) 227-1654

From: Kevin Mulcaster, AICP
Mead & Hunt
Kevin.Mulcaster@meadhunt.com
(503) 278-9944

Date: July 17, 2013

Subject: *Pullman – Moscow Regional Airport (PUW)*
Pullman, Washington
Future Runway Protection Zone (RPZ) Road Exposure Analysis

Introduction

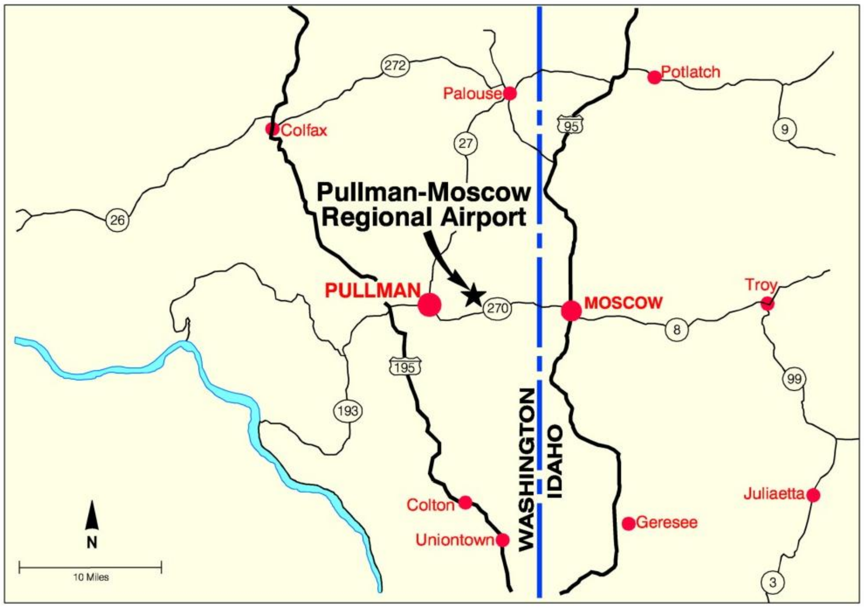
This memorandum is written to document and analyze alternatives for land uses within the future Runway Protection Zone (RPZ) associated with the proposed Runway Realignment Project at the Pullman-Moscow Regional Airport. It is organized into four main sections.

- *Section 1 – Existing Conditions:* describes the existing conditions at the airport.
- *Section 2 – Preferred Runway Alternative RPZ Analyses:* presents the incompatible land uses within the RPZ for the selected runway alignment (preferred alternative) and outlines the steps to be taken to eliminate or minimize such.
- *Section 3 – Technical Memorandum Recommendations Summary*

Section 1 – Existing Conditions

The Pullman – Moscow Regional Airport (PUW) is located in Whitman County, Washington near the Washington-Idaho border approximately 90 miles south of Spokane. It is approximately four miles northeast of Pullman, Washington and eight miles west of Moscow, Idaho (**Exhibit 1**).

Exhibit 1 – Location Map



The airport lies within the Palouse region (a part of the foothills of the Clearwater Mountains) which includes parts of five Washington counties and two Idaho counties. The topography is a unique landscape characterized by a rolling silt and sand, steep rock, and channeled scablands. There are three main characteristics found in the Palouse. The rocky areas of the Palouse are on the easternmost border of the region and are forested, steep-sloped and mountainous. To the east and west are buttes ranging in altitude from 2,500 to 4,000 feet. Surrounding these buttes are rolling hills.

The City of Pullman is located in Whitman County between Lewiston, Idaho (30 minutes to the south), Spokane, Washington (90 minutes to the north), and Moscow, Idaho (10 minutes to the east) on the rolling hills of the Palouse. The City of Pullman is home to Washington State University (WSU). Since its inception in 1890, WSU has virtually defined the city's growth and development patterns. Nearly 50 percent of land within the city limits is owned or controlled by the university. WSU's student, faculty, and staff population comprises about 58 percent of Pullman's total population which is 30,000.

The City of Moscow, Idaho is eight miles east of Pullman in Latah County, Idaho. Moscow's population is approximately 24,080. Moscow is also a university town, as it is home to the University of Idaho (UI). UI students, faculty, and staff comprise about 59 percent of Moscow's total population.

Pullman-Moscow Regional Airport (PUW) is situated within the city limits of Pullman, Washington, and is a Federal Aviation Regulation (FAR) Part 139 certified commercial service facility sponsored jointly by the

City of Pullman and the City of Moscow. PUW provides scheduled air carrier and general aviation services to the residents of and visitors to Pullman (Washington), Moscow (Idaho), and other nearby communities in Whitman and Latah Counties. PUW is a non-towered airport and has one paved runway, currently designated Runway 6-24 (previously 5-23; changed summer 2012 due to magnetic variation), that is 6,731 feet long and 100 feet wide. Runway 6 has a 209 foot displaced threshold to meet 600-foot safety area standards for B-II, while Runway 24 has an 801 foot displaced threshold due to terrain penetrations of the approach surface. Both runways have RNAV GPS approaches, with minimums at 480 feet / 1 3/8 mile.

The Airport handles an average of 80 operations per day and has 71 based aircraft. Horizon Air began offering passenger service to and from PUW in 1982, just one year after it was founded in Seattle. Horizon Air currently provides five flights daily of direct and one-stop service to Seattle-Tacoma International Airport utilizing the Q-400 aircraft. The one-stop service includes a stop in Lewiston. Due to weather, PUW experiences approximately 124 cancellations or re-routing annually, with 80% occurring in the winter months. The Airport also serves some athletic charters for WSU, the Pacific 12 Conference (Pac-12), UI, and the Western Athletic Conference (WAC). Athletic charters range from Bombardier Q-400's to Boeing 737s and Airbus A319s. PUW captures approximately 40 operations annually from large turbojet charter aircraft and approximately 160 are redirected to Lewiston or Spokane due PUW's lack of all-weather reliability and runway length. PUW has based corporate jets including multiple Citation Xs and a Citation Sovereign. Both charters and corporate operators limit payload to accommodate available runway length at PUW.

PUW and the Federal Aviation Administration (FAA) Seattle Airports District Office have long-recognized the nonstandard conditions on the airfield at PUW, resulting from the introduction of larger commercial aircraft serving PUW. With the exception of a substandard 200-foot runway to taxiway separation, the Airport is currently designed to B-II standards, but the critical aircraft is C-III. Nearly all design standards are nonstandard for C-III. To address the situation, a conditional "Modification to Design Standards" from the FAA was granted in 2006 provided that PUW works toward a long-term solution to meet C-III design standards. The conditional permission allows C-III operations to continue under strict operational management rules which include suspension of all other aircraft movements when a C-III aircraft is in operation.

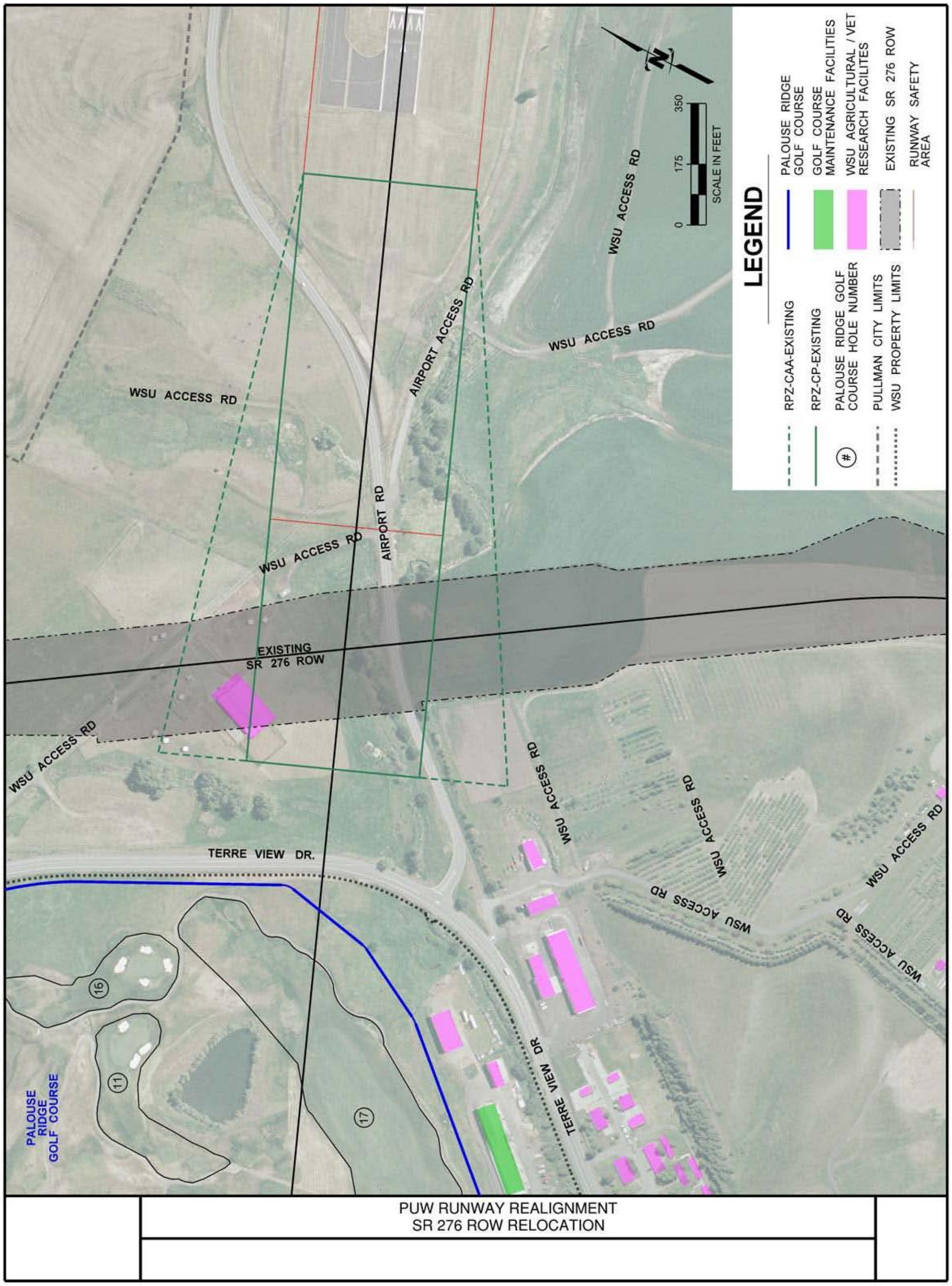
Existing Runway 6 RPZ Condition

Land uses within the existing Runway 6 RPZ include the existing SR 276 ROW, a portion of Airport Road (the only public access to the airport, with 3,000 Average Daily Traffic volume on this portion), an Airport access road, WSU access roads to agricultural research facilities (one equestrian barn staffed with 1-3 people per day, and WSU research orchards / fields whose caretaker numbers vary by season but is estimated to be no more than 20 per day). **Exhibit 2** and **Table 1** show the RPZ exposure, distance to runway end, and distance to landing threshold for each land use. The existing conditions would result in the construction of a limited access freeway (SR 276) and retain Airport Road and WSU access roads and facilities within the current RPZ.

Table 1: Existing RPZ Conditions Exposure

Land Uses	RPZ Central Portion	RPZ Controlled Activity Area	Distance to Runway End	Distance to Landing Threshold
Existing SR 276 ROW	3.7acres	2.9 acres	1,300’	1,590’
Airport Road and Airport Access Road	3.45 acres	0.05 acres	425’	715’
WSU Access Roads	0.5 acres	0.2 acres	400’	690’
WSU Agricultural Research Facilities	4.1 acres	2.2 acres	524’	818’
Palouse Ridge Golf Course	0 acres	0 acres	N/A	N/A
Total Exposure	**11.75 acres**	**5.35 acres**	**N/A**	**N/A**

Exhibit 2: Existing RPZ Conditions



Section 2 – Preferred Runway Alternative RPZ Analyses

Terra View Drive

Terra View Drive is a two lane arterial road that provides access from SR 270 to the Airport, WSU, and the northeast side of the City of Pullman. The portion in the future RPZ is the section between Terre View Drive and SR 270. This section provides direct business and truck access to the Airport and WSU without going through the WSU campus or residential sections of the City of Pullman. A 2013 traffic count shows the Average Daily Traffic (ADT) of 2,407 vehicles. More importantly, Terra View Drive provides critical links for police, fire, and medical emergency services. PUW is a Category III Airport under 14 CFR 107.3(f) and (g), and therefore cannot exceed a maximum law enforcement response time of 15 minutes. The Airport depends on this section of Terra View Drive to meet this requirement utilizing City of Pullman police coverage (current average response time is 12 minutes). Without this section of road, the airport would have to construct and man a police station at the airport.

While the Airport has an ARFF station and vehicles to meet Part 139 Index A requirements, these are first response only. Mutual aid is provided primarily by the City of Pullman, with secondary from Whitman County. The City's main fire resources come from the south side of Pullman and do not want to travel through the congested WSU campus to reach the Airport or northeast sides of Pullman and WSU (WSU contracts fire protection services from the City of Pullman). Without this section of Terra View Drive, the Insurance Standards Organization (ISO) ranking of fire protection for the City, Airport, and WSU could be downgraded due to increased response time. The result could be significant insurance coverage cost increases for the Airport, City, and WSU. As for medical response, the local area hospital is in Pullman, and closure of Terra View Drive would significantly increase time for emergency services to reach the hospital if an accident happened in the northeast part of town.

Closure of Terra View Drive is not considered feasible.

WSU Agricultural Research Facilities

WSU has 40 agricultural research buildings consisting of barns, research labs, and equipment storage within the footprint of the future RPZ, as well as research orchards, crops, and access roads to each. The vast majority of these facilities are in the Central Portion of the RPZ. All of these facilities will be relocated under the preferred runway alignment alternative. **Exhibit 3** illustrates the WSU facilities adjacent to the Airport, including the golf course below.

WSU Golf Course – The Palouse Ridge Golf Course

A portion of one hole, and the maintenance equipment storage building for this course, lies within the Controlled Activity Area of the future RPZ. On a busy day, approximately 220 players are spread over the entire course at any one time. Players actually within the RPZ at one time is no more than 4 because only the last portion of the fairway of Hole 17 is within the RPZ (the Tee box is not). The average number of people using the maintenance building ranges from 6-10 at peak periods which are early morning. The rest of the day that number is much lower.

The Palouse Ridge Golf Course on the campus of WSU opened in the fall of 2008. The course was designed to incorporate the rolling hills of the Palouse landscape and provides views of Washington, Idaho, and Oregon peaks and the surrounding farmlands.

The course was designed specifically for the unique property on which it was built. The design optimizes elevation changes to add complexity, strategic value, flexibility, flow and natural beauty unlike any other golf course and cannot be replicated.

This golf course was specifically designed to attract world class golfing events. Since its debut, the course has or is scheduled to host seven significant collegiate and amateur golf tournaments and has received national acclaim by consistently appearing and moving up the national rankings. Additional United States Golf Association (USGA), National Collegiate Athletic Association (NCAA), and potentially Professional Golf Association (PGA) or Ladies Professional Golf Association (LPGA) sponsored events are expected beyond 2015.

The Palouse Ridge Golf Course at WSU is a Certified Audubon Cooperative Sanctuary which helps golf courses protect the environment and preserve natural habitat and serves as a research and recreational outlet for WSU students and staff. WSU Turf Grass Management and Landscape Architecture programs utilize the golf course for research. The course was specifically designed to meet guidelines established by FAA and the US Department of Agriculture Wildlife Services to avoid the creation of wildlife attractants.

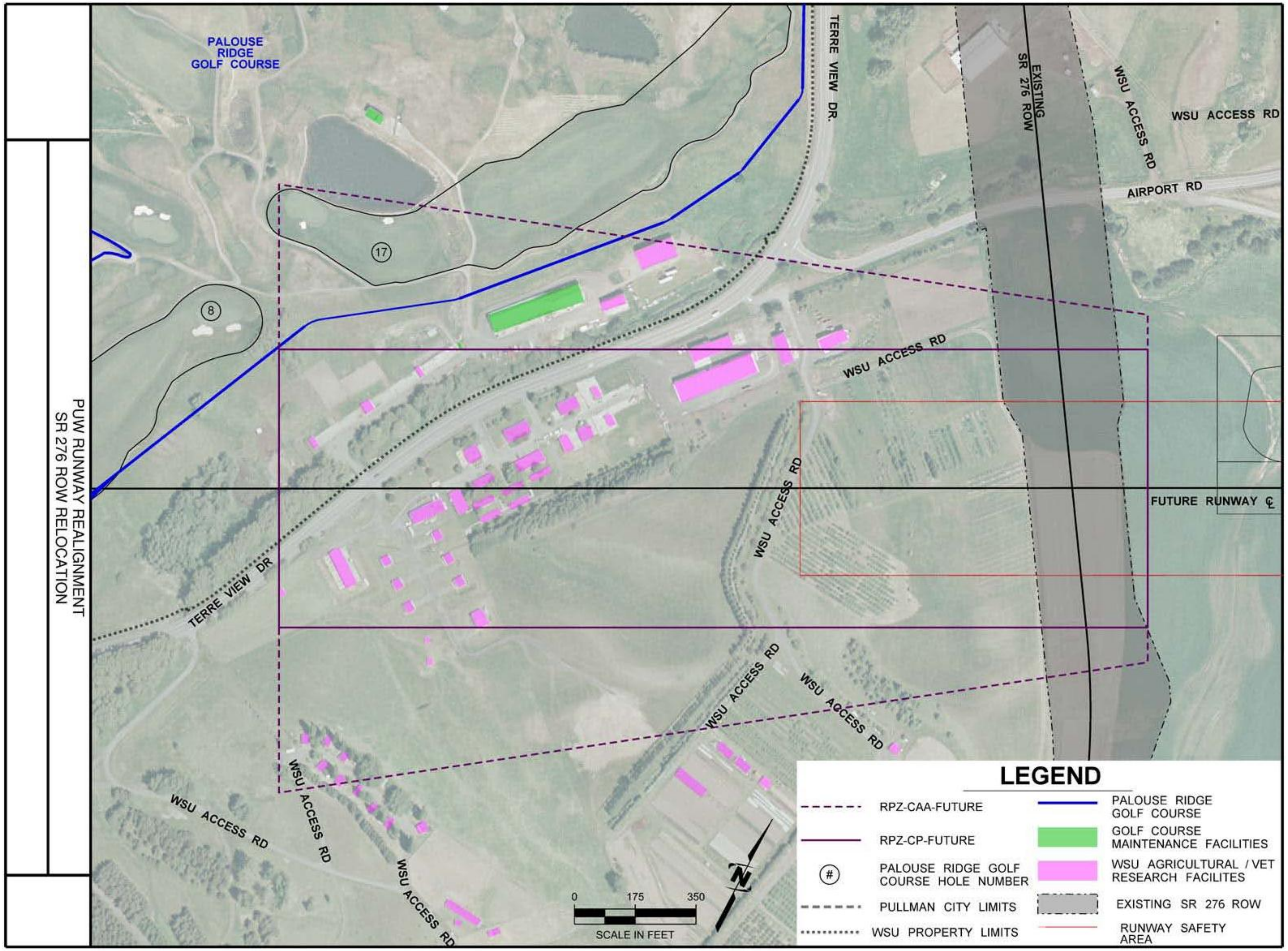
Should the golf course be impacted as a result of the runway realignment project, it would likely no longer be a nationally ranked course, and it could lose the ability to host NCAA, USGA, LPGA and PGA events. Losing the drawing power of the golf course would have negative economic impacts on the region due to the loss of visitors. It is expected that any impact to the golf course will require relocation of the entire golf course because modification is not feasible given the existing course layout, unique topography and nearby land uses. The limitation of land immediately adjacent to the golf course and the inability to maintain its character, integrity and national rankings make modification to the golf course an impractical alternative. The golf course is located “on-campus” which means it is surrounded by institutional land uses to the north, south, and west. To the east it is bound by Terra View Drive and the Airport. An “on campus” golf course is a unique situation that adds to the challenge of relocation. Relocating the golf course “on campus” would require disruption and relocation of other WSU facilities and educational programs.

Quantifying the value of the Palouse Ridge Golf Course is difficult due to intangible elements such as the unique design that fits the landscape and the national recognition that the design has garnered. Many golf course designs strive to be nationally ranked but fall short. It is highly unlikely a relocated golf course could obtain the same characteristics and rankings. The approximate cost to build a golf course of similar size is $20-30 million but the cost to replace the Palouse Ridge Golf Course is unquantifiable because it is one of kind, has gained national recognition, and has demonstrated a significant impact on the local and regional economy. If the property were to be sold, it could be worth more than $100 million.

The Palouse Ridge Golf Course at WSU is a public recreational facility and would likely qualify as a Department of Transportation (DOT), Section 4(f) resource. DOT, Section 4(f) provides that the Secretary of Transportation will not approve any program or project that requires the use of any publicly owned land from a public park, recreation area, or wildlife or waterfowl refuge of national State, or local significance or land from an historic site of national, State or local significance as determined by the officials having jurisdiction thereof, unless there is no feasible and prudent alternative to the use of such land and such program, and the project includes all possible planning to minimize harm resulting from the use. A physical use would occur if the proposed project or a reasonable were to physically occupy a portion of all of the golf course.

Removal of a portion of the golf course from the RPZ is not considered feasible.

Exhibit 3: Adjacent WSU Facilities



SR 276 Right-of-Way

A portion of the Right-of-Way (ROW) for State Route 276 (SR 276) lies within the future RPZ. The Washington Department of Transportation (WSDOT) purchased ROW for SR 276 in the 1970's and has recently taken steps toward planning for its construction. In February 2007, WSDOT released a Route Development Plan for SR 276. As planned, SR 276 begins at an intersection with US Highway 195, northwest of the City of Pullman, and ends at an intersection with SR 270 just southwest of the Airport. As designed, SR 276 would be a four-lane limited access freeway that acts as a bypass around the northeastern side of the City of Pullman. The future SR 276 bypass route crosses the Runway Safety Area (RSA) and RPZ of the preferred runway alternative, immediately west of the runway threshold. The ROW is currently used by WSU for agricultural research and education. WSU will be required by WSDOT to relocate their facilities when SR 276 is constructed.

WSDOT is unwilling to relinquish a connection to SR270, currently in the form of ROW. They are unwilling to accept current market value for the ROW today and hope to obtain ROW in another location in the future. The topography, cost, and environmental concerns are too challenging. The City of Pullman cannot condemn the ROW as it is state property (WSU property is also state property and cannot be condemned by the City).

The FAA does not permit roads within the RSA, and discourages any roads within the RPZ. After consideration of the existing SR 276 ROW alignment, the FAA determined it is necessary to remove the ROW from the RSA and relocate it as far as possible from the runway end within the RPZ, if it is not practical to locate the road outside of the RPZ.

Several key stakeholders are involved in the decision to relocate the SR 276 ROW. The following section identifies and discusses the roles of stakeholders associated with the SR 276 Bypass ROW relocation:

- *Washington State Department of Transportation (WSDOT)* – WSDOT is responsible for keeping people and business moving by operating and improving the state's transportation systems vital to taxpayers and communities. WSDOT is the owner of the SR 276 ROW.

- *Washington State University (WSU)* –WSU operates agricultural research facilities that are home to over 10 different academic or research programs located west of the Airport that will be impacted by the project.

- *City of Pullman* – The City owns portions of Airport Road and Terre View Drive that are impacted by SR 276 relocation alternatives.

- *Whitman County* – The County owns portions of Terra View Drive that are impacted by SR 276 relocation alternatives.

Coordination with the WSDOT Eastern Region and Aviation Division, the FAA, WSU, Whitman County, the City of Pullman and the Airport has resulted in a plan that preserves the SR 276 corridor while allowing the runway realignment project to move forward. Six alternatives were developed by the stakeholders to relocate the ROW for SR 276. Each of the alternatives would maintain WSDOT's ability to construct the bypass in a different location while allowing for the runway realignment.

SR 276 ROW Alternatives Considered

The following alternatives were developed:

- No Action (Maintain existing conditions within the preferred alternative RPZ)
- Southwest 4–Lane Boulevard Alternative 1 (Preferred SR 276 ROW Relocation Alternative)
- Southwest 4–Lane Boulevard Alternative 2
- Southwest 4–Lane Boulevard Alternative 3
- Tunnel
- Northeast Alternative
- Declared Distances
- East Shift Alternative

One additional alternative was evaluated but was determined not to be feasible. The alternative connected US 195 to SR 270, passing around the southern portion of the City of Pullman. This alternative was eliminated from further consideration because WSDOT origin and destination studies indicated that traffic would not utilize a southern bypass.

All SR 276 Alternatives were developed to accommodate the preferred runway realignment alternative, meet the roadway requirements of WSDOT, and to minimize to the greatest extent possible the exposure of incompatible land uses within the RPZ.

No Action (Maintain existing conditions within Preferred Runway Realignment RPZ)

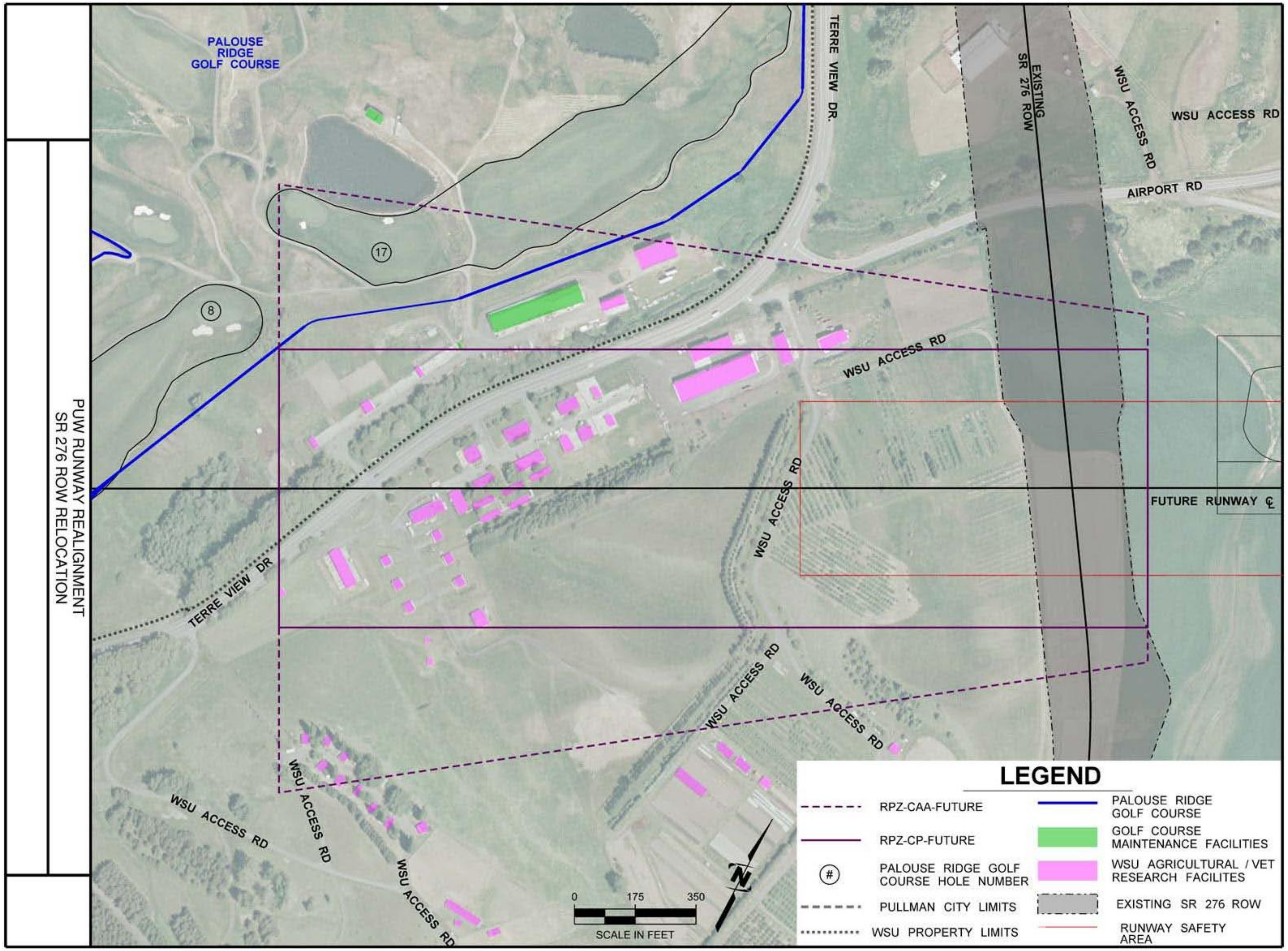
The No Action alternative evaluates existing conditions with the preferred runway realignment alternative moving forward. The purpose of including the No Action alternative is to create a baseline RPZ condition from which all other alternatives will be compared.

Incompatible land uses that would remain within the RPZ include the existing SR 276 ROW, Terra View Drive, WSU access roads, WSU agricultural research facilities, and a portion of one hole of the Palouse Ridge Golf Course. The land use within the future RPZ is agricultural and institutional. **Exhibit 4** and **Table 2** show the incompatible land use exposure within the RPZ, distance to runway end, and distance to landing threshold for each incompatible land use.

The No Action alternative would likely result in the preferred runway realignment alternative not moving forward because WSDOT controls land within the future Runway Safety Area (RSA) and will not release the land unless an adequate replacement ROW is provided.

Table 2: No Action (Maintain existing conditions within Preferred Alternative RPZ)				
Land Uses	**RPZ Central Portion**	**RPZ Controlled Activity Area**	**Distance to Runway End**	**Distance to Landing Threshold**
Existing SR 276 ROW	5.4 acres	1.9 acres	240’	530’
Terra View Drive and Airport Access Road	1.1 acres	0.7 acres	1,686’	1,976’
WSU Access Roads	2.8 acres	1.1 acres	526’	816’
WSU Agricultural Research Facilities	39.4 acres	22.0 acres	200’	490’
Palouse Ridge Golf Course	0.0 acres	5.4 acres	2,262’	2,552’
Total Exposure	**48.7 acres**	**31.1 acres**	**N/A**	**N/A**

Exhibit 4: No Action (Maintain Existing Conditions within Preferred Alternative RPZ)



Southwest 4–Lane Boulevard Alternative 1 (Preferred ROW Alternative)

The Southwest 4-Lane Boulevard Alternative 1 utilizes the existing road network to the greatest extent practicable (Terra View Drive) in an effort to minimize property and environmental impacts while reducing project costs (**Exhibit 5 and 6).** This concept would provide ROW for WSDOT to expand the existing Terra View Drive which is currently a two-lane configuration into a 4-lane boulevard with modified access within the future RPZ. The future SR 276 ROW will deviate from the existing Terra View Drive ROW through a portion of the RPZ. The deviation is necessary to meet WSDOT design standards which require a roadway design speed of 45 mph. The deviated portion of Terra View Drive will be removed when WSDOT constructs the SR 276 bypass. Intersections and access points would be limited to allow traffic to flow unconstrained through the RPZ.

RPZ Exposure – This alternative provides an opportunity to mitigate existing roadways within the future RPZ by realigning the intersection of Terre View Drive and Airport Road out of the RPZ. This alternative reduces exposure within the RPZ Central Portion (CP) by 44.1 acres and by 23.6 acres within the Controlled Activity Area (CAA) compared to the No Action alternative. This alternative assumes the WSU agricultural research facilities and access roads will be relocated as part of this alternative. **Table 3** shows the RPZ exposure associated with the Southwest 4–Lane Boulevard Alternative 1 compared to the No Action Alternative.

Table 3: Southwest 4 – Lane Boulevard Alternative 1 RPZ Exposure

Land Uses	RPZ Central Portion	RPZ Controlled Activity Area	Distance to Runway End	Distance to Landing Threshold
Southwest 4 – Lane Boulevard Alternative 1	4.6 acres	2.1 acres	1,300’	1,300’
Terra View Drive	0.0 acres	0.0 acres	N/A	N/A
WSU Access Roads	0.0 acres	0.0 acres	N/A	N/A
WSU Agricultural Research Facilities	0.0 acres	0.0 acres	N/A	N/A
Palouse Ridge Golf Course	0.0 acres	5.4 acres	N/A	N/A
Total Exposure	4.6 acres	7.5 acres	N/A	N/A
No Action Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-44.1 acres	-23.6 acres	N/A	N/A

*WSU Agricultural Research Facilities and Access Roads to be relocated

Right-of-Way Impacts – This alternative avoids and minimizes impacts to wetlands, Airport Creek and WSU electrical utilities located on the west side of Terra View Drive. It avoids impacts to the Palouse Ridge Golf Course on the west side of Terra View Drive. This alternative will require 55 acres of ROW acquisition.

The Preferred SR 276 ROW Relocation Alternative requires concessions from WSDOT, WSU and the FAA.

- WSDOT has agreed to terminate the limited access freeway north of the Airport and utilize a four-lane boulevard with modified access through the proposed RPZ south to SR 270.
- WSU has agreed that relocation of its agricultural research facilities is acceptable.
- The FAA would concede some incompatible land uses within the future RPZ because the Preferred SR 276 ROW Relocation Alternative is the best alternative that meets standards, reduces RPZ exposure to incompatible uses while permitting the runway realignment project to move forward, and is the most cost effective solution.

Cost – **Table 4** illustrates the costs to develop Southwest 4–Lane Boulevard Alternative 1.

Table 4: Cost – Southwest 4-Lane Boulevard – Alternative 1

Phase	Cost
ROW Acquisition	$0.44 million
Design	$1.43 million
Construction	$13.35 million
Total	**$15.22 million**

Each of these concessions is critical because without them, the Preferred SR 276 ROW Relocation Alternative would not be feasible, since the airport sponsors cannot condemn state properties.

Stakeholder Support – All stakeholders support the Southwest 4–Lane Boulevard Alternative 1. Stakeholders provided the following comments:

- WSDOT believes this alternative best serves the purpose of the SR 276 ROW bypass and is the most cost-effective solution.

- WSU supports this alternative because it is compatible with their campus master plan, supports improved access to the University and the Airport, and avoids impacts to the Palouse Ridge Golf Course.

- The Airport prefers this alternative because it provides the most cost-effective solution that provides a runway alignment and length that meets design standards and improves all-weather capability.

- The City of Pullman supports this alternative because it maintains a critical police, fire and emergency response route, improves accessibility to the Airport and WSU, and is consistent with city planning policies.

- Whitman County supports this alternative because it improves accessibility to the Airport and WSU, and because it is consistent with county planning policies.

Exhibit 5: Southwest 4–Lane Boulevard Alternative 1 (Preferred SR 276 ROW Relocation Alternative)

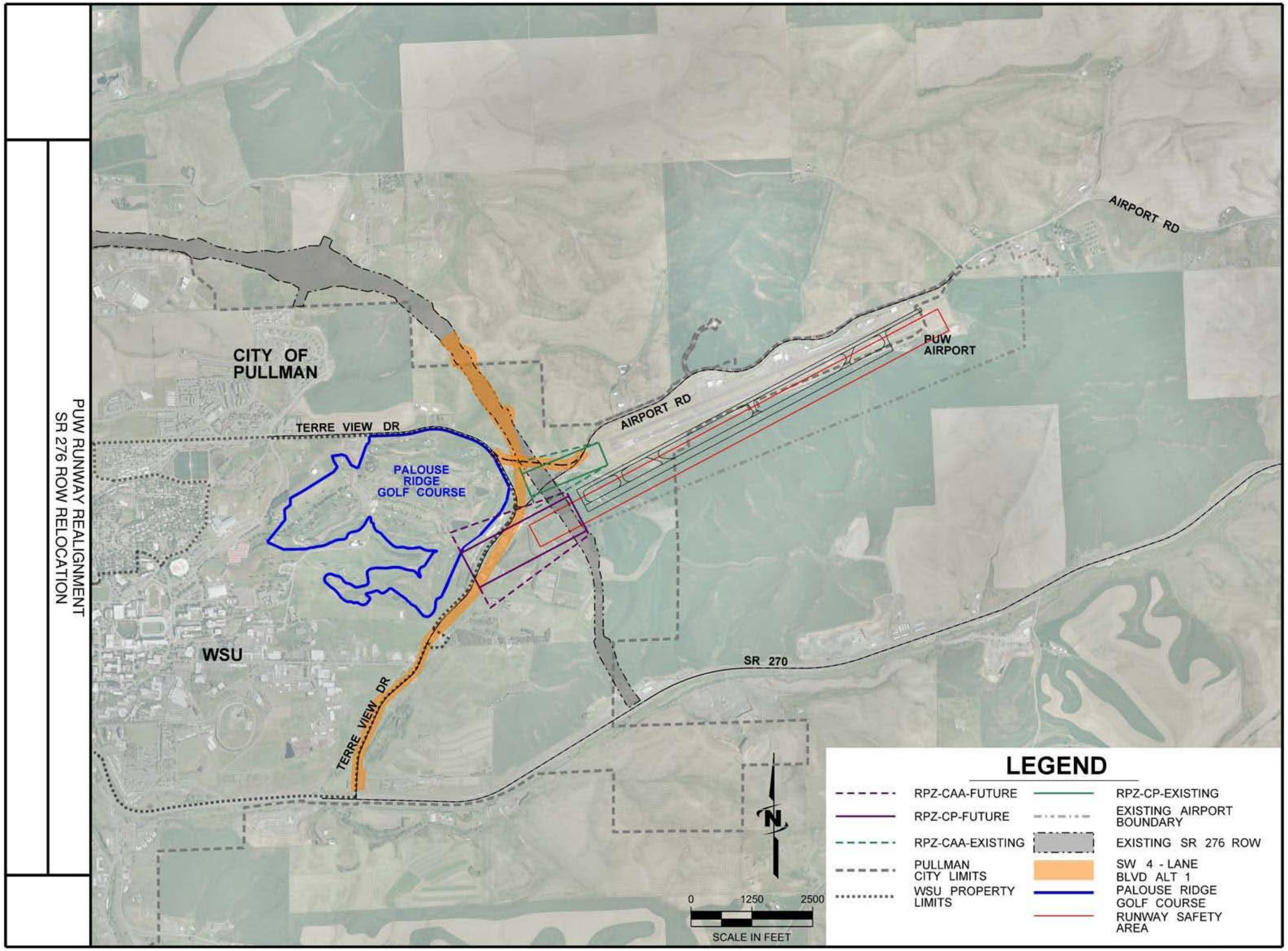
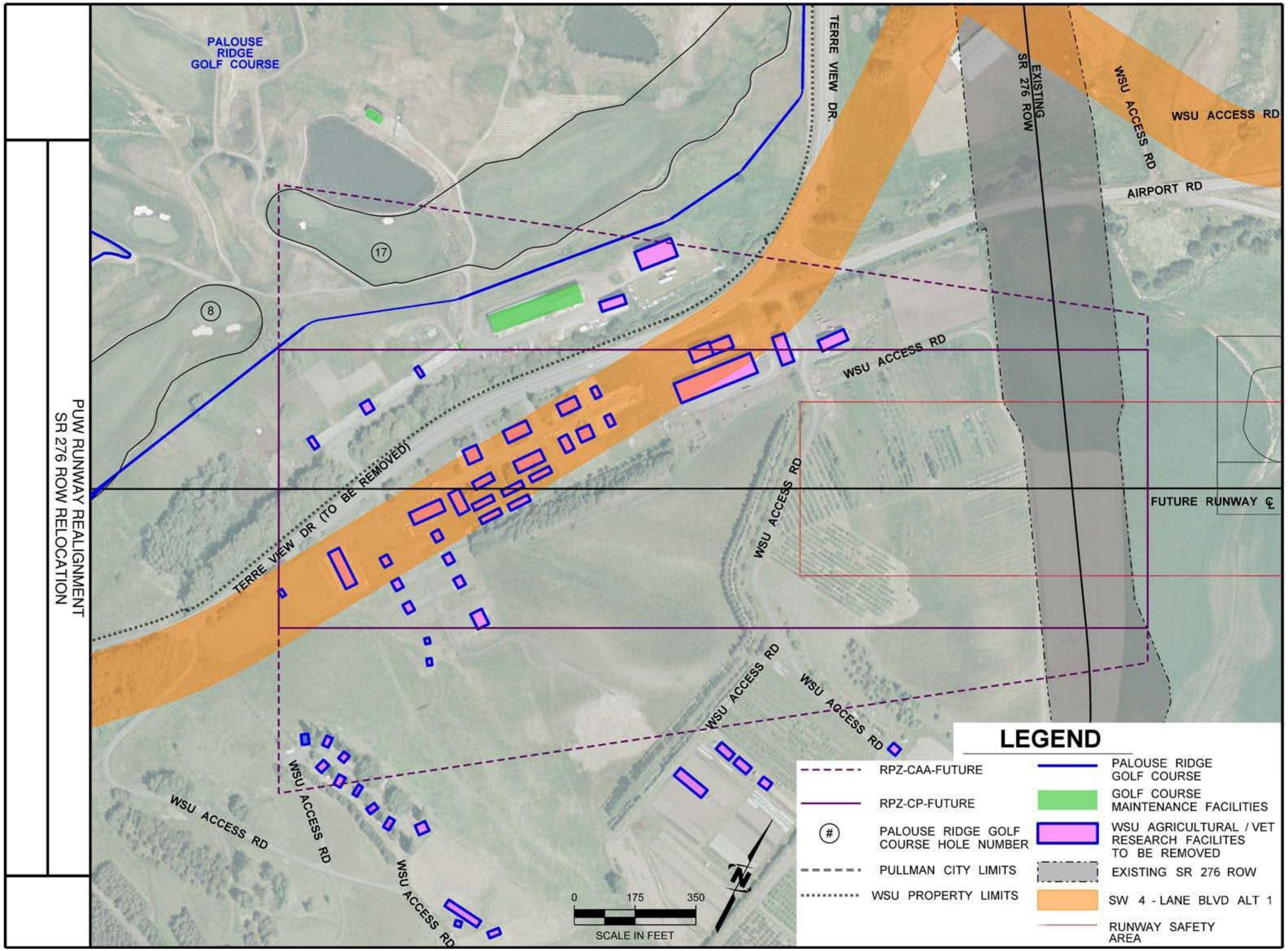


Exhibit 6: Southwest 4–Lane Boulevard Alternative 1 (Preferred SR 276 ROW Relocation Alternative)



Southwest 4–Lane Boulevard – Alternative 2

The Southwest 4-Lane Boulevard Alternative 2 minimizes exposure of incompatible land uses by bending the ROW west around the CP of the future RPZ (**Exhibit 7 and 8**). This modification results in impacts to wetlands, Airport Creek, and the Palouse Ridge Golf Course.

RPZ Exposure – This alternative provides the same opportunity as Alternative 1 to mitigate the existing roadways within the future RPZ by realigning the intersection of Terre View Drive and Airport Road to minimize the extent of exposure within the future RPZ. It is assumed that the portion of Terra View Drive within the RPZ will remain as an access road to the WSU Agricultural Research Facilities. WSU Agricultural Research Facilities and Access Roads will remain. This alternative reduces exposure of incompatible land uses within the CP by 5.4 acres while increasing exposure by 2.5 acres within the CAA exposure compared to the No Action alternative. **Table 5** shows the RPZ exposure associated with the Southwest 4–Lane Boulevard Alternative 2 compared to the No Action Alternative.

Table 5: Southwest 4 – Lane Boulevard Alternative 2 RPZ Exposure

Land Uses	RPZ Central Portion	RPZ Controlled Activity Area	Distance to Runway End	Distance to Landing Threshold
Southwest 4 – Lane Boulevard Alternative 2	0.0 acres	4.4 acres	1,526'	1,526'
Terra View Drive	1.1 acres	0.7 acres	1,686'	1,976'
WSU Access Roads	2.8 acres	1.1 acres	526'	816'
WSU Agricultural Research Facilities	39.4 acres	22.0 acres	200'	490'
Palouse Ridge Golf Course	0.0 acres	5.4 acres	N/A	N/A
Total Exposure	43.3 acres	33.6 acres	N/A	N/A
No Action Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-5.4 acres	+2.5 acres	N/A	N/A

Exhibit 7: Southwest 4–Lane Boulevard Alternative 2

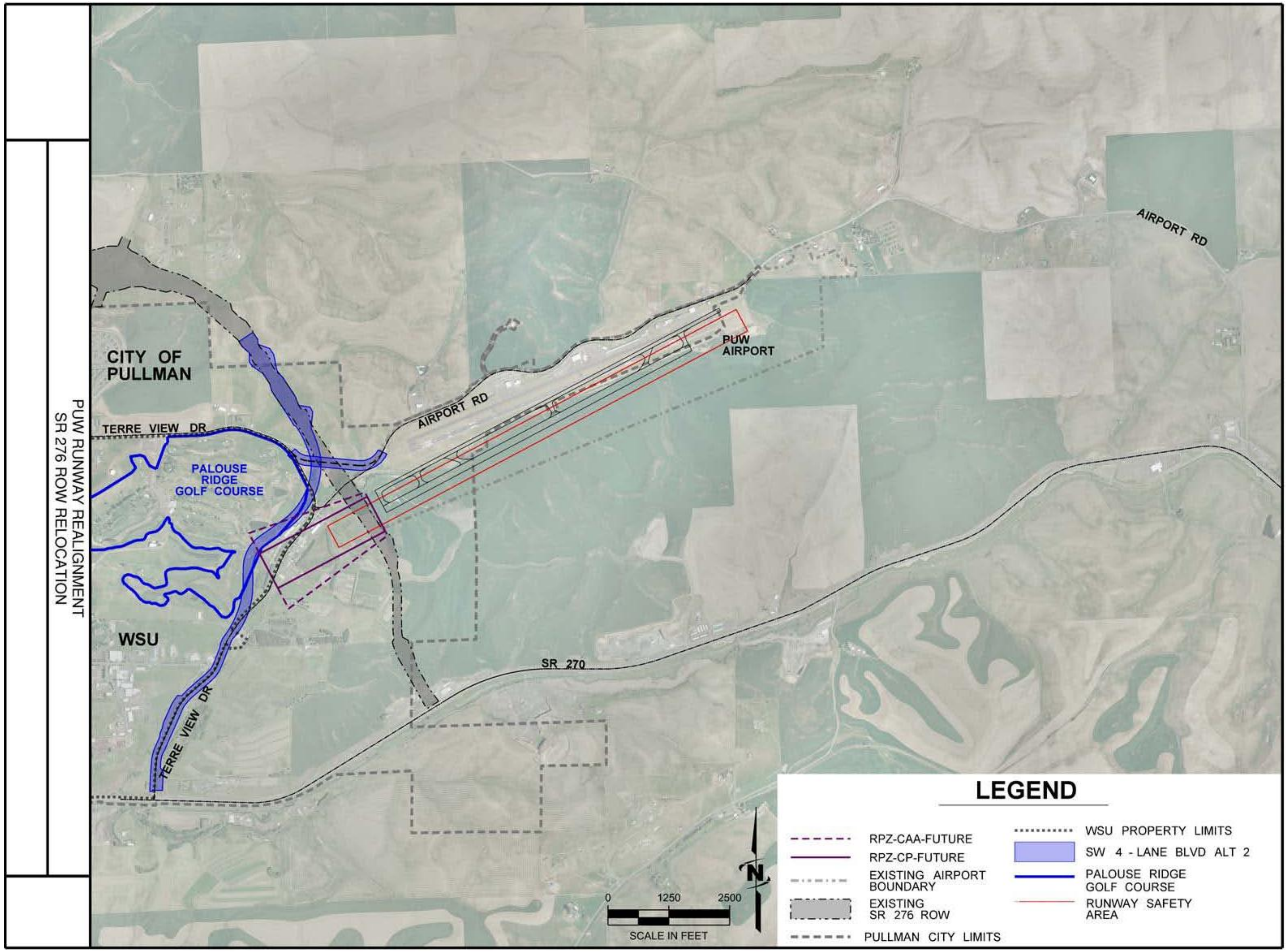
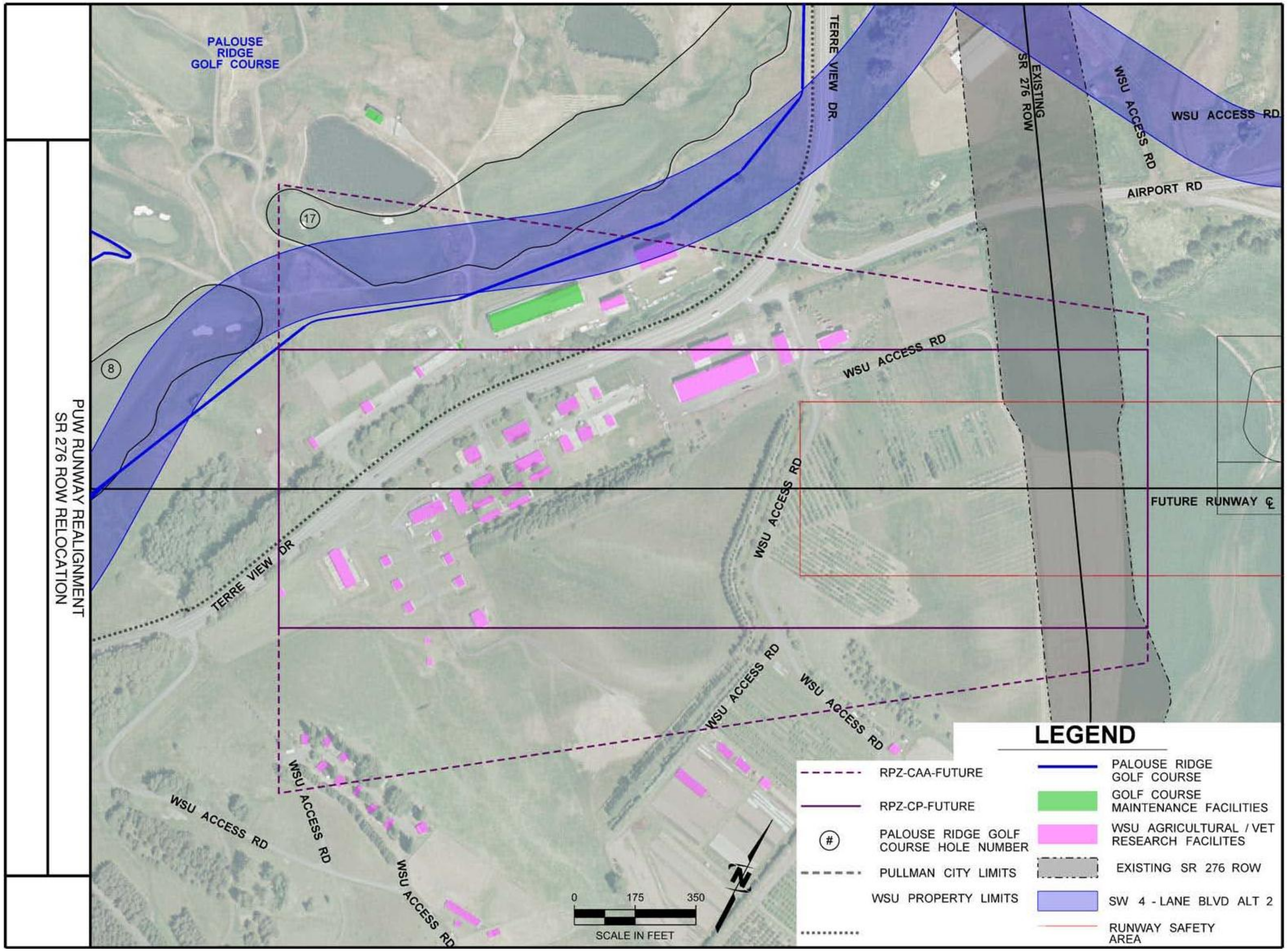


Exhibit 8: Southwest 4–Lane Boulevard Alternative 2



Right-of-Way Impacts – This alternative will require approximately 800 acres of land acquisition. The land acquisition includes the Palouse Ridge Golf Course, land required to replace the golf course, and land required to secure the SR 276 ROW.

Construction feasibility is a concern with this alternative due to the severe difference in elevation between Terra View Drive and the golf course. The cost for this alternative is therefore higher due to the increased earth work and retaining walls.

Cost – **Table 6** illustrates the costs to develop Southwest 4–Lane Boulevard Alternative 2. ROW acquisition includes the cost to acquire property from WSU. Construction costs include road construction and construction of a new golf course to replace the Palouse Ridge Golf Course.

Table 6: Cost – Southwest 4-Lane Boulevard – Alternative 2

Phase	Cost
ROW Acquisition	$101.44million
Design	$6.50 million
Construction	$43.44 million
Total	**$151.38 million**

Stakeholder Support – Most stakeholders do not support the Southwest 4–Lane Boulevard Alternative 2. Stakeholders provided the following comments:

- WSDOT has not commented on this alternative.
- WSU does not support this alternative because of the impacts to the Palouse Ridge Golf Course.
- The Airport does not support this alternative because it is a cost prohibitive solution and is not supported by WSU and the City of Pullman.
- The City of Pullman does not support this alternative because of the impacts to the Palouse Ridge Golf Course. Whitman County has not commented on this alternative.

Summary – This alternative is not recommended due to lack of stakeholder support and increased ROW and construction costs.

Southwest 4–Lane Boulevard – Alternative 3

The Southwest 4-Lane Boulevard Alternative 3 minimizes exposure of incompatible land uses by bending the ROW west around the future RPZ (**Exhibit 9 and 10**).

RPZ Exposure – This alternative eliminates the ROW from the future RPZ entirely and mitigates the existing roadways within the future RPZ by realigning the intersection of Terre View Drive and Airport Road to minimize the extent of roadway exposure within the future RPZ. It is assumed that the portion of Terra View Drive within the RPZ will remain as an access road to the WSU Agricultural Research Facilities. WSU Agricultural Research Facilities and Access Roads will remain. This alternative reduces exposure of incompatible land uses within the CP by 5.4 acres and the CAA by 1.9 acres compared to the No Action alternative. **Table 7** shows the RPZ exposure associated with the Southwest 4–Lane Boulevard Alternative 3 compared to the No Action ROW Alternative.

Table 7: Southwest 4 – Lane Boulevard Alternative 3 RPZ Exposure

Land Uses	RPZ Central Portion	RPZ Controlled Activity Area	Distance to Runway End	Distance to Landing Threshold
Southwest 4 – Lane Boulevard Alternative 3	0.0 acres	0.0 acres	N/A	N/A
Terra View Drive	1.1 acres	0.7 acres	1,686'	1,976'
WSU Access Roads	2.8 acres	1.1 acres	526'	816'
WSU Agricultural Research Facilities	39.4 acres	22.0 acres	200'	490'
Palouse Ridge Golf Course	0.0 acres	5.4 acres	N/A	N/A
Total Exposure	43.3 acres	29.2 acres	N/A	N/A
No Action ROW Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-5.4 acres	-1.9 acres	N/A	N/A

Right-of-Way Impacts – This alternative will require acquisition of the Palouse Ridge Golf Course. As described, the golf course has significant value to WSU, the City of Pullman and the region.

This alternative will require approximately 800 acres of land acquisition. The land acquisition includes the Palouse Ridge Golf Course, land required to replace the golf course, and land required to secure the ROW. Similar to Alternative 2, construction feasibility is a concern with this alternative due to the severe difference in elevation between Terra View Drive and the golf course. Construction costs are higher for this alternative because of the increased earth work and the need for retaining walls.

Cost – **Table 8** illustrates the costs to develop Southwest 4–Lane Boulevard Alternative 3. ROW acquisition includes the cost to acquire property from WSU. Construction costs include road construction and construction of a new golf course to replace the Palouse Ridge Golf Course.

Table 8: Cost – Southwest 4-Lane Boulevard – Alternative 3	
Phase	**Cost**
ROW Acquisition	$101.33 million
Design	$6.62 million
Construction	$44.15 million
Total	**$151.10 million**

Stakeholder Support – Most stakeholders do not support the Southwest 4–Lane Boulevard Alternative 3. Stakeholder’s comments are identical to Southwest 4 – Lane Boulevard Alternative 2.

Summary – This alternative is not recommended due to lack of stakeholder support and increased ROW and construction costs.

Exhibit 9: Southwest 4 – Lane Boulevard Alternative 3

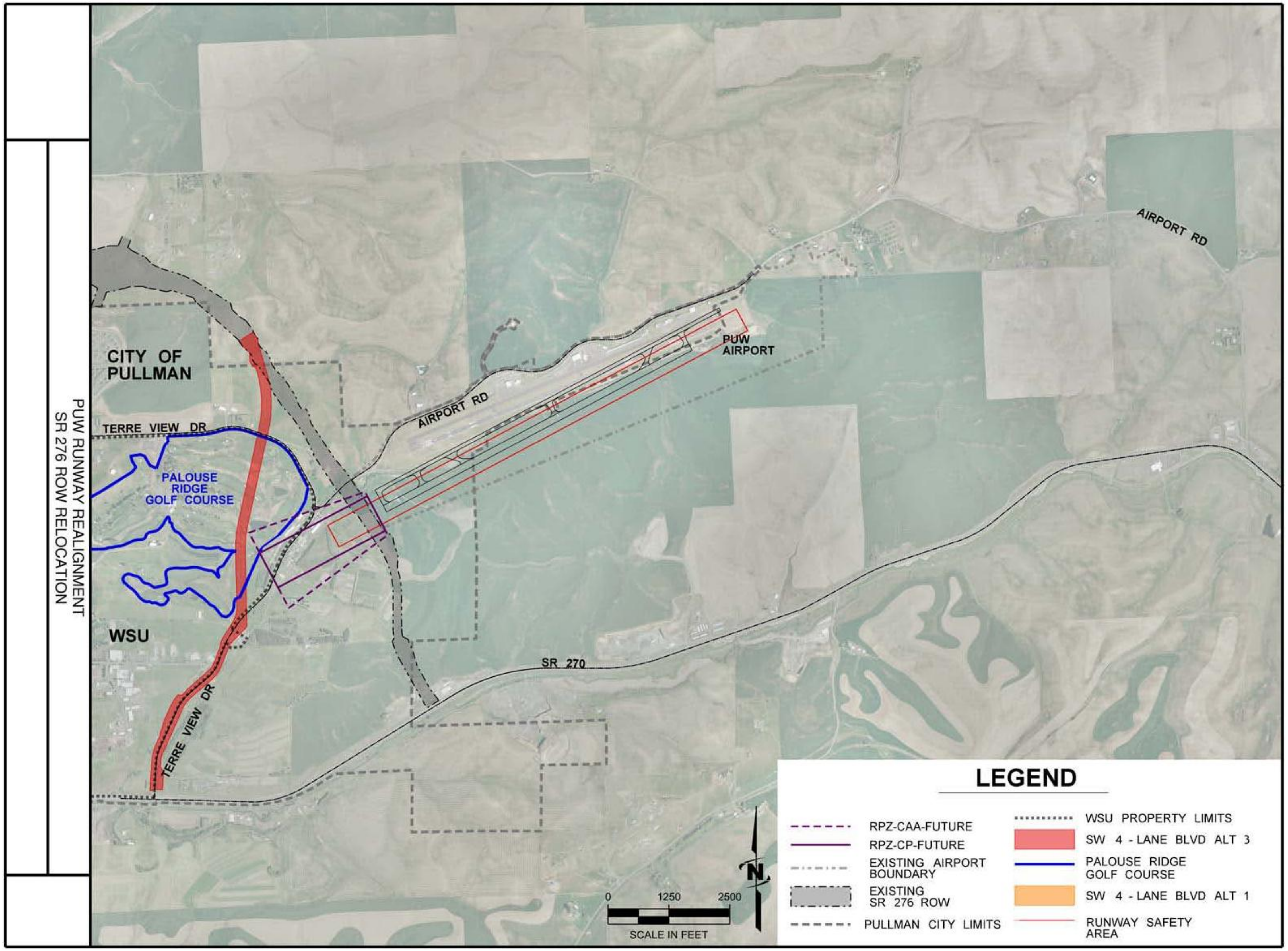
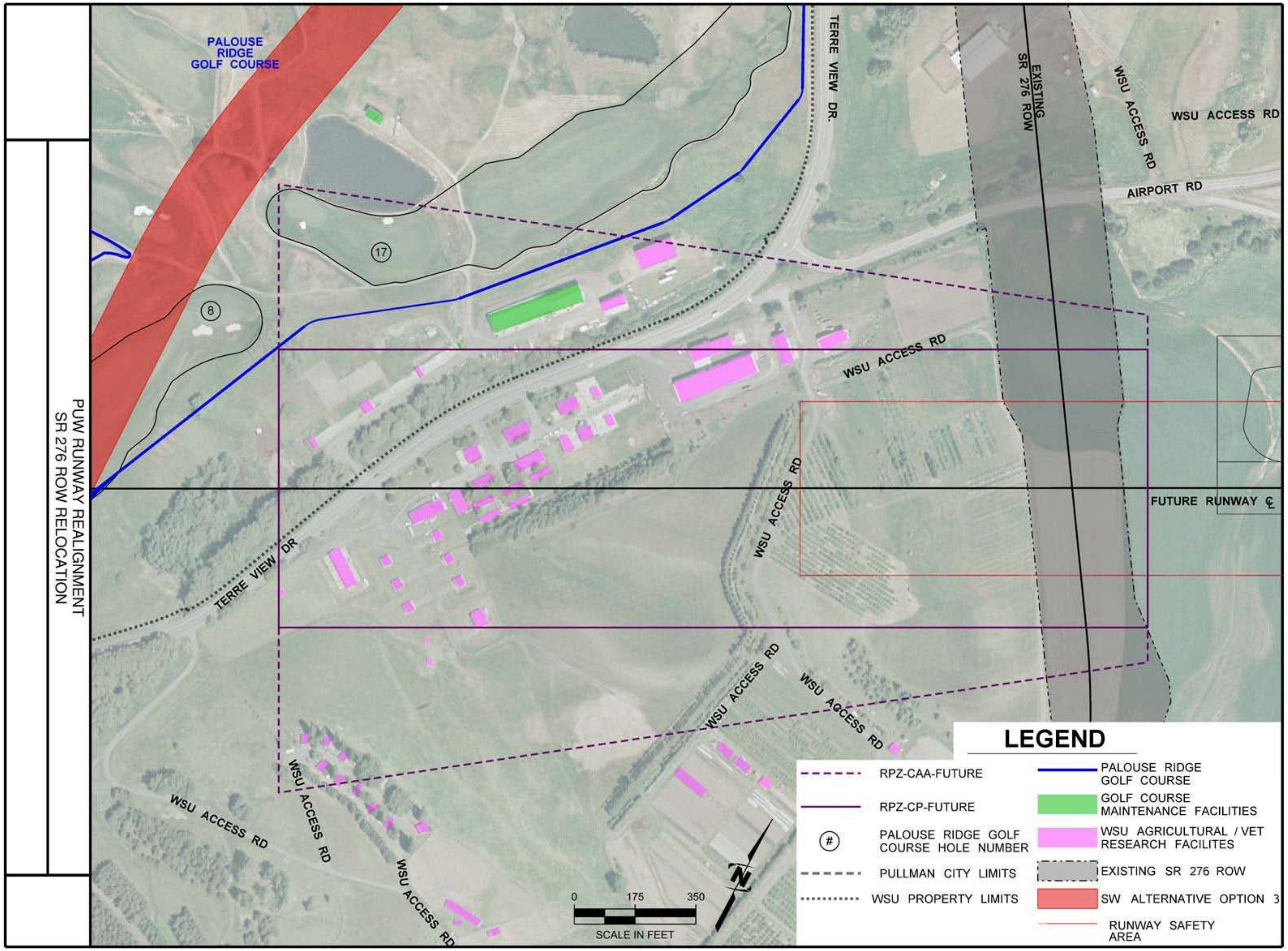


Exhibit 10: Southwest 4 – Lane Boulevard Alternative 3



SR 276 ROW Tunnel Alternative

The SR 276 Tunnel Alternative utilizes the existing WSDOT ROW, and requires additional ROW to accommodate the profile necessary to support a tunnel (**Exhibit 11 and 12**). SR 276 would be four-lanes and constructed in a tunnel through the future RPZ and RSA.

RPZ Exposure – The Tunnel Alternative removes SR 276 from the RPZ and the tunnel would be directly under the RSA. Existing Terra View Drive remains in the future RPZ with its intersection with Terre View Drive north of the future RPZ. As previously discussed, Terra View Drive is the only means of accessing the Airport, provides an important link for police and fire protection services, and is critical to existing and future development at WSU. WSU Agricultural Research Facilities and Access Roads will remain. This alternative reduces exposure of incompatible land uses within the CP by 5.4 acres and within the CAA by 1.9 acres compared to the No Action alternative. **Table 9** documents the RPZ roadway exposure compared to the No Action ROW alternative.

Table 9: SR 276 Tunnel Alternative RPZ Exposure

Land Uses	**RPZ Central Portion**	**RPZ Controlled Activity Area**	**Distance to Runway End**	**Distance to Landing Threshold**
SR 276 Tunnel Alternative	0.0 acres	0.0 acres	200’	200’
Terra View Drive	1.1 acres	0.7 acres	1,686’	1,976’
WSU Access Roads	2.8 acres	1.1 acres	526’	816’
WSU Agricultural Research Facilities	39.4 acres	22.0 acres	200’	490’
Palouse Ridge Golf Course	0.0 acres	5.4 acres	N/A	N/A
Total Exposure	43.3 acres	29.2 acres	N/A	N/A
No Action Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-5.4 acres	-1.9 acres	N/A	N/A

Right-of-Way Impacts – The Tunnel Alternative requires an additional 20 acres of ROW beyond that already owned by WSDOT because the road profile for a tunnel is larger than that of a road built at grade. The required ROW is in agricultural use.

Cost – **Table 10** illustrates the costs to develop SR 276 ROW Tunnel Alternative 3. Two cost estimates are included because the timing of construction has an impact on cost. The lowest cost tunnel would be constructed at the same time as the runway realignment project to take advantage of the existing topography before it is modified by the runway realignment. The tunnel would be constructed above ground where possible and then the grade would be modified around it to cover and form the RSA. The risk associated with this approach is due to the fact that WSDOT does not have funding to build SR 276. If the tunnel is constructed after the runway realignment project is complete, the complexity will increase and the design and construction costs will increase by 100 percent. This technical memorandum assumes the worst-case scenario (higher cost) when comparing alternatives.

Table 10: Cost – Tunnel Alternative

Constructed with Runway Realignment		Constructed after Runway Realignment	
Phase	**Cost**	**Phase**	**Cost**
ROW Acquisition	$0.16 million	ROW Acquisition	$0.16 million
Design	$10.20 million	Design	$19.10 million
Construction	$95.50 million	Construction	$191.00 million
Total	**$105.86 million**	**Total**	**$210.26 million**

Stakeholder Support – The Tunnel Alternative meets the objectives of all stakeholders; however is not considered practicable due to the cost and other stakeholder concerns. Stakeholders provided the following comments:

- WSDOT believes this alternative would serve the purpose of the SR 276 Bypass, but would be the most expensive solution. Because the cost to implement the tunnel alternative is significantly higher than the SR 276 at-grade Bypass originally planned by WSDOT, WSDOT expects the FAA, the Airport, the City of Pullman and Whitman County to pay for the increase in project costs. Additionally, WSDOT is not supportive of this alternative due to the long-term maintenance costs associated with a tunnel.
- WSU does not support this alternative because of its cost, and because it complicates access to the Airport and WSU.
- The Airport does not support this alternative because of its cost..
- The City of Pullman does not support this alternative because of its cost.
- Whitman County does not support this alternative because of its cost.

Summary – This alternative is not recommended due to high construction costs, and lack of stakeholder support.

Exhibit 9: Tunnel Alternative RPZ Exposures

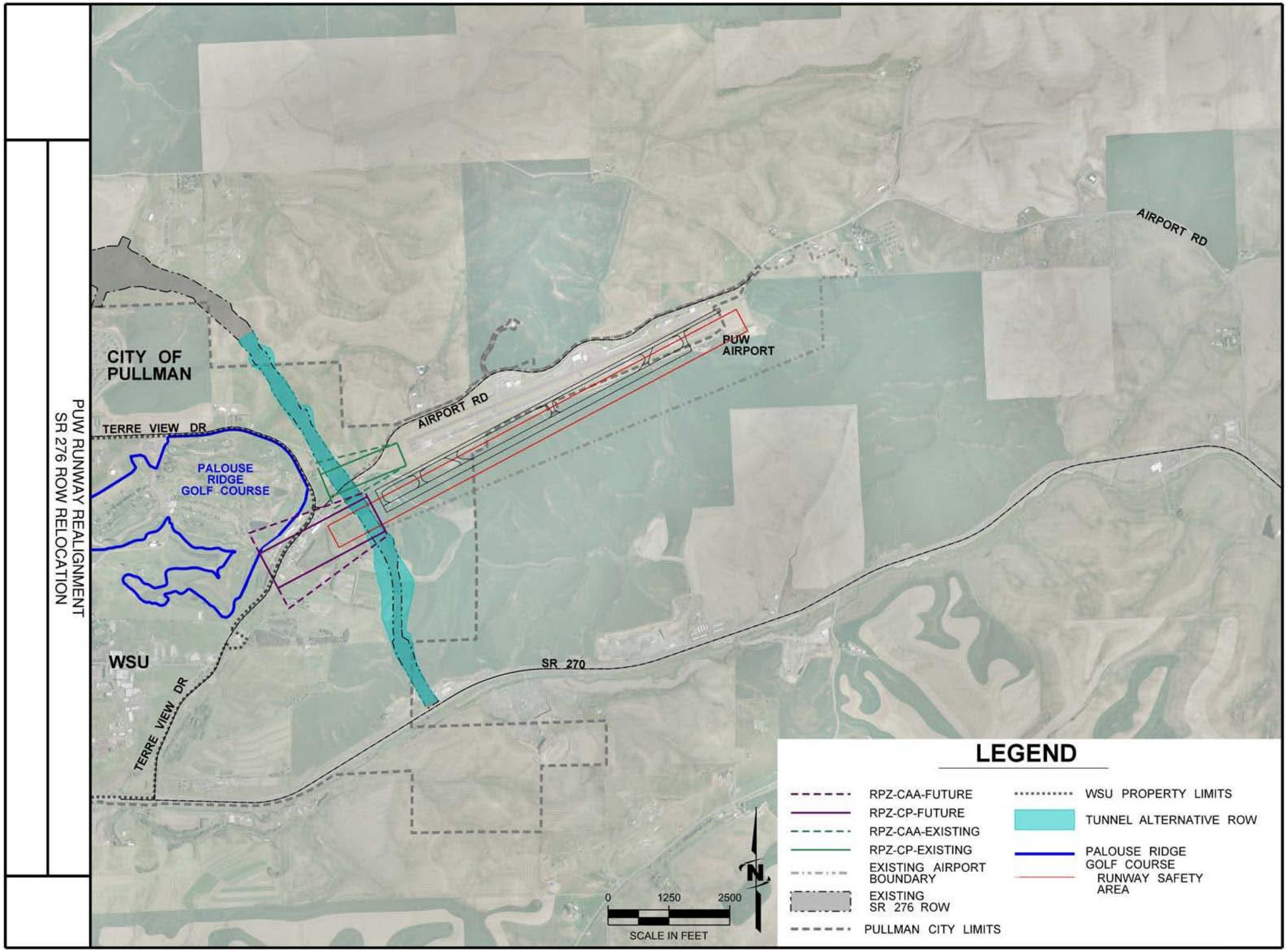
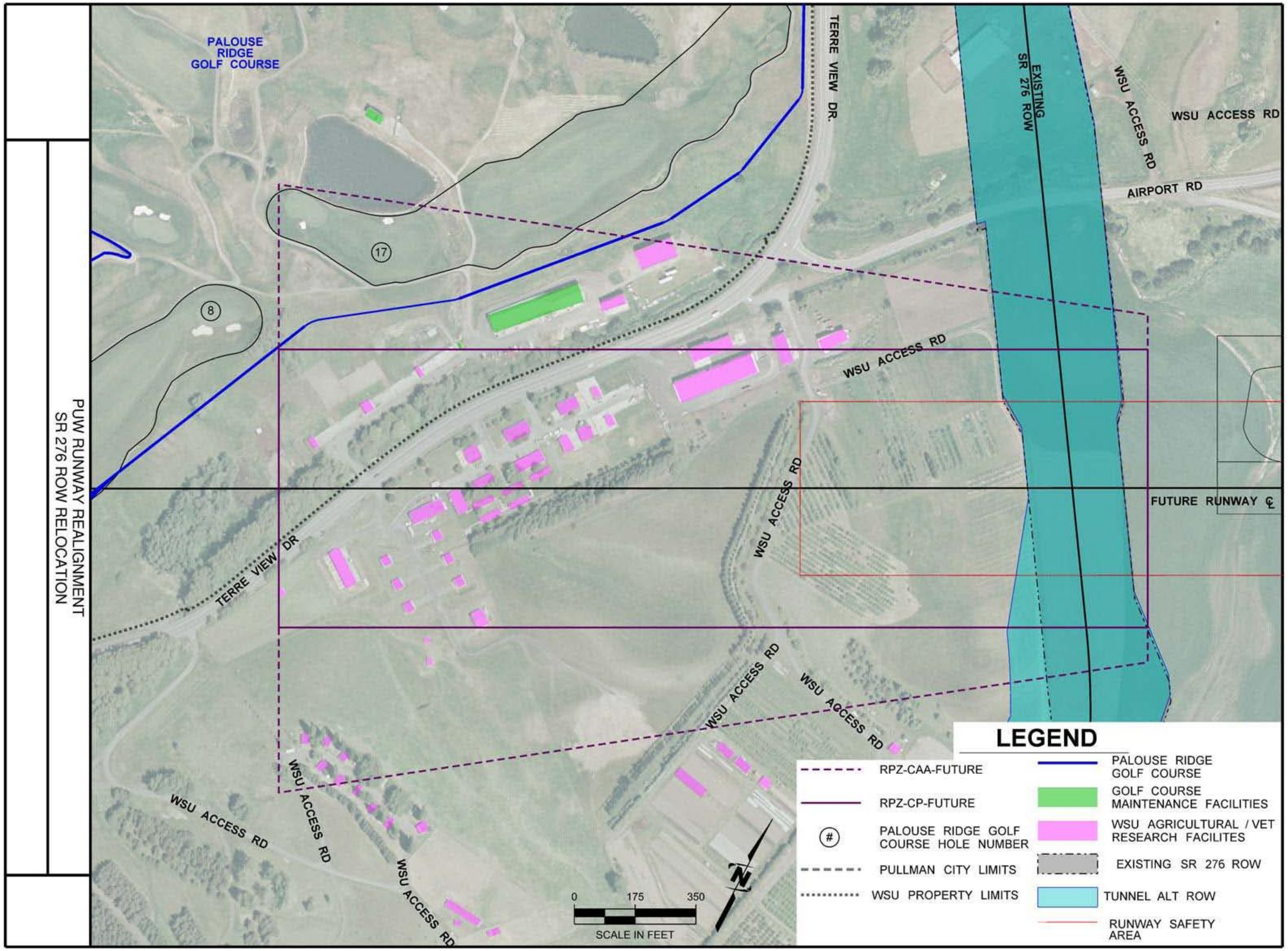


Exhibit 10: Tunnel Alternative RPZ Exposures



SR 276 ROW Northeast Alternative

The SR 276 Northeast Alternative would be located north of Airport Road and head east on a new alignment before turning south to connect with SR 270 (**Exhibit 11**). This alternative would be a four lane limited access roadway.

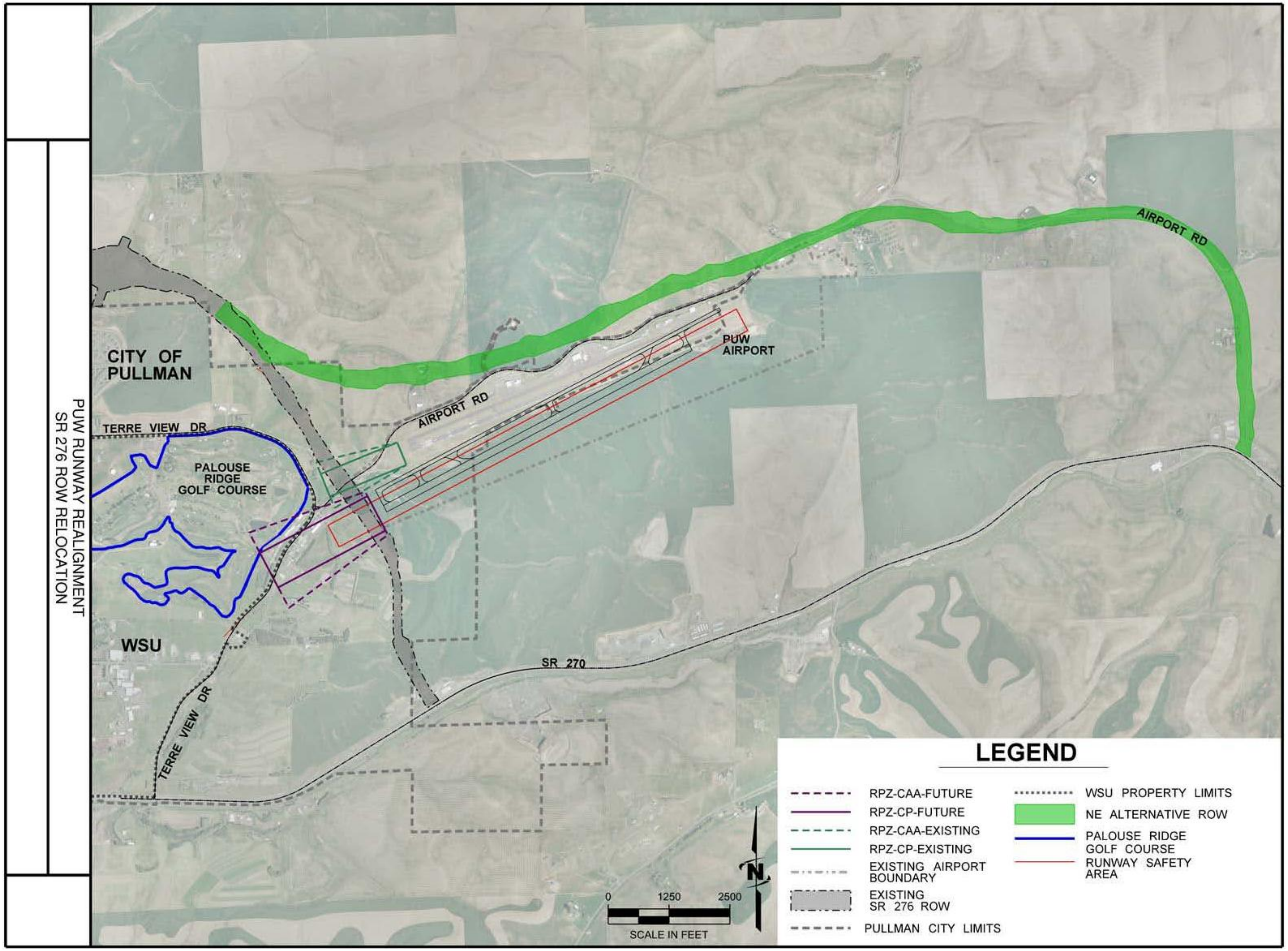
RPZ Exposure – The Northeast Alternative removes SR 276 from the RPZ. Existing Terra View Drive would remain in the future RPZ with its intersection with Terre View Drive north of the future RPZ. This alternative reduces exposure of incompatible land uses within the CP by 5.4 acres and within the CAA by 1.9 acres compared to the No Action alternative. WSU Agricultural Research Facilities and Access Roads will remain. **Table 11** shows the RPZ exposure for the Northeast Alternative compared to the No Action ROW alternative.

Table 11: Northeast Alternative

Land Uses	**RPZ Central Portion**	**RPZ Controlled Activity Area**	**Distance to Runway End**	**Distance to Landing Threshold**
Northeast Alternative	0.0 acres	0.0 acres	N/A	N/A
Terra View Drive	1.1 acres	0.7 acres	1,686’	1,976’
WSU Access Roads	2.8 acres	1.1 acres	526’	816’
WSU Agricultural Research Facilities	39.4 acres	22.0 acres	200’	490’
Palouse Ridge Golf Course	0.0 acres	5.4 acres	N/A	N/A
Total Exposure	43.3 acres	29.2 acres	N/A	N/A
No Action ROW Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-5.4 acres	-1.9 acres	N/A	N/A

Right-of-Way Impacts – The Northeast Alternative will require more than 200 acres of ROW, which is the most of all alternatives. Preliminary designs suggest that residential, commercial and industrial properties may be impacted.

Exhibit 11: SR 276 ROW Northeast Alternative



Cost – **Table 12** illustrates the costs to develop SR 276 ROW Northeast Alternative.

Table 12: Cost – Northeast Alternative

Phase	**Cost**
ROW Acquisition	$1.61 million
Design	$3.30 million
Construction	$30.70 million
Total	**$35.61 million**

Stakeholder Support – The Northeast Alternative is not supported by all stakeholders. Stakeholders provided the following comments:

- WSDOT stated that this alternative will not serve the intent of the bypass due to the change in location with its connection to SR 270. This alternative would require out-of-direction travel to reach destinations on the eastern side of Pullman.

- WSU may support this alternative because it opens new areas for development. However, this alternative is not WSU's first choice because it does not improve access to the University and the Airport, because its costs twice as much as the Preferred Alternative, and because it does not meet WSDOT needs.

- The Airport does not support this alternative because of its cost and WSDOT's concerns. The City of Pullman does not support this alternative because of its cost and WSDOT concerns. The City of Pullman does recognize the potential benefits of opening land for development as a result of this alternative.

- Whitman County does not support this alternative because of its cost and WSDOT concerns.

Summary – This alternative is not recommended due to its inability to meet WSDOT's need for the SR 276 bypass, high construction costs, and lack of stakeholder support.

Declared Distance Alternatives

Declared distance alternatives were also evaluated as a means of mitigating SR 276 ROW from the future RPZ. Declared Distance Alternatives were only considered for the preferred Southwest 4-lane Boulevard Alternative 1 because it is the only alternative supported by the Airport, FAA, and stakeholders. Three declared distance alternatives were developed and are presented below.

Runway Length - The Airport prepared a Runway Length Requirements technical memorandum in January 2011 that recommended a near-term runway length of 7,100 feet. The recommended runway length utilized a family grouping of large aircraft with a maximum takeoff weight up to and including 60,000 pounds. The FAA approved the justification for the 7,100 foot runway on March 1, 2011.

Table 13 illustrates the takeoff and landing distances required for the most demanding airport users. The Bombardier Q400 landing length has not been adjusted for wet and icy conditions because it is not a jet aircraft. The Cessna Citation X is used as a representative aircraft from the family grouping utilized in the runway length analysis. This analysis maintains the operational characteristics of aircraft utilized for the Runway Length Requirements analysis.

Table 13: PUW Runway length Requirements

Runway Requirements at 90 Percent of Useful Load					
PUW Elevation: 2,556 MSL	**Avg. High Temp: 83 degrees**				
	Typical Hot Day - MSL Adjusted		**Wet/Icy**	**Weights - 90% UL**	
Aircraft	**Takeoff Required**	**Landing Required**	**Landing Required**	**TOW**	**LW**
Airbus A320	8,500’	5,800’	6,700’	162,000	136,000
Boeing 737-8	9,300’	7,600’	8,000’	169,000	140,000
Bombardier Q400	6,600’	4,600’	N/A	63,000	56,000
Family Grouping GA Jets	7,100	4,669’	6,258’	36,000	32,000

Declared Distance (DD) Alternatives Analysis – Three alternatives were developed to evaluate the feasibility of utilizing DDs to mitigate incompatible land uses within the future RPZ. FAA Advisory Circular (AC) 150/5300-13A *Airport Design* defines declared distances as:

> …the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The declared distances are TORA and TODA, which apply to takeoff; Accelerate Stop Distance Available (ASDA), which applies to a rejected takeoff; and Landing Distance Available (LDA), which applies to landing. By treating these distances independently, declared distances are a design methodology that results in declaring and reporting the TORA, TODA, ASDA and LDA for each operational direction.

DD Alternative 1 (**Exhibit 12**): The objective of DD Alternative 1 was to minimize exposure of incompatible land uses within the CP of the future RPZ. This requires displacing the threshold 1,410 feet. The CAA will retain 1.37 acres of the Southwest 4–Land Boulevard Alternative 1. **Table 14** illustrates the declared distances for this alternative, the most critical being the LDA for Runway 5 (5,690'). The LDA does not meet the performance requirements for large charter aircraft or the Cessna Citation X's which are based at PUW.

DD Alternative 2 (**Exhibit 13**): The objective of DD Alternative 2 was to minimize all exposure of incompatible land uses within the future RPZ. This requires displacing the threshold 1,743 feet. **Table 14** illustrates the declared distances for this alternative, the most critical being the LDA for Runway 5 (5,356'). The LDA does not meet the performance requirements for large charter aircraft or the Cessna Citation X's which are based at PUW.

DD Alternative 3 (**Exhibit 14**): The objective of DD Alternative 3 was to minimize exposure of incompatible land uses within the future RPZ. This requires displacing the threshold 1,524 feet. **Table 14** illustrates the declared distances for this alternative, the most critical being the LDA for Runway 5 (5,690'). The LDA does not meet the performance requirements for large charter aircraft or the Cessna Citation X's which are based at PUW.

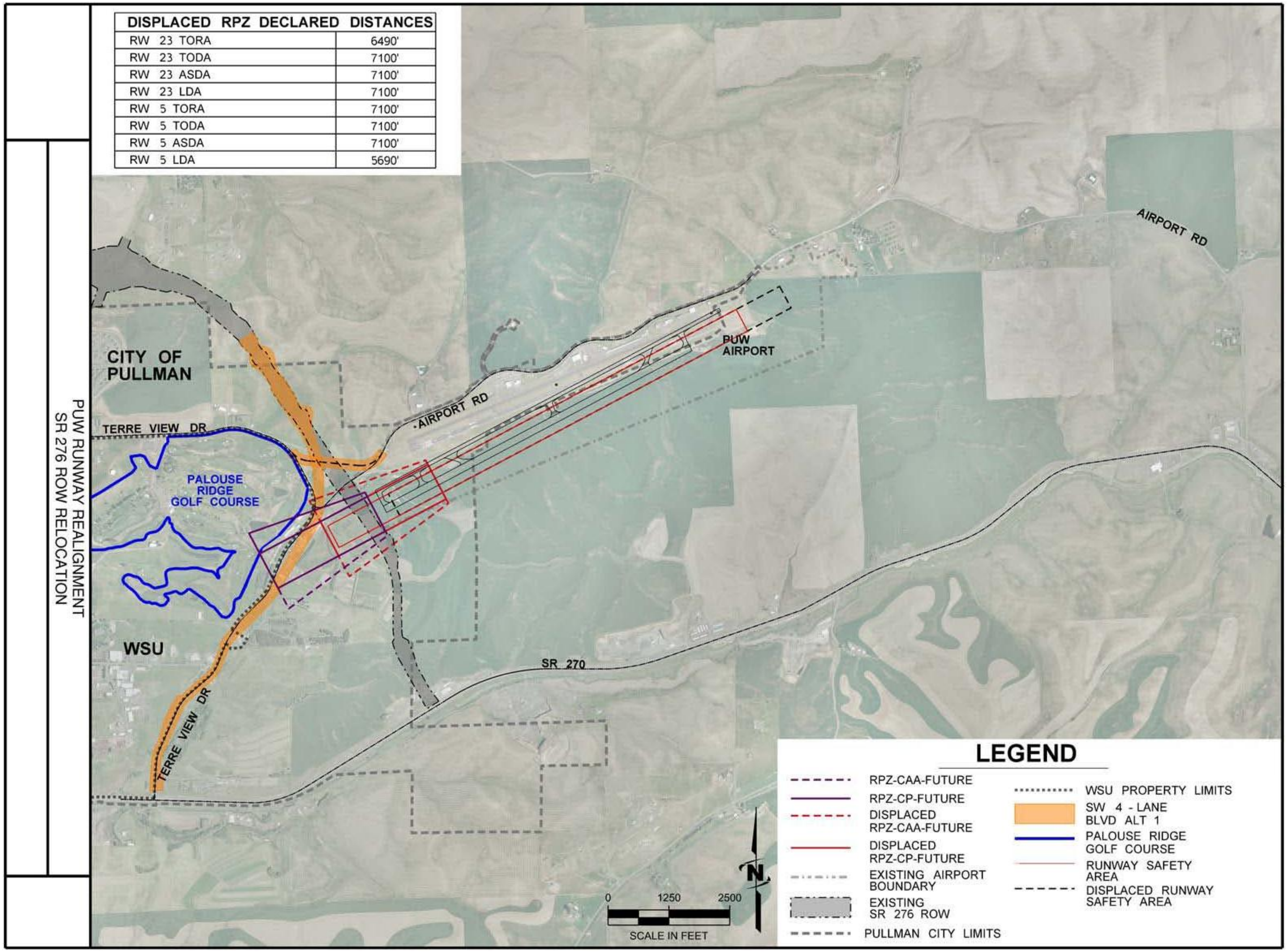
Because none of the declared distance alternatives are capable of meeting the LDA requirements for the large charter aircraft and the family grouping of GA jet aircraft, no further analysis was completed and none of the alternatives are recommended for further consideration. In addition, FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* states that the application of the declared distances concept to overcome safety deficiencies is not intended for new runways. New runways must meet design standards when constructed. For these reasons, the DD alternatives are not considered feasible. The DD Alternatives exhibits are included on the following pages.

Table 14: Declared Distance (DD) Alternatives

	DD Alternative 1		DD Alternative 2		DD Alternative 3	
Declared Distance (DD)	**Runway 5**	**Runway 23**	**Runway 5**	**Runway 23**	**Runway 5**	**Runway 23**
TORA	7,100'	6,490'	7,100'	6,376'	7,100'	6,948'
TODA	7,100'	7,100'	7,100'	7,100'	7,100'	7,100'
ASDA	7,100'	7,100'	7,100'	7,100'	7,100'	7,100'
LDA	5,690'	7,100'	5,356'	7,100'	5,576'	7,100'

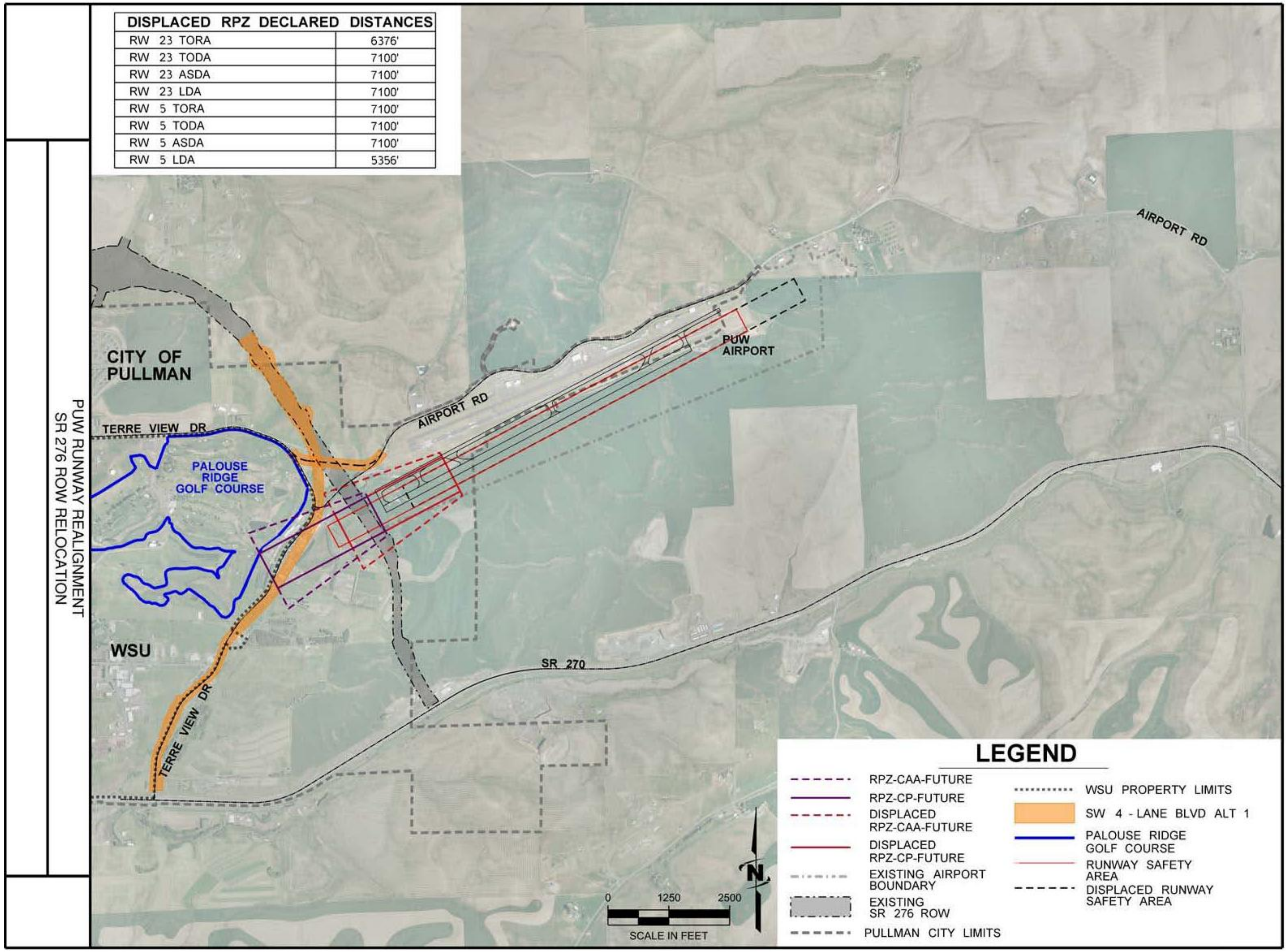
** 6,258' is Minimum LDA for Critical Aircraft Grouping*

Exhibit 12: Declared Distance Alternative 1



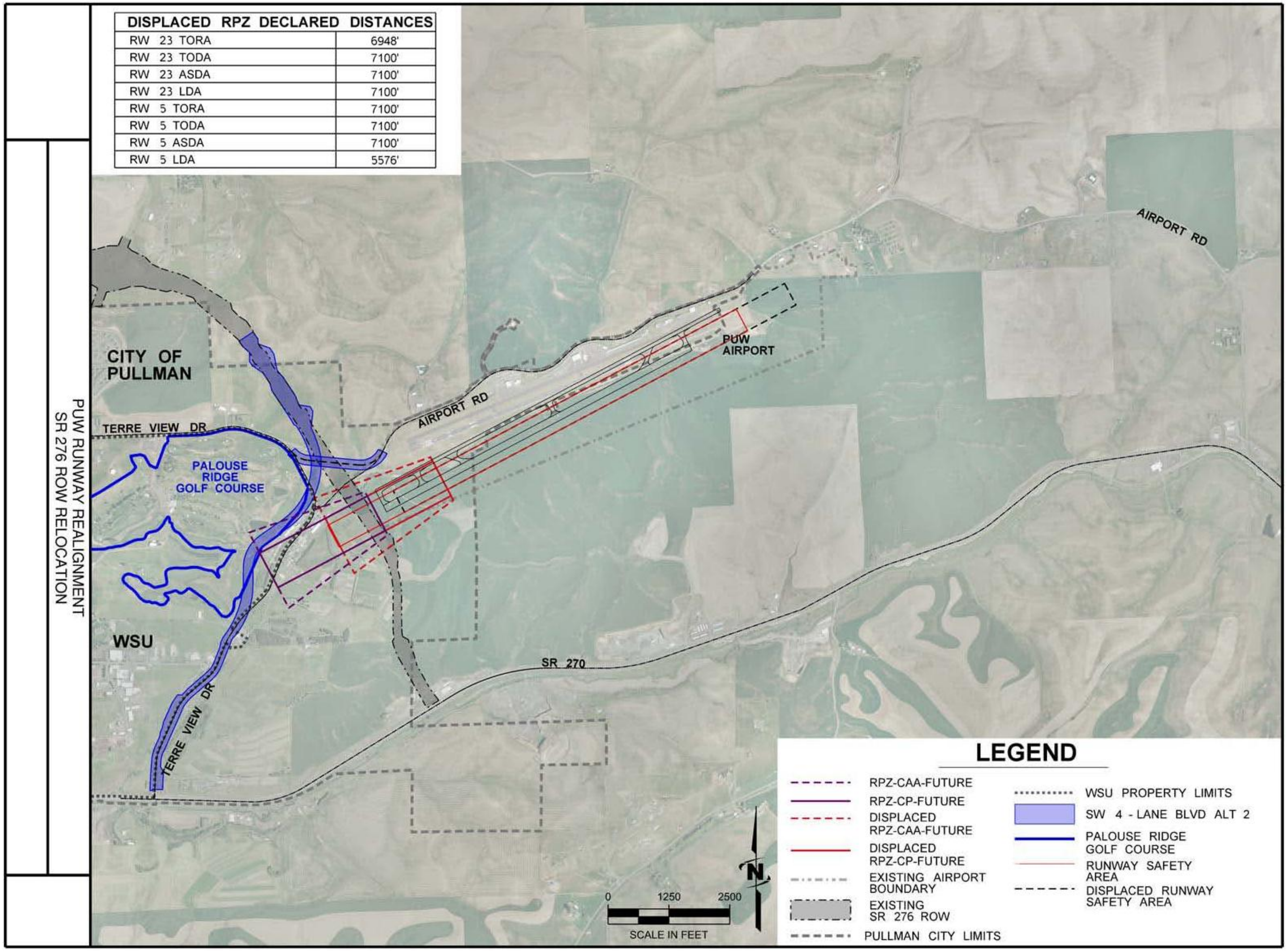
DISPLACED RPZ DECLARED	DISTANCES
RW 23 TORA	6490'
RW 23 TODA	7100'
RW 23 ASDA	7100'
RW 23 LDA	7100'
RW 5 TORA	7100'
RW 5 TODA	7100'
RW 5 ASDA	7100'
RW 5 LDA	5690'

Exhibit 13: Declared Distance Alternative 2



DISPLACED RPZ DECLARED	DISTANCES
RW 23 TORA	6376'
RW 23 TODA	7100'
RW 23 ASDA	7100'
RW 23 LDA	7100'
RW 5 TORA	7100'
RW 5 TODA	7100'
RW 5 ASDA	7100'
RW 5 LDA	5356'

Exhibit 14: Declared Distance Alternative 3



DISPLACED RPZ DECLARED	DISTANCES
RW 23 TORA	6948'
RW 23 TODA	7100'
RW 23 ASDA	7100'
RW 23 LDA	7100'
RW 5 TORA	7100'
RW 5 TODA	7100'
RW 5 ASDA	7100'
RW 5 LDA	5576'

East Shift Alternative

This alternative utilizes the Preferred Runway Realignment Alternatives alignment but shifts the runway to the east 2,785 feet and maintains a runway length of 7,100 feet. The purpose of shifting the alternative to the east is to remove Airport Road, Terra View Drive, the Palouse Ridge Golf Course, and the existing SR 276 ROW from the RPZ. **Exhibit 15** illustrates the alternative.

Airspace – The 2012 ALP, United States Geological Survey, and terrain elevation contours generated by an ongoing FAA Airports Geographic Information System project indicate that terrain to the east of the airport rises above airport elevation and will impact airspace. Extending the Runway to the east increases terrain penetrations in Runway End 23 approach surfaces and Runway End 5 departure surfaces as defined by AC 150/5300-13A, Airport Design; Federal Aviation Regulation Part 77.19, Safe, Efficient Use, and Preservation of the Navigable Airspace – Civil Airport Imaginary Surfaces; and FAA Order 8260.3B, U.S. Standard for Terminal Instrument Procedures (TERPS).

The 40:1 TERPS departure surface for operations for Runway 5 experiences an increase in terrain penetrations covering an area of 180 acres within 6,000 feet of the runway end, where aircraft will be flying at low altitude. The Preferred Runway Realignment Alternative has 40 acres of terrain penetrations. Shifting the runway to the east to clear the RPZ will require a significant increase in earthwork to clear terrain penetrations and subsequently will increase project costs dramatically. **Exhibit 16** illustrates compares the terrain penetrations associated with the Preferred Runway Realignment Alternative and the East Shift alternative.

The Preferred Runway Realignment Alternative requires the removal of 5.6 million cubic yards of soil to remove penetrations from the Runway 23 end and meet FAA design standards. The East Shift Alternative would require the removal of 9.6 million cubic yards of soil, an increase of 4 million cubic yards. It is estimated that 3 million cubic yards of soil can be used on-site and the remaining 6.6 million cubic yards of soil must be transported off-site. The East Shift alternative is estimated to increase project costs by $32 million. This cost estimate assumes the soil conditions are the same as those identified through geotechnical investigations completed for the Preferred Runway Realignment Alternative. Should variable conditions be identified, the cost estimate would likely increase significantly. **Table 15** outlines the estimated cost for the East Shift Alternative compared to the Preferred Runway Realignment Alternative.

Table 15: Cost – East Shift Alternative Compared to Preferred Runway Realignment Alternative

Alternative	**Preferred Runway Realignment Alternative**	**East Shift Alternative**
Phase	**Cost**	**Cost**
Property Acquisition	$2.5million	$2.5million
Design	$12.2 million	$12.2 million
Construction	$45.3 million	$77.3 million
Total	**$60.0 million**	**$92.0 million**

Exhibit 15: East Shift Alternative

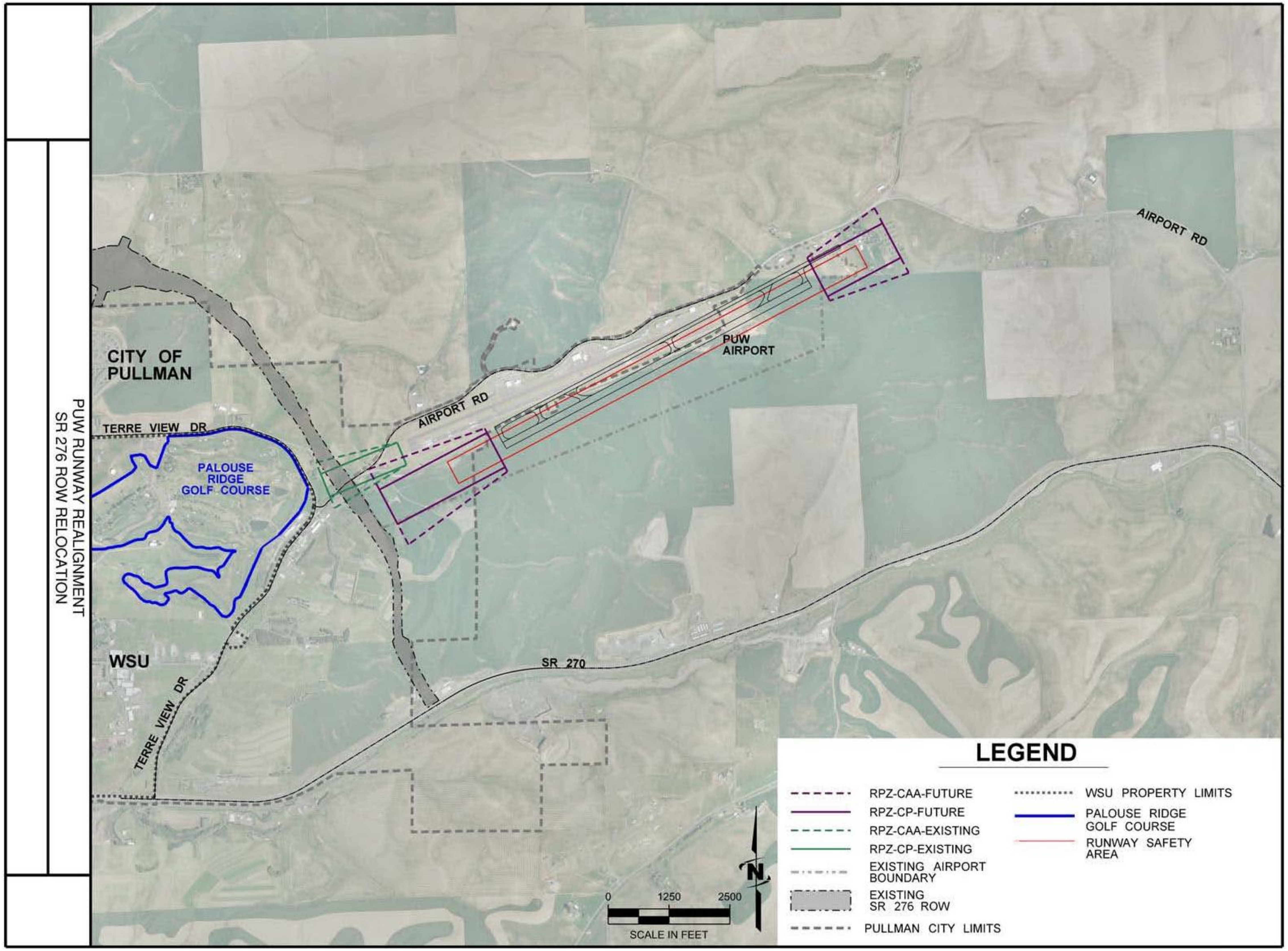
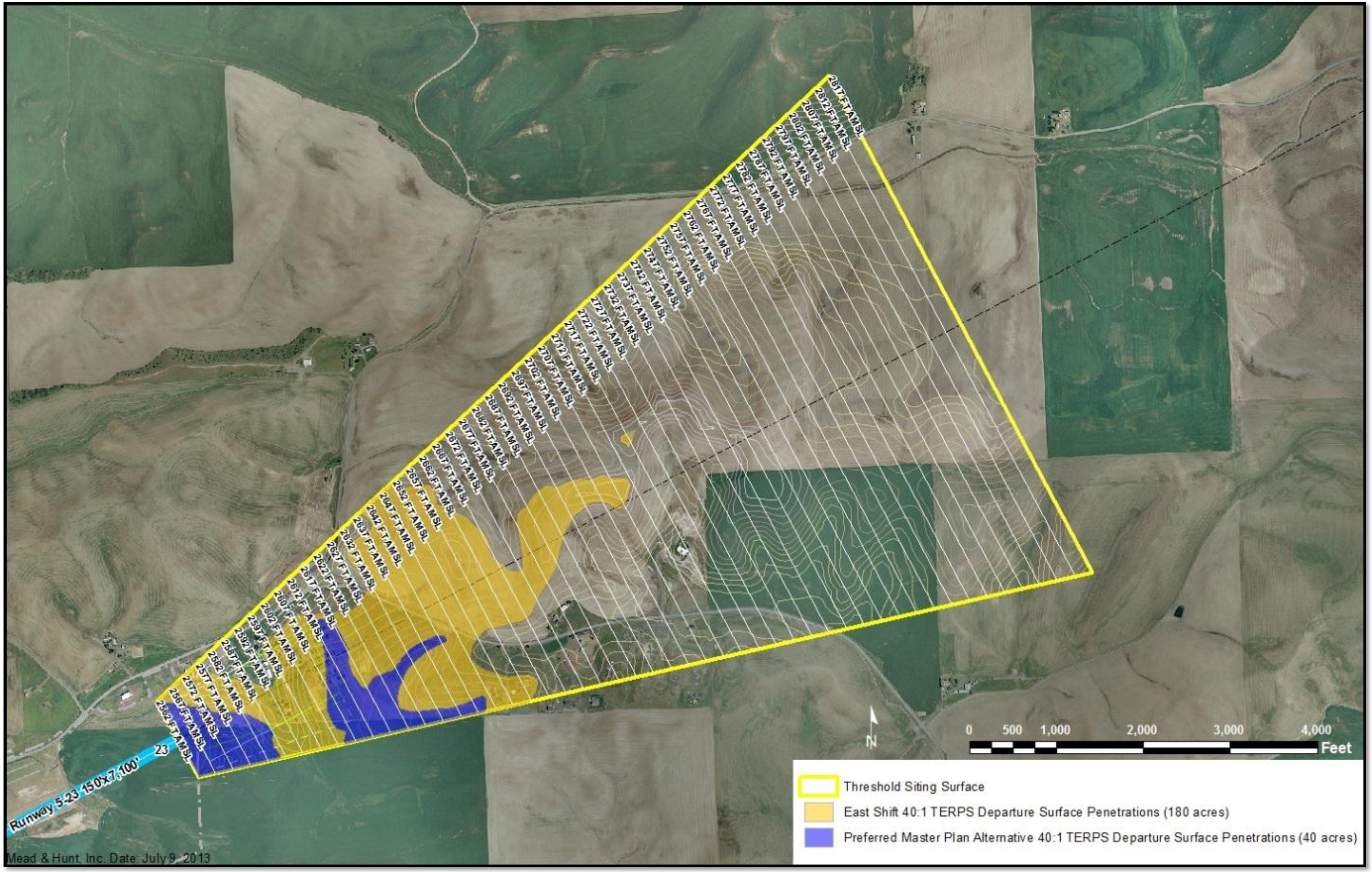


Exhibit 16: Terrain Penetration Comparison



Mead & Hunt, Inc. Date: July 9, 2013

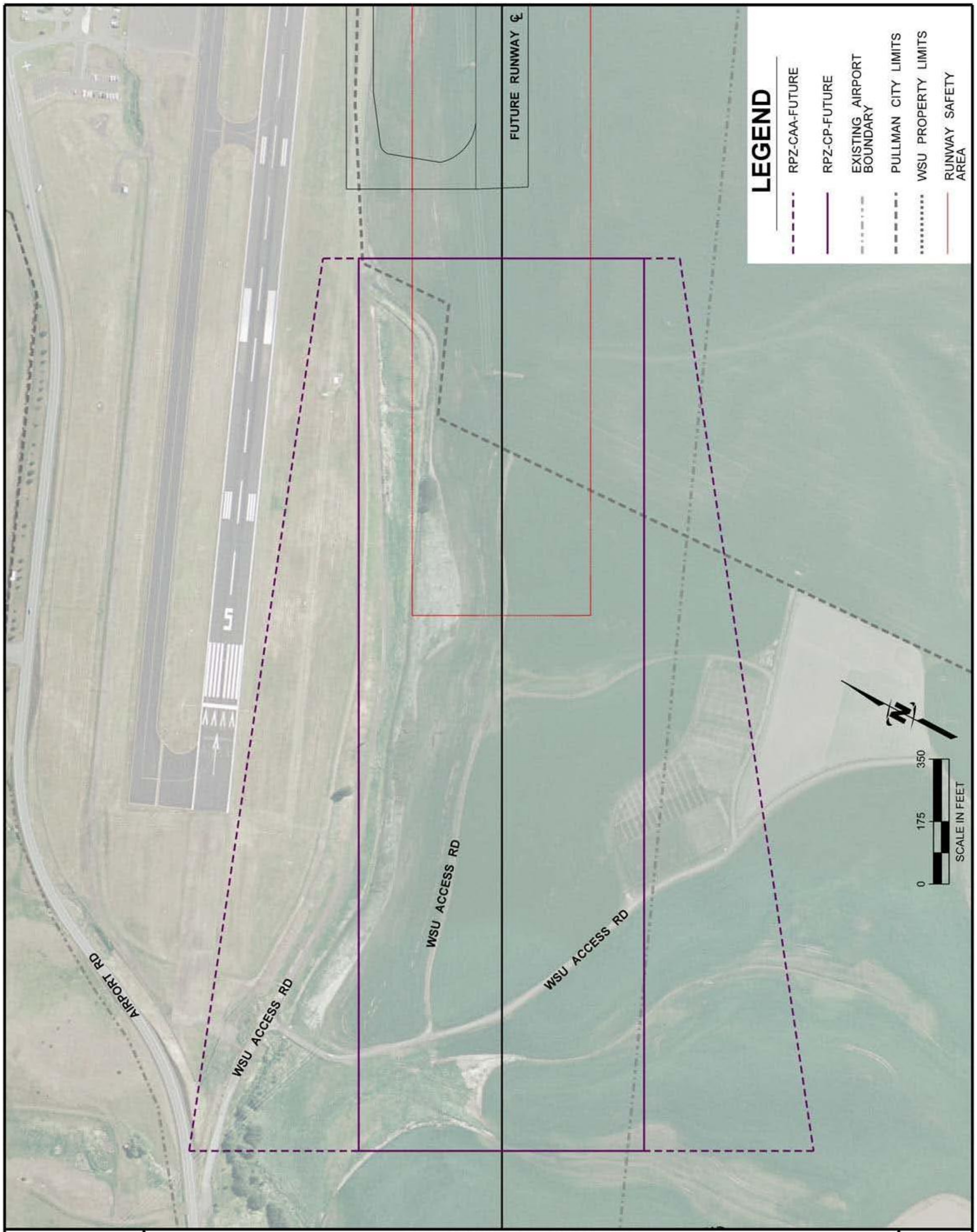
RPZ Exposure – This alternative eliminates Airport Road, Terra View Drive, the existing SR 276 ROW, Palouse Ridge Golf Course, and reduces WSU agricultural research facility exposure from within the Runway 5 RPZ. However, this alternative introduces incompatible land uses within the Runway 23 RPZ which includes 6 residential properties and one commercial property (agricultural business). The residential properties are single family homes with market values of approximately $200,000. The introduction of residential land uses within the Central Portion (CP) of the RPZ is not consistent with FAA policy regarding incompatible land uses within RPZs and would likely result in the required acquisition of the residential properties. The estimated cost to acquire the 6 residential properties is $1.5 million assuming cooperation from the land owners.

This alternative reduces exposure within the RPZ Central Portion (CP) by 25 acres and by 1 acre within the Controlled Activity Area (CAA) compared to the No Action alternative. This alternative assumes the WSU agricultural research facilities and access roads will not be relocated. **Table 16** shows the RPZ exposure associated with the East Shift Alternative compared to the No Action Alternative. **Exhibit 17** illustrates the Runway 5 RPZ conditions while **Exhibit 18** shows the Runway 23 RPZ conditions.

Table 16: East Shift Alternative –RPZ Exposure

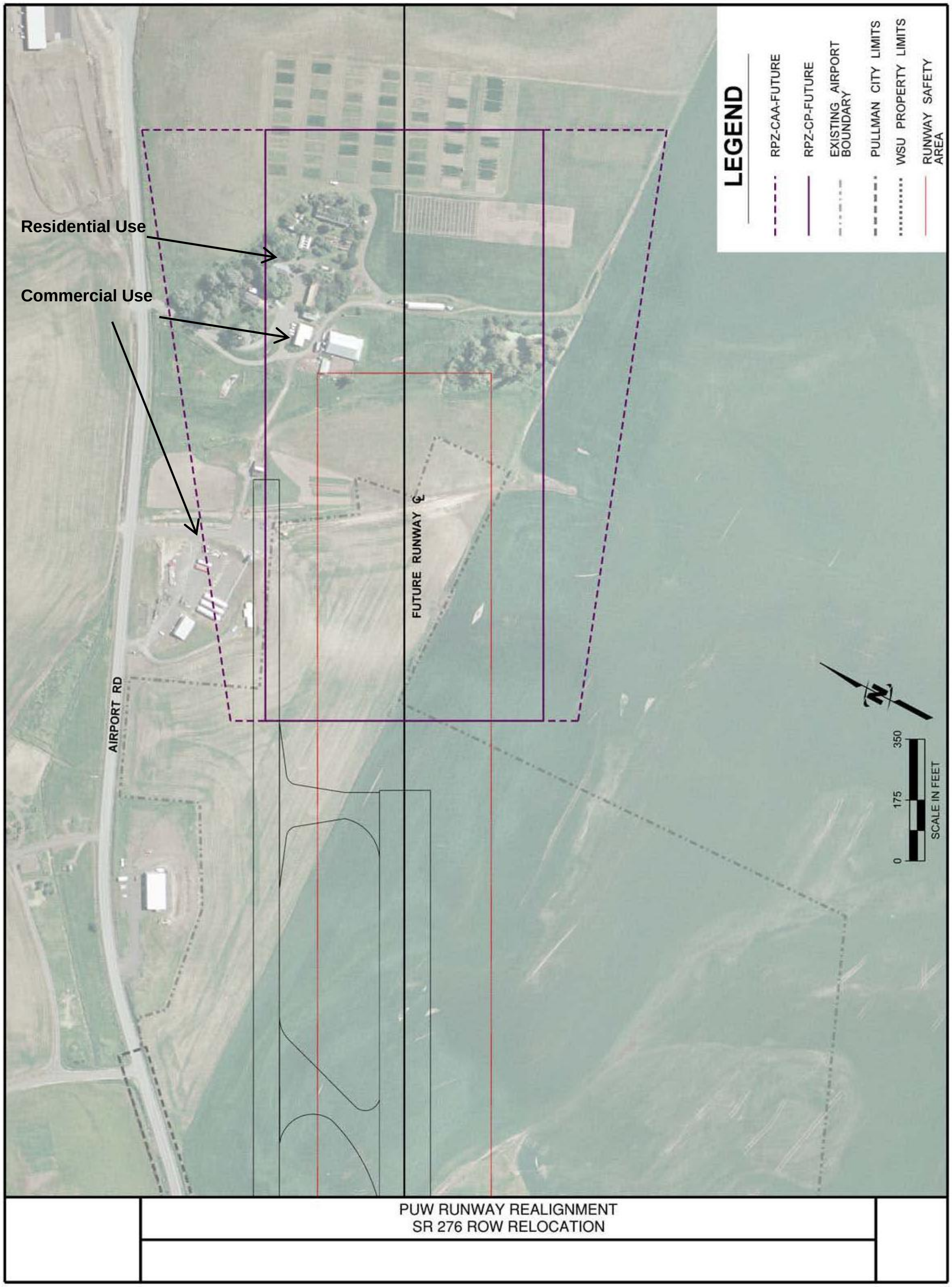
Land Uses	RPZ Central Portion	RPZ Controlled Activity Area	Distance to Runway End	Distance to Landing Threshold
Runway 5 RPZ Exposure				
Existing SR 276 ROW	0.0 acres	0.0 acres	N/A	N/A
Terra View Drive	0.0 acres	0.0 acres	N/A	N/A
WSU Access Roads	0.0 acres	0.4 acres	N/A	N/A
WSU Agricultural Research Facilities	0.3 acres	12.2 acres	N/A	N/A
Palouse Ridge Golf Course	0.0 acres	0.0 acres	N/A	N/A
Total Exposure (Runway 5)	0.3 acres	12.6 acres	N/A	N/A
Runway 23 RPZ Exposure				
Land Uses	**RPZ Central Portion**	**RPZ Controlled Activity Area**	**Distance to Runway End**	**Distance to Landing Threshold**
Residential	2.3 acres	1.2 acres	1,409’	1,409’
Commercial (Agricultural Business)	20.6 acres	16.0 acres	298’	298’
Commercial / Residential Access Roads	.5 acres	.3 acres	879’	879’
Total Exposure (Runway 23)	23.4 acres	17.5 acres	N/A	N/A
Combined Runway 5-23 RPZ Exposure				
Total Exposure (Runway 5)	0.3 acres	12.6 acres	N/A	N/A
Total Exposure (Runway 23)	23.4 acres	17.5 acres	N/A	N/A
Total Exposure (Runway 5/23 Combined)	23.7 acres	30.1 acres	N/A	N/A
No Action Alternative Total Exposure	48.7 acres	31.1 acres	N/A	N/A
Variance	-25.0 acres	-1.0 acres	N/A	N/A

Exhibit 17: East Shift Alternative Runway 5 RPZ Conditions

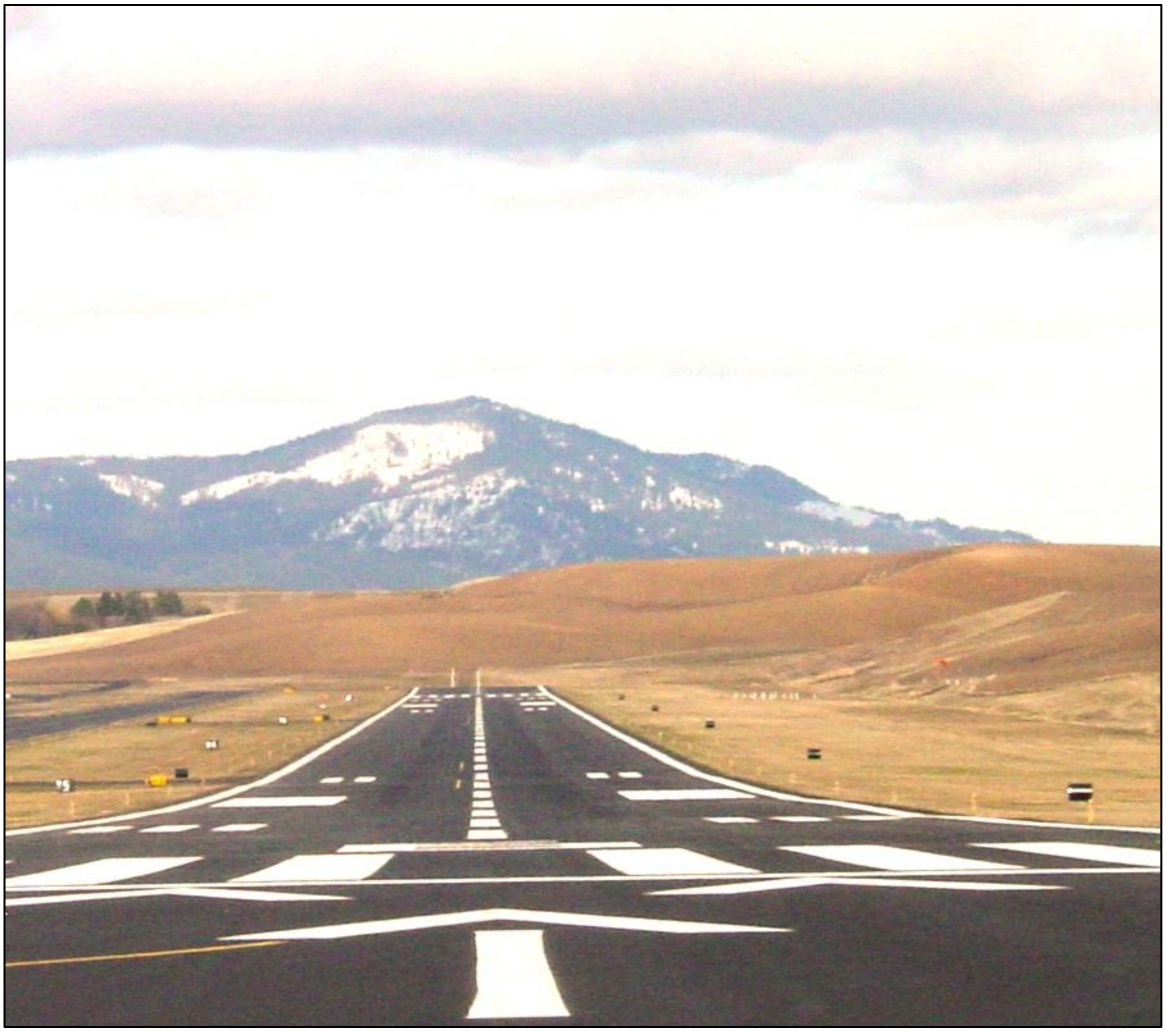


PUW RUNWAY REALIGNMENT
SR 276 ROW RELOCATION

Exhibit 18: East Shift Alternative Runway 23 RPZ Conditions



Future Limitations – The 2012 Master Plan indicates that an ultimate runway length of 8,000 feet may be necessary in the future, and recommends that the Airport plan to protect the property for a future extension when it is justified. If the East Shift Alternative were implemented and the Runway End 5 is fixed due to RPZ concerns, a 900 foot runway extension from Runway End 23 would further increase terrain penetrations by lowering the 40:1 TERPS departure surface by 25 feet. Terrain rises from west to east making any future need for a runway extension impracticable to implement due to significant terrain penetrations (pictured below).



The high point of Moscow Mountain (pictured above) is located approximately 8.4 nautical miles from the Existing Runway End 24, would be located approximately 8 nautical miles from Proposed Runway End 23 in the East Shift alternative. The high point of Moscow Mountain is located approximately 8.5 miles from the Proposed Runway End 23 in the 7,100 foot runway alignment in the Preferred Runway Realignment Alternative as depicted on the Airport Layout Plan.

Proximity of the existing runway to Moscow Mountain influences the design of the missed approach procedure into Runway End 5. The East Shift alternative moves Runway End 5 1,750 feet to the east compared to its existing location and 2,785 feet to the east compared to the Preferred Runway Realignment Alternative. A goal of the runway improvement is to lower instrument minimums, which may shift the missed approach point closer to the runway end. This would mean that aircraft executing a missed approach would be farther east (closer to Moscow Mountain) when they begin their climb. The missed approach procedure instructs pilots to fly runway heading, towards Moscow Mountain, as they climb from 3,000 feet to 3,500 feet above mean sea level (AMSL), which requires a distance of 2.5 nautical miles using a TERPS standard 200 feet per nautical mile minimum climb gradient. After passing through 3,500 feet AMSL, aircraft are instructed to turn to the north to avoid Moscow Mountain.

It is likely that most aircraft will be able to climb quickly enough and turn to the north before terrain becomes an issue; however, it is not recommended that the runway end (and missed approach point) be moved 0.5 nautical miles closer to a known terrain hazard.

Moving Proposed Runway End 23 2,785 feet to the east will lower the one engine inoperative (OEI) departure surface by 45 feet over any point where the two surfaces overlap. OEI is not a TERPS surface, and has been removed from the Airport design AC; however, it is used by airlines. Terrain in the departure surface may influence an air carrier's decision on whether or not to operate at PUW, or what type of aircraft to operate at PUW.

Summary – This alternative is not recommended due to the significant increase in terrain penetrations, cost to remove the terrain penetrations, introduction of residential land use within the Runway 23 RPZ, and the future limitations it would impose upon the airport.

Section 4 – Technical Memorandum Recommendations Summary

Evaluation of land uses within the future RPZ, alternative / mitigation cost, and stakeholder coordination resulted in the selection of the Southwest 4-Lane Boulevard Alternative as the Preferred SR 276 ROW Relocation Alternative.

The Southwest 4–Lane Boulevard Alternative provides the following benefits:

- Reduces people and buildings from the RPZ (removal of WSU Agricultural Research Facilities and Access Roads)
- Improves CP RPZ conditions over the No Action ROW alternative
- Moves SR 276 away from runway end and outside the Runway Safety Area
- Removes part of Terra View Drive and Terre View Drive / Airport Road intersection from future RPZ
- Limited access points to allow unconstrained traffic flow through the RPZ
- Least expensive solution