FRIEDMAN MEMORIAL REPLACEMENT AIRPORT

ENGINEERS' REPORT

FOR

PRELIMINARY SITE ENGINEERING

SITE 12

January 13, 2011

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SECTION 1 - INTRODUCTION

1.1 Project Assignment

Friedman Memorial Airport is located 13 miles south of Sun Valley inside the City of Hailey, Idaho. The airport currently does not and cannot comply with FAA airfield design standards on the limited land owned by the airport. The location also has mountainous terrain on the east, west, and north sides that preclude instrument approach procedures. Given these conditions, the Friedman Memorial Airport Authority (FMAA) has proposed to construct and operate a replacement airport within Blaine County, Idaho.

The Federal Aviation Administration is evaluating two potential replacement airport sites in greater detail as part of the Environmental Impact Statement (EIS) in order to select the preferred location for the Friedman Memorial Replacement Airport. This study uses draft ALP plan sets prepared by L&B in June 2010 for Sites 10A and 12 as the basis for this preliminary civil engineering site development analysis. The level of the design effort of this study is 15% to 20% progress toward complete design.

1.2 Scope of Services

The Scope of Services for this work effort includes performance of a preliminary engineering study that identifies key systems and details of those systems to achieve a confidence level in the infrastructure quantities and order of magnitude cost estimates related to Site 10A and Site 12.

This report identifies the principal airport facility requirements focused on identification, sizing and quantification of basic civil engineering infrastructure, including earthwork, drainage, pavements, utilities, and FAA Part 139 infrastructure. The report also reviews and presents basic terminal, hangar, and other airport building facilities. Where there were options to take an economical or a conservative approach the conservative approach is taken. Final design of this project will include performance of the necessary detailed analyses to identify the best systems to be constructed.

Documents available for review during the development of this report were:

- Wood River Region Airport Site Selection and Feasibility Study August 2006.
- Aviation Activity Forecast, September 2008
- Airport Layout Plan set Site 10A, June 2010
- Airport Layout Plan Set Site 12, June 2010

1.3 Project Description

The proposed airfield will replace the existing Friedman Memorial Airport in Hailey, Idaho (SUN) as the commercial air carrier facility. The new airport is expected to consist of an 8,500 foot by 100 foot runway, parallel taxiway, commercial and general aviation aprons, hangar areas, terminal building, air traffic control tower and ancillary facilities. Landside access will be via new roadways connecting directly to U.S. 20 on the south side of the airport. The initial development plan indicates a 9-27 orientation for the runway and parallel taxiway "A". Aprons, terminal, and primary access are planned for the south side of the airfield. Elevations for the Runway 9-27 thresholds are 4,974 to 4,984 feet MSL. Design traffic indicates the largest aircraft in the mix is an Airport Design Group III C with the largest aircraft expected to serve the airport being an Airbus A319. Preliminary pavement design is based on flexible pavement being used for all paved areas, with the exception of rigid pavement for the commercial apron and deicing pads. All full strength pavements were designed for 20 years of traffic. In addition, infrastructure systems (water & sewer) design parameters shall be based on the approved Airport Layout Plan (ALP) and on the YR 2022 projections.

SECTION 2 - REVIEW OF USER REQUIREMENTS

The user requirements for the Friedman Memorial Replacement Airport as presented in this document are based on the Airport Layout Plan (ALP) prepared by Landrum & Brown in June of 2010. An effort has been made to evaluate the airport and aviation related facilities shown on the ALP based on experience with development of airports of similar size in the United States. In certain cases, facilities have been added or modified as a result of this effort, such as:

- Maintenance Facility
- Water Supply and Treatment
- Sewage Treatment Facility
- Rental Car Quick Turn Around (QTA) Facility
- Fuel Facilities

Final user requirements, as well the proposed phasing of the development of the airport should be confirmed with the Airport Authority and tenants once a replacement airport site is selected and the development process is initiated.

SECTION 3 - CODES, STANDARDS AND REGULATORY REQUIREMENTS

3.1 Federal Design/Permit Requirements

3.1.1 U.S. Environmental Protection Agency (US-EPA)
Storm Water Pollution Prevention Plan (SWPPP)
Control of storm water runoff from construction sites that disturb more than one (1) acre must comply with the requirements of the Clean Water Act (CWA); that mandates the preparation and implementation of a sediment and erosion control plan during construction under the National Pollutant Discharge Elimination System (NPDES) program.

Federal Emergency Management Agency (FEMA)
Flood Insurance Rating Maps (FIRM): Elevation Certificate – Form 81-31

3.1.2 FAA Advisory Circulars:

- AC 150/5070-6B Airport Master Plans
- AC 150/5210-15A Aircraft Rescue And Firefighting Station Building Design
- AC 150/5220-18A Buildings For Storage And Maintenance Of Airport Snow And Ice Control Equipment And Materials
- AC 150/5300-13 Airport Design
- AC 150/5320-5C Surface Drainage Design
- AC150/5320-6E Airport Pavement Design and Evaluation
- AC 150/5325-4B Runway Length Requirements for Airport Design
- AC 150/5340-30D Design and Installation Details for Airport Visual Aids
- AC 150/5360-13 Planning and Design Guidelines for Airport Terminal Facilities
- AC 150/5370-10E Standards for Specifying Construction of Airports

3.1.3 FAA Orders:

- 6480.7D Air Traffic Control Siting Criteria
- 6750.16D Siting Criteria for Instrument Landing Systems
- 6850.2B Visual Guidance Lighting Systems

3.2 State Design/Permit Requirements

3.2.1 Idaho Transportation Department (ITD):

- Roadway Design: "Roadway Design Manual", July 2010
  AASHTO "A Policy on Geometric Design of Highways and Streets, 5th Edition"

- Roadway Technical Specifications: Idaho Transportation Department "Materials Manual", July 2010

3.2.2 Idaho Department of Environmental Quality (IDEQ):

- Air Quality: Air Pollution Control Permit
  An Air Quality Permit will be required prior to construction for any facilities that emit or may emit pollutants into the air per the rules and regulations of IDEQ.

- Water Permit
  Water will be supplied to the site via a self-sufficient public drinking water system that will be regulated by the IDEQ in accordance with the requirements of the Safe Drinking Water Act (SDWA) and the State of Idaho Rules for Drinking Water Systems (IDAPA 58.01.08). The system will likely be classified as a non-transient water system.

- Wastewater Permit
  Due to the remote location of the proposed facility, away from any municipal wastewater systems, it will be necessary to treat all sewage generated at the airport in-situ. A gravity sewer system will collect all wastewater flows and convey them to a lift station and force main for pumping to a proposed Wastewater Treatment Package Plant to be placed on the site. The treated effluent will then be discharged into a sub-surface disposal system (i.e. drain field). Installation of the sanitary sewer system will be regulated by the Idaho Administrative Procedures Act (IDAPA); Chapter 58, Department of Environmental Quality, Section 16, "Wastewater Rules."

- Hazardous Waste Permit
  The Hazardous Waste Management Act of 1983 requires owners of facilities that treat, store or dispose of hazardous waste to prepare a hazardous materials management plan and obtain a Hazardous Waste Permit from the IDEQ to ensure the hazardous wastes are handled and managed safely.

- Solid Waste Management
  The proposed facility will not include any provisions for on-site solid waste handling, composting or incineration. It is anticipated that all solid waste and other miscellaneous rubbish will be picked up and trucked off the premises by a regularly scheduled service. As feasible, handling and disposal of solid waste materials will be include provisions for recycling.

- Underground Storage Tanks Permit
  All underground tank installations shall comply with the requirements of the Idaho Statues, Title 30 Health and Safety, Chapter 88 "Idaho Underground Storage Tank Act."

3.2.3 Idaho Department of Water Resources (IDWR)

- Surface Water Permit
  All proposed drainage improvements required for the development of the site are governed by the Idaho Department of Water Resources

policies and procedures, Idaho Administrative Procedures Act (IDAPA); Chapter 37, Department of Water Resources. Site 12 is located within the boundaries of Water District 37M – The Little Wood River Basin.

- Floodplain Management
  Development of the site will require coordination of water management actions with the Idaho Department of Water Resources (IDWR) floodplain manager, who is responsible for the National Flood Insurance Program (NFIP) in Idaho.

- Stream –Channel Alteration
  A permit to modify or alter stream channels will be required from IDWR.

- Water Rights & Supply Well
  A permit will be required from IDWR to secure a Water Right for the Supply Well and to install (or drill) a new supply well.

- Low Temperature Geothermal Use
  Since groundwater at the test well was found at temperatures greater than 80° F, a permit from IDWR will be required to request an exemption of Low Temperature Geothermal Use.

3.2.4 Idaho Department of Health & Welfare: South Central District

- Waste Water Treatment Plant Permit
  A permit will be required from the Idaho Department of Public Health & Wellness, South Central Public Health District for the installation and operation of the Subsurface Sewage Disposal System (SSDS).

- Water Use (Groundwater / Well)
  The installation and operation of a water supply well will be required to follow the guidelines of the Idaho Department of Public Health & Wellness, South Central Public Health District.

3.3 Local Design/Permit Requirements

The proposed airport facility for Site 12 is located in Blaine County, Idaho; therefore, the following local/county permits will be required:

3.3.1 Blaine County:

- Zoning Application & Permit
- Building Permit
- Fire Code (Section 41-253): Wood River Rural Fire District

3.3.2 Other Codes & Regulations:

- International Building Code (IBC)

- International Energy Conservation Code (IECC)
- International Fire Code (IFC)
- NFPA 24: Installation of Private Fire Service Mains and Their Appurtenances
- NFPA 70: National Electric Code (NEC)
- Idaho Power: Idaho Power Transmission Line Dept.

SECTION 4 - SITE LOCATION AND TOPOGRAPHY

Site 12 is located in Blaine County, Idaho, approximately 13 miles east of Fairfield, Idaho, 15 miles southwest of Bellevue, Idaho, and adjacent to the Camas County line. The site is also located approximately 12 miles west of the junction of U.S. 20 and State Highway 75. The study area is located in Township 1 South, Ranges 16 East and 17 East, Boise Meridian and is situated in the eastern portion of the Camas Prairie, between Camas Creek to the south, Moonstone Mountain to the northeast, Square Mountain to the north, and Macon Flats to the south.

The site is bounded on the west by County Line Rd, on the north by range land, to the east by Camp Creek, and the south by Camas Creek. The topography slopes gently downward to the southeast, from a high of about 5,005 ft MSL near the northwest corner of the site to a low of approximately 4,895 ft MSL, at the point where Camp Creek exits the eastern boundary of the site. The slopes are considered moderate, ranging from 0% to 4% and the terrain can be described as gently rolling. The ground cover at the time of the initial site exploration generally consisted of sparse to dense sage brush with annual grasses.

SECTION 5 - SITE GEOLOGY

5.1 Geotechnical Exploration

Geotechnical services performed by Terracon Consultants, Inc. included drilling 15 borings within this proposed relocation site. Based on the information obtained from our subsurface exploration, the site can be developed for the proposed project. The identified geotechnical considerations are presented below. Conclusions, recommendations, and considerations identified in this report are preliminary. Detailed design of the airport facilities will require a more extensive geotechnical investigation, as the subsurface conditions identified by the borings were highly variable. Terracon's report dated November 19, 2010 is presented in Appendix A.

5.2 Subsurface Conditions

Development of the airport will require grading of the site to establish runway and taxiway horizontal and vertical alignments that meet the requirements of the Federal Aviation Administration's Airport Design standards. Therefore, the geotechnical investigation also provided information regarding the elevation of soft and hard rock at the site. Seven of the 15 borings were terminated due to auger refusal on basalt boulders or bedrock at depths of 2½ to 15½ feet below the existing ground surface. Based on auger resistance, the thickness of the weathered basalt overlying competent basalt generally ranged from about ½ to 3½ feet. Subsurface conditions were highly variable among the boring locations. Lean clay and clayey sand were the primary soils encountered above the basalt. Other soils included silty sand, sand with clay, sand with gravel, silty clay, and basalt gravel, cobbles, and boulders.

5.3 Groundwater

The borings were monitored during drilling for the presence and level of groundwater. Groundwater was not encountered within the borings performed as part of the exploration. Fluctuations in the depth to groundwater may occur due to seasonal variations in the amount of irrigation, rainfall, runoff, and other factors not evident at the time the borings were performed. Evaluation of these factors was beyond the scope of the preliminary exploration.

5.4 Geotechnical Considerations

As stated above, based on preliminary field and laboratory investigations, Site 12 should be suitable to support the proposed development. A primary geotechnical consideration identified during the exploration is the presence of shallow rock throughout most of the site. In addition, the surface soils are shallow, variable, and commonly include highly plastic clay.

5.5 Seismic Considerations

Site 12 has been identified in the geotechnical report as being located within an active seismic zone. However, the limited scope of this preliminary investigation has only yielded the following information and recommendations.

International Building Code (IBC) Seismic Design Parameters (1)	
Description	**Value**
Site Classification (2)	**C to D (3)**
Ss, Short period spectral response acceleration (Site Class B)	**0.37g**
S1, 1-second period spectral acceleration (Site Class B)	**0.12g**
(1). Based upon Section 1613 of the 2006 International Building Code (IBC)	
(2). From the 2006 IBC, the seismic site class is determined from a soil profile extending to a depth of 100 feet. The scope for this preliminary site analysis does not include a boring to a depth of 100 feet. The borings for this project extended to a maximum depth of approximately 15 feet, and the seismic site classification assumes that similar soil/rock conditions continue below the maximum depth of the subsurface exploration. A geophysical exploration should be performed to confirm the site classification, or possibly justify a more favorable site classification.	
(3). The seismic site classification will depend on the depth to rock at the specific structure locations. Final selection of the seismic site classification should be determined as part of the design level geotechnical exploration.	

5.6 Site Preparation

Prior to construction, deleterious materials such as vegetation, root systems, topsoil, debris, manmade structures/utilities, and soft, frozen, disturbed, or otherwise unsuitable materials should be removed from the proposed pavement and building structure areas. For this study it is assumed to clear and grub 1.0 foot of soil covering all developed areas. Exposed surfaces should be free of mounds and depressions that could prevent uniform compaction. Excavations for pavements and site utility installations may encounter shallow rock that could require special equipment for rock excavation and trenching.

SECTION 6 - PAVEMENT SECTION DESIGN

The pavement structural sections of the roadways for the State of Idaho are governed by the Standards Manuals listed in Section 3 above. In order to perform the structural section calculations, R-Values need to be obtained for the existing soil on the site. The R-Value is a number that defines the bearing capacity of the soil based upon a soils/materials resistance to deformation under saturated conditions.

All landside pavements for the airport were designed using the applicable standards for the specific pavement. U.S. 20 pavements were designed using the Idaho Transportation Department (ITD) design criteria. On-airport roadways and parking lots also utilized the ITD design standards but the pavement surface thickness was reduced to reflect the low vehicle volumes and operating speeds and the limited number of large trucks that will traverse the airport landside pavement.

Airfield pavement design is based upon Fleet Mix developed by Landrum & Brown, the FAARFIELD Airport Pavement Design (V 1.203, 7/31/2008) and the Geotechnical Engineering Report prepared by Terracon Consultants, Inc. for the primary airfield pavements dated November 19, 2010 (Appendix A). For pavement design assumptions for General Aviation and landside pavements see Appendix C.

Aircraft Traffic Mix

Forecasted aircraft mix and traffic growth factors from Landrum & Brown and a 20 year design life were used to calculate pavement sections. In accordance with the policies of the Federal Aviation Administration, Northwest Mountain Region Airports Division Office, drainage treatment for new pavements includes the installation of edge drain. Gross take-off weights were verified using AC 150/5300-13, *Airport Design*, Appendix 12 and aircraft technical manuals.

Subgrade CBR Value and Frost Penetration

Soil samples of near surface clay soils were taken from borings preformed by Terracon in September 2010. The samples were tested in accordance with ASTM D1883 and ASTM D1557, resulting in a CBR of 7.5. The subgrade soil was also determined to have a Plasticity Index of 19 and 35 percent of the sample was finer than 0.02 mm. By referring to the FAA pavement design Advisory Circular AC 150/5320-6E the soil is classified in Frost Group FG-3. The depth of frost penetration derived by the Corps of Engineers method from the Air Freezing Index is 70 inches. However, local design codes only require a depth of 30 inches for shallow spread footings. Based upon discussions with FAA, this 30-inches frost depth will be used for the airfield pavement design.

U.S. 20 Pavement Design

Design of the pavement section for the relocation of U.S. 20 was prepared in accordance with the Idaho Transportation Department's (ITD's) Roadway Design Guide and companion Materials Manual, which are collectively define the requirements/parameters for development of the applicable roadway section. The pavement section calculation is then calculated using the observed site soils condition test values, planned traffic volumes and characteristics and a climate factor, based on the location of the roadway within the State of Idaho.

Based on traffic data obtained from the ITD website, the 2008 ADT on the existing U.S. 20 was 1,250 passenger vehicles and 250 commercial vehicles. These volumes of traffic have been consistent over time and were therefore used as the design input values. The Traffic Index produced from this input data plus the Climate Factor and a set of three R-values (subgrade bearing capacities) were used to derive a set of three pavement sections for the relocated roadway. A set of R-values, selected for the three pavement designs, reflected building a roadway on subgrade, on placed aggregate subbase and on a prepared aggregate base material, respectively. The resulting analysis and calculations, presented in Appendix C, produced three distinct pavement sections composed of an asphaltic concrete surface pavement, an aggregate base course and an aggregate subbase, placed on a prepared subgrade. The ITD minimum pavement section requirement is two (2) inches of asphaltic concrete surface pavement on four (4) inches of aggregate base on four (4) inches of aggregate subbase over a prepared subgrade. All of the calculated pavement sections exceeded this minimum requirement. In accordance with the defined frost penetration depth to be used for local pavement design, the equivalent pavement section provided in the table below was selected for the roadway design section to be used for the project cost estimate.

Preliminary section thicknesses for each of the various pavement types to be used to construct the airport project are presented in the following set of tables.

Runway and Taxiway (Proposed Full-Strength ACC Pavement Section)

Description	Thickness
Asphalt Surface Course	4-inches
Asphalt Base Course	5-inches
Drainage Layer Underlain with Geotextile	8-inches
Subbase Course	13-inches
Compacted Subgrade	12-inches

Proposed Shoulder and Blast Pad Pavement Section

Description	Thickness
Asphalt Surface Course	3-inches
Crushed Aggregate Base Course	6-inches
Subbase Course	11-inches
Compacted Subgrade	6-inches

Proposed PCC Air Carrier Apron Section

Description	Thickness
Portland Cement Concrete (PCC)	15.5-inches
Econocrete	6-inches
Drainage Layer Underlain with Geotextile	6-inches
Subbase Course	6-inches
Compacted Subgrade	12-inches

General Aviation ACC Pavement Section

Description	Thickness
Asphalt Surface Course	4-inches
Crushed Aggregate Base Course	8-inches
Drainage Layer Underlain with Geotextile	6-inches
Subbase Course	12-inches
Compacted Subgrade	12-inches

Relocated U.S. 20 Pavement Section

Description	Thickness
Asphalt Surface Course	6-inches
Crushed Aggregate Base Course	9-inches
Subbase Course	15-inches
Compacted Subgrade	12-inches

Internal Airport Roads & Parking Lots

Description	Thickness
Asphalt Surface Course	4-inches
Crushed Aggregate Base Course	10-inches
Subbase Course	16-inches
Compacted Subgrade	12-inches

Interior Perimeter Security Road

Description	Thickness
Crushed Aggregate Base Course	6-inches
Subbase Course	9-inches
Compacted Subgrade	12-inches

SECTION 7 - EARTHWORK AND DRAINAGE

7.1 Earthwork

During preparation of the earthwork mass balance calculations, it was found that holding the fixed runway end elevations resulted in a significant volume of excavation for Site 12. It is recommended that consideration be given to raising the east end of the runway to balance the overall excavation and embankment quantities on the site. By raising the east end of the runway, the volume for excavation can be greatly reduced. A second opportunity to reduce the site earthwork is to construct a box culvert to route the ephemeral streams under the airport rather than the realignment of the streams around the airport. This man-made channel results in approximately one million cubic yards of excavation as well as the placement of approximately 23,000 cubic yards of riprap for channel bank armoring. Realignment of the ephemeral streams is discussed further below in the Section 7.2 Drainage.

The earthwork evaluated for this study consisted of one foot of clearing and grubbing across all the developed site and removal of all in situ material under pavement sections down to 30 inches below proposed finished grade and 30 inches under buildings and roads. All materials used in the completion of the pavement sections (top 30 inches), throughout the airport, shall be imported from local quarries. In areas of fill, below the 30 inch pavement section or under buildings, on-site materials will be used. All clearing, grubbing and excavated material will remain on site and not hauled off.

<u>Pavement Subgrade in Cut Areas</u>
The grading requirements result in various cut and fill sections to establish the required vertical profile for the runway, taxiway and other airport pavements. In the cut areas, the depth of rock will control the work to be done to prepare the pavement subgrade. At a minimum, any encountered rock will be excavated to the depth of the bottom of the pavement subbase. This will result in a layer of compacted base between the top of the rock and the pavement. Where the depth of rock is encountered below the subbase materials, soil and soft rock excavation will be continued to the 30-inch designated depth for frost penetration. Compacted layers of select, non-frost susceptible fill materials will be used to rebuild the excavation to the bottom of the subbase. Then the specified subbase, base and surface pavement section will be placed on the compacted subgrade.

When areas of abrupt rock and soil changes occur, the surface will be shaped to create a gradual transition of the rock surface down to the 30-inch depth of frost penetration. The transition of the rock surface is intended to minimize the chance of experiencing differential settlement in the completed and operational pavement areas.

<u>Pavement Subgrade in Fill Areas</u>
In areas where fill is required to be placed to establish the required subgrade, the

top soil, frost-susceptible soils and any other unsuitable materials will be removed from within the limits of the pavement. Following this initial site preparation the fill will be placed in lifts meeting the requirements for fill specified in the FAA construction specifications. Once the fill is constructed to the level of the top of subgrade (bottom of subbase), the balance of the pavement section components will be placed on the prepared subgrade.

7.2 Drainage

Local site conditions and the control of flooding dictate the regulatory requirements for flood control, peak discharge and water quality management, which must be considered in the selection of the Storm Water Management System (SWMS) for the airport. Site 12 is located within the boundaries of Water District 37 – The Big Wood River Basin in Blaine County, Idaho. The proposed SWMS shall comply with all applicable Federal, State and Local Water Quantity and Water Quality regulations.

<u>Water Quantity</u>
The management of storm water both on a developed site and discharging from the site must be considered when performing work that results in an increase in the area of impervious surface. Generally, storm water management regulations state that the rate of runoff from the site after development cannot exceed the rate of runoff before the development. This requirement is typically met by construction storm water detention facilities within the development site.

The engineer started by evaluating the volume of water (i.e. Water Quantity) for a given storm event that is discharged based on the antecedent conditions (i.e. pre-development flows) and the hydrology of the site. Several erosion-defined features from ephemeral streams were observed on the site. Evidence of shallow groundwater was not observed.

The Storm Water Management System (SWMS) must consider the ultimate build-out based on the Airport Layout Plan (ALP), which is to be the basis of the post-development condition drainage system design. The post-development runoff flow rate from the proposed land development shall not exceed the calculated pre-development runoff rate for any storm up to the 10 YR event. One outfall is proposed to accommodate the entire runoff from the airport site.

In accordance with applicable standards, the design used to size the SWMS conveyance elements will be the 10YR/24HR storm event. Culverts crossing taxiways connectors or state roadways shall be sized to accommodate the 50YR/24 HR storm event. Based on the National Oceanic & Atmospheric Administration (NOAA) Atlas for the western United States Isopluvials, the precipitation for a 10YR/24HR storm event at the proposed airport site is 2.2 inches. In addition, the NOAA Atlas shows that the precipitation for the 50YR/24 HR storm event is 3.0 inches and for the 100 YR/24 HR storm event is 3.4 inches. Intensity-Duration-Frequency (I-D-F) curves based on the NOAA data were developed for the site and included in the Appendix D.

According to the FEMA FIRM maps, Site 12 is located in Zone C, outside an identified flood zone with no based flood elevation. As a result, a flood routing analysis shall be performed for the 100YR/24 HR storm event. The finished floor elevation of all facilities and the runway profile grade line shall be set no lower than 12 inches above the projected flood stage (i.e. based on the 100 YR flood routing). Furthermore, the edge of pavement for all taxiways and/or connectors shall be set at or above flood stage. For the purposes of this study, the elevations shown on the plans are assumed to meet these criteria.

Due to prolonged winter storms experienced at the site, the condition that most often contributes to flooding is snowmelt, especially in conjunction with a storm event. Snowmelt maybe particularly damaging in that heavy flows are not lessened by absorption into ground that is saturated or frozen. As a result, snowmelt can cause significant SWMS capacity and site erosion problems. These factors must be considered in the final design of the drainage system to arrive at an estimate of flows occurring during snowmelts.

The SWMS shall consist of a network of inlets, pipes, trench drains, manholes (Airside – non-movement areas) and secondary swales (Landside – non-movement areas) to collect the storm water runoff and route the flows via a primary system of swales and culverts towards the outfall. Storm water facilities shall be designed in accordance to the parameters identified above. In addition, a control structure shall be installed at the outfall to regulate the peak discharge. Based on the identified parameters, preliminary configuration and sizing of pipes, culvert and swales is included in the cost estimate.

<u>Pavement Edge Drain System</u>
In accordance with the policies of the Federal Aviation Administration, Northwest Mountain Region Airports Division Office, drainage treatment for new runway and taxiway pavements should include edge drain installation. The longitudinal collector should be placed below the edge of the full strength pavement, and below the frost line. Some transverse drains may be needed to provide discharge outlets for water collected in the longitudinal drains. Subdrains should be encased in pea gravel and filter fabric, and be in contact with the base and subbase courses. Subgrade surfaces should be graded with sufficient cross slope to assure that free water reaches the edge.

<u>Water Quality</u>
Structural and non-structural water quality features shall be implemented on all impervious and disturbed areas. It is anticipated that the following water quality criteria shall be incorporated into the detailed design of the airport:

- Applicable nonstructural practices for source control and pollution prevention to prevent pollutants from entering the storm water runoff. Such practices may include parking lot sweeping and spill prevention mechanisms.
- Structural elements such as Storm Water Best Management Practices (BMPs) sized to capture and treat runoff.
- Retain and treat the volume generated by the first inch of runoff.

- Stabilize and protect areas against erosion.
- Treatment will be provided on all non-movement areas, Airside and Landside, via structural BMPs consisting of bio-filtration swales, baffled structures and/or oil-water separators (i.e. with coalescent plates) or similar devices.
- Storm water BMPs shall be designed to remove at least 60% of Total Suspended Solids (TSS) from runoff.
- Storm water detention facilities that will control the discharge of water from the developed site to the pre-development levels.

The proposed SWMS shall include all necessary structural and non-structural quality features as identified above to meet the required Water Quality standards.

Ephemeral Stream Realignment

The location of Site 12 airport results in the crossing of ephemeral streams. The streams represent a water conveyance across the site. So as not to require construction of multiple, large drainage culverts under both the airside and landside portions of the airport, the preliminary design includes realignment of the ephemeral streams along the northern limits of the airport property. The stream realignments end with a merging with Camas Creek, southwest of the airport. As discussed above, due to the volume of earthwork required to construct the channel and the requirement to armor the embankment with approximately 23,000 cubic yards of riprap, the final design of the airport should include an evaluation of and decision regarding using box culverts instead of a conveyance channel.

SECTION 8 - SITE UTILITIES

8.1 Power

Primary Power

This study made a number of assumptions regarding the electrical power utility service for the airport, namely:

- Only the utility service inside of the airport property was considered.
- An independent service company will be used to supply and maintain the utility power distribution system.
- The independent service provider will also design, and install the required service to each of the facilities within the airport property.

Based on these assumptions, a basic layout of the electrical power utility system was prepared for the facilities within the airport property. The layout was prepared to define the general location of the electrical system for the purpose of identifying any significant differences in construction costs between Site 12 and Site 10A. One distinguishing feature of the design that affects the overall price for Site 12 is the relocation of the utilities along U.S. 20.

Electrical power to the site will need to be provided from one or more utility companies supplying power from outside the airport property. Idaho Power Company (IPC) has been identified as the sole electrical service provider currently providing service in the area of this site. Currently, IPC has overhead power lines near the site. It was assumed that IPC may need to upgrade these lines to supply the required amount of power as needed for operation of the airport facilities. As part of this upgrade, it was also assumed that IPC will want to install overhead power lines on the airport property. For this study, overhead lines were assumed to be installed in all locations within the airport property with the exception of locations where the utility will interfere with aircraft approach surfaces or surface movement of aircraft.

The demand load for all on-airport facilities was estimated to be approximately 7,500 kilovolt amperes (kVA) with a connected load (peak load) as high as 9,000 kVA. The power to be supplied from the utility company shall be a 12,000 kVA service to the airport property which allows for 30% growth beyond what was anticipated by this study without the need for an upgrade of the offsite utility feed. To reduce service disruptions, the ideal scenario would be to supply the airport from two separate feeds originating from two separate power sources. Considering the remote location of the site and the discussions with IPC during the EIS, the design will only call for one incoming line. This single feed results in a poor level of reliability for the power distribution system. Therefore, power storage devices (e.g. UPS, batteries, etc.) and generators will be required to be used for backup and emergency power at the various critical facilities throughout the airport.

The utility power distribution system is expected to connect to the high voltage incoming line from the utility at an off-site power substation. The incoming line will supply a switchgear substation equipped with step down transformers, as needed to convert the primary feed power to the primary distribution power required for the airport facilities. The switchgear will be located as close as possible to the airport site. From this switchgear, several high voltage (20kV Class) feeders will feed the different outdoor transformer substations within the airport property. Most of the substations will step the power down to a utilization voltage of 480/277 volts with a few services that will need to be stepped down to 208/120 volt, as noted below. Apron and parking area lighting are included in the load calculations for the nearest substation.

The on-site substations are located near and will service the following facilities (Appendix B):

Transformer Station	Facilities Serviced	Service
T-1	Maintenance, Water Supply, FBO	One 20KV Class outdoor substation capable of supplying 2,200 KVA.
T-2 & T-4	Hangars and Fuel Farm	Two 20kV Class outdoor substations capable of supplying 1,200 KVA each.
T-3	ATCT	One 20kV Class outdoor substations capable of supplying 400 KVA.
T-5	Rental Car QTA Facility	One 20KV Class outdoor substation capable of supplying 130 KVA.
T-6	Cargo Facility, Operations, ARFF, and Airfield Lighting Vault	One 20KV Class outdoor substation capable of supplying 700 KVA.
T-7 & T-8	Terminal	Two 20KV Class outdoor substations capable of supplying 1,000 KVA each
T-9	Hangars and Fuel Farm	One 20kV Class outdoor substations capable of supplying 1,500 KVA.
T-10	USFS, Fuel Farm	One 20KV Class outdoor substation capable of supplying 1,100 KVA.
T-11	Sewer Treatment Plant	One 20KV Class outdoor substation capable of supplying 100 KVA.
T-12 & T-15	MALSR / ILS	Two 20KV Class outdoor substations capable of supplying 30KVA at a utilization voltage of

		208/110 volts.
T-13 & T-14	ILS	Two 20KV Class outdoor substations capable of supplying 20KVA at a utilization voltage of 208/110 volts.

Emergency Power

As identified earlier, power storage devices and generators will be utilized throughout the airport to supplement the electrical utility supply for backup and emergency power. NFPA 101 requires that all commercial buildings utilize some type of emergency power system during an event to ensure safe passage of people. Most of the facilities at the airport will be able to use power storage devices to meet the requirements of NFPA 101.

Two categories of facilities have been identified for this study, which require fixed generator power to be supplied for extended periods of time. The chart below identifies the facilities in each category.

Category 1 **100% Coverage**	**Category 2** **<100% Coverage**
ATCT	Terminal
Operations / ARFF / Airfield Lighting Vault	FBO
	USFS
	Water Supply and Treatment Plant
	Sanitary Sewer Treatment Plant

Category one includes those facilities that require 100 percent operation until power is restored or until the airfield can be systematically shutdown. Category two includes those facilities that require partial operation for a fixed amount of time. The FBO and the terminal were added to this category as portions of these facilities may be used as shelters during inclement weather. All power storage devices and fixed generators were included in the pricing for each of the facilities.

The ILS and MALSR systems will be powered via portable generators provided by the FAA. Other fixed and portable generators may be requested by the various owners, tenants and operators of some facilities. These generators were not included in this study as they are not required by code but were instead deemed to be used for convenience only.

8.2 Water

Due to the remote location of the airport, far away from any municipal water systems, the airport's water supply demands can only be met by one option. Site 12 will be required to construct its own self-sufficient and complete water supply system for both potable and fire water. As a result, the proposed public drinking water system (PWS) for the airport will operate as a separate entity with its own source (i.e. well supplied water), water treatment facility (if required), storage tank, pressurization pumps and distribution pipe network to accommodate the required demand for water consumption and to meet requirement for fire water flows.

System capacity and detailed design of the water piping system of the PWS, that serve at least 25 people 60 days out of the year, is regulated by the requirements of the Safe Drinking Water Act (SDW), the State of Idaho Rules for Drinking Water Systems (IDAPA 58.01.08) and Idaho Fire Code (Section 41-253). All PWS projects require preconstruction approval by the Idaho Department of Environmental Quality (IDEQ), the Idaho Department of Water Resources (IDWR), the Idaho Department of Health & Welfare, the International Fire Code and the local Fire District (Wood River Rural Fire District).

Site 12 is located north of Camas Creek in Blaine County near the Camas County line. U.S. 20 crosses the southern edge of the site. Unlike Site 10A, which is on federal public land, Site 12 is privately owned. Camp Creek crosses the eastern edge of the site. Camas Creek is located within ¼ mile of much of the southern boundary of the site. Depth to groundwater is less than 100 feet. Productive wells can likely be developed by drilling to depths of 100 to 300 feet. There are five privately-owned water rights appurtenant to the site, at least in-part. See Appendix G "Water Rights Assessment and Acquisition Plan" for details relating to rights and acquisition.

Primary water consumers at an airport are the people using the passenger terminal complex, administration and support buildings, FBO, and the rental car services complex. Fire flow requirements were also identified as a very important consideration in the design of the water distribution system.

The proposed water supply and distribution system shall include the following components:

- Groundwater source (supply) well with delivery pumps.
- Water Treatment facility (if required to meet water quality standards) and lift station to storage tank.
- Adjoining Offices
- An above ground storage tank (365,000 gal) for fire protection, general water use and peak flow buffering.
- Storage of consumables, gear & equipment.
- Pumping facilities for pressurization for water consumption and fire flow delivery.
- Diesel Generator for back-up power
- Primary distribution mains for water consumption to serve critical airport facilities via a network of pipes and provide fire flow coverage.

Based on the preliminary assessment of the airport facilities and the anticipated use of the facility, it was assumed the airport would consume approximately 10 Acre-Feet of water per year. Preliminary ground flow tests for the test well conducted at Site 12 have yielded adequate rates to meet the required demand.

A preliminary water quality analysis was also conducted at the test well that indicated minimal water treatment would be required. However, once the location of the actual supply well is established, if the source of water does not meet Water Quality Standards, additional water treatment (i.e. water treatment package plant) may be required. At the time of the study, it was not possible to evaluate the parameters and requirements of a treatment system, as the content and quality of the groundwater at the ultimate well location was unknown.

An above ground water storage tank was deemed to be the most efficient and effective way to provide the required capacity for water consumption and fire flows. Sufficient water must be stored in the tank to accommodate a 3 day supply of potable water for consumption at an estimated average flow of 34 gpm (at 60 psi) and to provide a minimum of 1,200 gpm, at the furthest fire hydrant in the system, for a 3 hour period. Based on these parameters, it was estimated that the above ground water storage tank must have a diameter of 45 ft with a height of 36 ft and the capability to store 365,000 gal (min). The tank is to be located near the southeast quadrant of Site 12.

Pumping facilities will be designed to maintain the required system pressures and flows, for both water consumption and during fire emergencies, operating with primary power from the airport's electrical grid. However, in case of a loss in power, a secondary back-up system using diesel generators will automatically enter in operation. (Appendix H)

The water distribution system will need to supply flow to fire hydrants and connect to fire lines of the individual facilities. The design assumptions for the Fire Protection system are defined as follows:

- All components of an ARFF (Aircraft Rescue Fire Fighting) water supply system shall meet the requirements of and be installed in accordance with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances".
- The installation must include freeze protection.
- A gridded or a looped water distribution system is preferred over a single water main.
- Hydrants are to be strategically located on loops or grids readily accessible to Airport Rescue and Fire Fighting (ARFF) vehicles.
- Optimum hydrant spacing is approximately 300 feet.
- Spacing of hydrants should not be more than 500 feet apart along the periphery of aprons which are used for aircraft parking and passenger loading and unloading.
- Hydrant station locations should not constitute a hazard to aircraft or ground vehicle movements. Placement should also safeguard hydrants against aircraft or ground service vehicular damage and vandalism.
- To take full advantage of existing vehicle technology, the water system connections designated as ARFF vehicle fill stations should, whenever practical, be sized and have the volume capacity to support the vehicle operations standard. As an illustration, a 2,000 gallon capacity vehicle

would need a minimum flow of 1,000 gallons per minute. By using the individual vehicle fill requirements, a cost-effective water supply system can be designated for any unique fleet of ARFF vehicles during preparation of the detailed design of the water supply system.

Based on the identified parameters, a preliminary configuration and sizing of supply well, pumping facilities, treatment system (if required), storage tank, pipes and valves is included in the cost estimate.

8.3 Sewer

The wastewater collection and treatment system will consist of a network of gravity lines that transmit sewage flows towards the location of the Sewage Treatment Package plant. The piping network shall convey all flows into a lift station, which will then pump the wastewater into the sewage treatment package plant. The package plant will provide secondary treatment and its effluent shall be discharged into a subsurface absorption field or drain field. The average daily flows for the YR 2022 ultimate build-out were estimated to be approximately 25,000 gpd. The package plant shall be sized to treat the ultimate flows and projected Biochemical Oxygen Demand (BOD) load with sufficient efficiency to permit the discharge of the treated effluent into the drain field. A subsurface treatment and disposal system (SSDS) is the most basic wastewater management option and the most desirable due to its simplicity of operation. It was anticipated that the drain field will cover an area of approximately 2 acres. However, its ultimate size and effectiveness is highly dependent on the types of soils present to absorb and remove contaminants. Where suitable soil-types are not present, it may be necessary to import other soil materials, and construct a suitable area for the SSDS. All proposed facilities shall be approved by the Idaho Department of Environmental Quality (IDEQ) and by the Idaho Department of Health & Welfare South Central Health District (SCHD). As part of the alternatives evaluation, SCHD personnel cautioned that soils mapping offers a general guide only and that a more detailed on-site investigation will be necessary for development of the final facility design. In a large area such as Site 12, suitable soils were anticipated to be present. Furthermore, the groundwater recharge system could function year-round or could be coupled with reuse of treated wastewater for landscape irrigation during the growing season. (Appendix H).

Design Assumptions:

- Sewer design guidelines shall be according to the Idaho Procedures Administrative Act (IDAPA) 58.
- For gravity sewer systems, the minimum pipe diameter is to be 8”.
- Sewer lateral services shall be a minimum of 4” in diameter.
- Gravity sewer systems must have a sufficient slope and velocity to be self-cleaning (assume 4ft/sec flow velocity).

- Wastewater pipelines shall be installed sufficiently deep or specifically designed to prevent freezing and to protect the facilities from surface loading (assume 30" for frost depth).
- Manholes shall be installed at the end of each line; at all changes in grade, pipe size or alignment and, at all intersections. Cleanouts may be used only for special conditions and shall not be substituted for manholes nor installed at the end of laterals greater than 150ft in length.
- Parallel installation requirements. Greater than 10ft of separation between potable water mains in relation to non-potable water mains: no additional requirements based on separation distance. Six to ten feet of separation: separate trenches, with potable main above non-potable main, and non-potable mains shall be constructed with potable-water class pipe. Non-potable mains are prohibited from being located in the same trench as potable mains.
- Requirements for potable water mains or services crossing non-potable mains or non-potable services. Eighteen (18) inches or more vertical separation with potable pipeline <u>above</u> non-potable pipeline: non-potable pipeline joints to be as far as possible from the potable water pipeline. Eighteen (18) inches or more vertical separation with potable water pipeline <u>below</u> non-potable pipeline: Non-potable pipeline joints to be as far as possible from the potable water pipeline and non-potable pipeline must be supported through the crossings to prevent settling. There are specific additional requirements for situations where there is less than 18" vertical separation.
- Sanitary Lift Station
- Adjoining Offices
- Waste Water Treatment Package Plant
- Diesel Generator for back-up power
- Sub-Surface Disposal System (i.e. drain field)
- Storage of consumables, gear & equipment
- Septic Tank for Air Traffic Control Tower (ATCT)
- Based on the identified parameters, a preliminary configuration and sizing of the gravity lines, lift station, waste water treatment package plant, and sub-surface disposal system (i.e. drain field) is included in the cost estimate.

8.4 Communications

The same considerations that were assumed for the electrical power utility also were used for the communications utility, namely:

- Only the utility service inside of the airport property was considered.
- An independent service company will be used to supply and maintain their own utility distribution system.
- The independent service provider will also design, and install the required service to each of the facilities within the airport property.

Based on these assumptions, the basic layout of the communications utility design within the airport property was designed for the purpose of identifying any significant differences in construction costs between this Site 12 and Site 10A. One distinguishing feature of the design that affects the overall price for Site 12 is the relocation of the utilities along U.S. 20.

Qwest Communications has been identified in the EIS as the sole telephone service provider for Site 12. Adequate communications trunk lines were identified as being available for the airport. One 200 pair cable was determined to supply all of the hard wire communications required for the airport. It is recommended that fiber optics be provided as the trunk line feeding the site to allow for future expansion. Cellular telephone communications were not considered in this study.

8.5 Gas

Gas will be provided on the site using above-ground storage tanks. As this type of provision for heating changes in accordance with the heating requirements for each of the facilities and can either be rented or owned, the assumption for this report was that the cost for installation of above ground storage tanks was equal to that of the underground distribution system at Site 10A. Therefore, this cost was not included in the estimate of probable construction cost.

SECTION 9 - AIRSIDE IMPROVEMENTS

9.1 Runway Horizontal Geometry

The requirements for design of runways were based on Airport Design Group (ADG) designation IIIC with the Airbus A 319 chosen as the design aircraft. The following table identifies the critical dimensions used for developing the geometric configuration of the runway.

ITEM	**AIRPLANE DESIGN GROUP III C**
Runway Length	8,500
Runway Width	100 ft
Runway Shoulder Width	20 ft
Runway Blast Pad Width	140 ft
Runway Safety Area Width	200 ft
Runway Safety Area Width	500 ft
Length Prior to landing Threshold	600 ft
Runway Safety Area Length Beyond RW End	1,000 ft
Obstacle Free Zone Width and Length	400 ft
Runway Object Free Area Width	800 ft
Runway Object Free Area Length Beyond RW End	1,000 ft

9.2 Taxiway Horizontal Geometry

The following table identifies the critical dimensions used for developing the horizontal geometric configuration of the parallel and connecting taxiways.

ITEM	**AIRPLANE DESIGN GROUP III C**
Taxiway Width	50 ft
Taxiway Edge Safety Margin	10 ft
Taxiway Shoulder Width	20 ft
Taxiway Safety Area Width	118 ft
Taxiway Object Free Area Width	186 ft
Taxilane Object Free Area Width	162 ft

9.3 Airfield Vertical Profiles

The runway centerline grading was established to create a balanced cut and fill to the extent practical while maintaining runway end elevations defined to satisfy the criteria for a precision instrument approached to both runway ends.

9.4 Aprons

Development of the airport facilities will require construction of concrete and asphaltic concrete aircraft parking aprons for parking of the commercial and general aviation aircraft, respectively. Due to the size of the commercial service aircraft and the number of ground servicing operations that are conducted on and around these aircraft, the proposed facilities design was based on Portland cement concrete to be used for the air carrier apron. All parking aprons for general aviation aircraft, to be used for aircraft parking and for the taxilanes and aprons located in front of the aircraft hangars will be constructed of asphaltic concrete pavement.

9.5 De-Icing Pads

Two de-icing pads are located on the edge of the commercial apron. Pavement within the limits of the deicing pads shall be constructed of Portland cement concrete and are to be graded so as to enable independent capture of the run-off drainage from any deicing operations. The captured deicing fluid will be diverted and stored in nearby underground holding tank(s) for subsequent collection and treatment. During periods when deicing of aircraft is not taking place, drainage will be routed into the airport storm drainage system via diverter valves for routine handling and discharge from the site.

9.6 Fuel Tank Farms

The preliminary engineering effort envisioned four fueling facilities. These facilities will supply fueling services for commercial, corporate and general aviation aircraft, rental cars, and airport maintenance and ARFF vehicles.

The fuel storage capacities for each fueling facility were determined based on the need for sufficient capacity to last for several days between refueling via over the road tanker trucks.

Based upon the demand (Appendix F), the basis for supply on airport was set as:

Fueling Facility	Fuel Type	Total Facility Supply (gallons)	Total Estimated Refueling Demand Per Day (gallons)	Days to Empty Tank
FBO	Jet A	253808	76564	3.3
	Avgas	12000	1300	9.2
SELF SERVICE	Avgas	12000	1350	8.9
RENTAL CAR	Gasoline	24000	1500	16.0
FOREST SER.	Gasoline	12000	375	32.0
	Diesel	12000	500	24.0
	Jet A	12000	1000	12.0

Fueling Facility Descriptions:

Fixed Base Operations Fuel Farm

The fuelling facility will supply Avgas and Jet A fuels for aircraft parked at the terminal and in the GA aprons. It will have a capacity to store 253,808 gallons (6,000 barrels) of Jet A and 12,000 gallons of Avgas fuel. The facility will include the following major items:

- Two 126,904 gallon (3,000-barrel) above-ground vertical Jet A storage tanks.
- One 12,000-gallon above-ground single wall Avgas storage tank.
- One 1,000-gallon above-ground double wall oil/water separator.
- One 500-gallon above-ground single wall used oil tank.
- Jet A truck offloading and Jet A refueler loading equipment.
- Avgas truck offloading and Avgas refueler loading equipment.
- Emergency Fuel Shut-Off system.
- Inventory management and leak detection system.
- Area lighting.
- Fire protection system.
- Concrete dike containment area for all storage tanks.
- Concrete pad for truck/refueler containment and equipment.

U.S. Forrest Services/BLM Operations Fueling Station

The fuelling facility will supply gasoline, diesel for vehicles and heavy equipment and Jet A for aircraft and helicopters. This facility will also serve as the airport maintenance fuel station. The facility will include the following major items:

- One 12,000 gallon self-service and self-contained aboveground double wall Gasoline tank package, which includes pump & motor, storage tank, automatic high level shut off, leak detection, emergency fuel shut off, fuel dispenser, point-of-sale card reader system, wheeled fire extinguisher, and a concrete support pad.

- One 12,000 gallon self-service and self-contained above-ground double wall Diesel tank package, including pump & motor, storage tank, automatic high level shut off, leak detection, emergency fuel shut off, fuel dispenser, point-of-sale card reader system, wheeled fire extinguisher, and a concrete support pad.
- One 12,000 gallon self-service and self-contained above-ground double wall Jet A tank package, including pump & motor, storage tank, automatic high level shut off, leak detection, emergency fuel shut off, fuel dispenser, point-of-sale card reader system, wheeled fire extinguisher, and a concrete support pad.

Rental Car Quick Turn Around Facility

The rental car facility includes gasoline, minor servicing, car wash and a small office. The facility will include the following major items:

- Two 12,000 gallon self-service and self-contained aboveground double wall Gasoline tank packages, including pump & motor, storage tank, automatic high level shut off, leak detection, emergency fuel shut off, fuel dispenser, point-of-sale card reader system, wheeled fire extinguisher, and concrete support pads.
- Office for rental car companies.
- Car wash bay.
- Concrete fuel island with vacuum cleaner and air compressor

Self Service Fueling Facility

The self service facility will supply Avgas for general aviation aircraft. The facility will include the following major item:

- One 12,000 gallon 200/35 gpm over-wing Avgas self-service and self-contained aboveground double wall tank package, including pump & motor, storage tank, automatic high level shut off, leak detection, emergency fuel shut off, fuel dispenser, point-of-sale card reader systems, wheeled fire extinguisher, and a concrete support pad.

9.7 Air Traffic Control Tower

The site requirements for the ATCT are detailed in the Federal Aviation Administration (FAA) Order 6480.7D “Air Traffic Control Siting Criteria”. The following bullets briefly outline the criteria that were compared to the ALP and confirmed the proposed location for the ATCT was appropriate.

- Maximum visibility of all airborne traffic patterns around the airport.
- Complete visibility to all airport surface areas used for the movement of aircraft, which are under the control of the ATCT. This requirement includes visibility to aircraft in the runways, taxiways and aircraft aprons under the control of ATCT personnel.
- The ATCT should not be located where it will derogate the performance of existing or planned electronic facilities.

- The tower should be oriented to face north, east, south or west, in that order of preference. A southern orientation should be avoided in areas where snow accumulates on the ground. The ATCT should be oriented to avoid placing a runway approach view in line with a rising or setting sun.
- Visibility should not be impaired by direct or indirect external light sources such as ramp lights, parking lot lights or reflective surfaces. Also, visibility should be available for all ground operations of aircraft and to airport ground vehicles on ramps, aprons and tie down areas.
- Exterior noise should be at a minimum.
- The ATCT should be located in an area that is free of jet exhaust fumes and impairments to visibility such as industrial smoke, dust and fumes.
- A minimum line of sight angle of 35 minutes to runway ends.

Typically, the best physical location for the ATCT is an equidistant point from all runway thresholds and with visual contact to the aircraft parked in the terminal area. The Engineer estimated the preliminary height and location was performed using the FAA's 3-Dimensional Airspace Analysis Program (3DAAP).

Using the FAA criteria, the CAB floor elevation is at 120 AGL. The elevation was derived from FAA Order 6480.4 using a minimum line of sight angle of 35 minutes to all runway ends. See Appendix E for illustrating sketches.

9.8 Access and Security Including Fencing

Access to the primary facilities at the airport, including the passenger terminal, FBO, ARFF, ATCT, hangars and other ancillary facilities shall be via the main airport entrance road connected to the relocated U.S. 20. The on-airport roadway network will provide access the specific facilities. In addition, a gravel airport perimeter road will provide access to the entire site by circling the airport property, inside the airport perimeter fence.

Since the airport will be certified as a Part 139 facility approved to handle scheduled commercial air carrier flights, a continuous airport perimeter security fence is required to be constructed around the entire airport operational area (AOA). The Security Identification Display Area (SIDA) will be enclosed by an 8 ft. high fence with 1 ft. of barbed wire on top. Access will be controlled by an electronic card reader system for the reading of ID cards and controlling the opening of the gate/door. The perimeter security fence will be constructed along the building restriction line on the side of the airport opposite the terminal complex and extend around the entire runway protection zone (RPZ) at both ends of the runway. The fence shall then extend along the building restriction line on the terminal complex side of the airport until the point that it reached the airport ancillary support facilities where it will be located so as to contain all airport operational facilities inside the fence line. The fence will extend between and connect to the airport, hangars, FBO building and terminal building, so as to create a complete and secure airport perimeter.

Airport AOA access gates will be located adjacent to the terminal facilities and at other locations required to provide needed access from the landside to the airside of the airport. The FBO and non-air carrier areas of the airport will be segregated from the terminal building and air carrier apron to meet FAA security requirements.

An airport perimeter security road will be constructed inside to perimeter security fence to enable routine inspection and maintenance of the security fence.

SECTION 10 - LANDSIDE IMPROVEMENTS

10.1 Terminal

The ALP indicates a Terminal building of 21,000 square feet. Identification of interior spaces and their function is beyond the scope of this report. Cost estimates are based upon industry publications for single story commercial buildings.

10.2 FBO and U.S.F.S./B.L.M.

The ALP indicates the Fixed Base Operator (FBO) is a building of 101,655 square feet and U.S.F.S./B.L.M is a building of 5,000 square feet. Identification of interior spaces and their function is beyond the scope of this report. Cost estimates are based upon industry publications for single story commercial buildings.

10.3 Aircraft Storage and Hangars

There are four basic types of storage hangars planned for the site.

- Corporate General Aviation Large Hangars – Capable of housing up to a Gulfstream VI having a floor area of 31,623 SF each with a 26 ft. 6 inch high hangar door and an interior concrete slab. Included in each hangar will be a bathroom and an office at 120SF.
- Corporate General Aviation Medium Hangars – Capable of housing up to a Cessna Citation X having a floor area of 7,907 SF with a 20 ft. high hangar door and an interior concrete slab. Included in each hanger will be a bathroom.
- T-Hangar – A 21,000 SF building will house 14 aircraft in a T-hangar configuration with a concrete floor slab and a 15 ft door height. There will be a bathroom installed at the end of each 14 unit building.
- Condo Hangar – Each hangar will measure approximately 3,600 SF and include a 20 ft. high door and are grouped in units of 5 each with a concrete floor slab of 1,800 SF. There will be a bathroom installed at the end of each 5 unit building.

10.4 Relocation of U.S. 20

The existing U.S. 20 traverses across much of the proposed site area, construction of the airport will require relocation of approximately 3¼ miles of U.S. 20 to the south side of the proposed airport site. Relocation of roadway starts near County Line Road to the west of the airport site.

U.S. 20 is classified as a two lane rural arterial with a typical cross section width of approximately 30 feet from edge of pavement to edge of pavement. There are a number of existing unpaved roads connected to highway, providing access to existing properties along both the north and south sides of the highway. There are approximately 16 existing culvert crossings within the section of U.S. 20 that will need to be relocated.

At the west end of the proposed airport site and approximately 350 feet south of the existing U.S. 20 alignment, there is an existing house/farm. In order to realign U.S. 20, it is expected that this house will need to be demolished.

Access to the airport and the associated landside facilities will be via a new airport entrance roadway that will connect the south side of the airport to the relocated U.S. 20. All aprons, terminal, and primary access are planned for the south side of the airfield, with access to the airport entrance road via an on-airport roadway network.

Relocation of U.S. 20 must be performed in strict accordance with the requirements of the Idaho Transportation Department. The following list of summary point defines the criteria used for preliminary design of the realigned roadway.

- The beginning of the roadway realignment is located approximately 1,000 feet east of the intersection of U.S. 20 and County Line Road.
- The end of roadway realignment is located approximately at mile marker 168, immediately adjacent to the culvert crossing for Camp Creek under the existing U.S. 20.
- The entrance roads for the proposed new Airport will established from the realigned segment of U.S. 20, approximately 6,500 feet from the start of the roadway realignment.
- The realigned roadway will slope gradually from west to east along the alignment so as to provide a balanced cut and fill section for the road, to the greatest possible extent, while still maintaining the required longitudinal sight distance.
- The primary design dimensions for the realigned roadway include:
    - two-lane roadway with 12 foot lanes at 2% cross slopes,
    - three (3) foot shoulders with a 2% cross slope,
    - thirteen (13) feet of recovery zone with 5% cross slopes, and
    - installation of drainage ditches connected to adjacent natural water features for the entire length of the roadway.
- The drainage ditches will be constructed on both sides of the road to maintain effective roadway drainage.
- Storm drainage culverts will be constructed at all locations along the realigned roadway where existing water features cross the alignment.

10.5 Roads, Parking Lots and Roadway Lighting

The airport entrance road and internal circulation roadway are defined in other previous sections of this report. Public parking lots are to be constructed to support the air carrier terminal facilities, FBO facility, ATCT, and National Forest Service facility, and all other ancillary facilities on the airport. The public parking lot for the meters and greeters plus passenger using air carrier terminal will be located immediately in front of the terminal building. Parking for all other occupied buildings and hangar facilities will be located adjacent to or within immediate proximity to the structures. The following table provides a listing of parking spaces for each building/facility.

Location	No.	Location	No.
Terminal Building – Passengers	376	FBO Facility	225
Terminal Building - Employee	78	Cargo	11
Terminal Building - Cell Phone Lot	28	Corporate Hangars - Medium	110
Rental Car Ready/Return Lot	126	Corporate Hangars - Large	**78**
Rental Car Clean-up Lot	165	Condo Hangars & T-Hangars	192
ATCT	40	Tie-Downs	60
ARFF	42	Water Treatment Facility	25
U.S. Forest Service	33		

Roadway lighting shall be installed along the entrance road and all interior airport circulation roadways to provide for safe and secure access throughout the airport. The final number and size of the lights to be installed along the roadways will be defined in the detailed design for the airport facilities. Pole-mounted lights will be installed in the parking lots, as required to provide that required level of light, per the applicable codes. Building mounted area lighting and pole-mounted pavement edge lights will be installed in all areas adjacent to occupied structures to ensure a safe and secure environment for the airport users. Design of the lighting for all areas of the airport shall comply with the appropriate building codes for candelas of light, based on the type and use of the respective buildings. The height of all lights will be established in accordance with the airspace clearance requirements for the airport. In addition, shields will be installed on all lights that would create a visual conflict with airport operations as required by FAA design standards.

10.6 Maintenance Facilities

A 15,000 SF airport maintenance facility is envisioned for the airport. The 60 ft. by 250 ft. building shall house:

- Offices, lockers, a break room and a dormitory.
- Shop space to support maintenance of airport equipment.
- Storage and maintenance of rolling stock including snow plows and grounds keeping equipment.
- Storage of supplies and spare parts.

In addition to the employee parking lot to be located in the front of the maintenance facility, a large maintenance/storage yard measuring approximately 60 ft. by 250 ft will be located in the back of the facility for materials and equip that can be placed in an unprotected environment.

SECTION 11 - NAVIGATIONAL & VISUAL AIDS

11.1 NAVAIDS

Precision Category I ILS approaches are planned for both runway ends. It was assumed that the systems will be of the newest design so no special requirements will be necessary beyond that indicated in FAA Advisory Circulars and Orders. This report includes the cost estimate to establish the site and infrastructure to support the facility. It is assumed that FAA will supply all equipment for the NAVAIDS as well as the ATCT and therefore, is not included in the estimate of probable construction cost.

Design assumptions include:

- Glide Slope
  The glide slope locations were calculated using a threshold crossing height of 45 feet and an approach angle of 3 degrees. The slope of the runway was also considered in these calculations. The location and critical area was designed for a null reference glide slope system. This allows for enough space for all of the different types of glide slope systems currently approved for use by the FAA. The antenna was located 410 feet from and perpendicular to the runway centerline.

- Localizer
  The localizer antenna array is assumed to be a standard eight element single frequency array located on the extended runway centerline 1010 feet from the threshold. The critical area assumptions do not allow for a bi-directional array to be installed.

- Distance Measuring Equipment (DME)
  A single DME is to be located with the localizer serving the primary approach end of the runway. All other requirements are assumed to be met for use of this DME for both approaches. The DME is also to be used in lieu of an outer marker. Middle and inner markers will not be used.

- Medium Intensity Approach Light System (MALSR)
  A standard MALSR will be installed for both ends of the runway.

- Airport Weather Observation Station (AWOS)
  A single AWOS system will be co-located with the glide slope serving the primary approach end of the runway.

Communications with the various systems and the FAA ATCT will be accomplished via radio communications. A radio activation and control system will be installed at the airport to allow all of the various systems to be implemented by the pilots when the ATCT is not being manned.

11.2 Visual Aids

Visual aids include airfield lighting, airfield signage, PAPIs, wind socks, airport rotational beacon and obstruction lights. For this design, conventional systems have been used but new technologies should be considered as the design progresses to reduce the power consumption of the systems.

Design assumptions include:

- Airfield Lighting
  The runway lighting system will be a high intensity system powered by constant current regulators (CCR). It was designed to use only elevated edge lights. The taxiway lighting system also only uses elevated edge lights powered by CCRs and is a medium intensity system. LED lights are proposed to be installed for the taxiway edge and quartz lights for the runway edge lights. All of the lights will be mounted on base cans with frangible couplings and 14-inch vertical supports. The base cans will be interconnected with conduits in which all of the cables will be run. Homeruns will utilize junction can plazas in lieu of the standard FAA manholes in an effort to reduce costs of installation and for ease of maintenance. The CCRs for each of the lighting systems will be housed in the Airfield Lighting Vault.

- Airfield Signage
  The design was based in the implementation of internally lit signage throughout the airfield. The signs will be connected to an appropriate edge lighting system that meets FAA requirements for control.

- PAPI
  Four element PAPIs will be installed at both ends of the runway to match the Category I ILS system being installed at the airport. Each set of PAPIs will be located so the approach angles will coincide with the ILS glide slope. Style B PAPI systems will be used with the CCRs installed in the Airfield Lighting vault.

- Wind Socks
  Two wind socks will be used, one for each end of the runway. This configuration was chosen to ensure pilots could see the nearest wind cone on approach with the variations in terrain. The wind socks will be lit from the power supplied to the taxiway edge lighting system, from the nearest taxiway edge light.

- Rotating Beacon
  The recommended location for the rotating beacon is on top of the ATCT. This will ensure the beacon can be seen above all other objects and will also prevent the light from shining into the ATCT cab and the controller's eyes.

- <u>Obstruction Lights</u>
  Obstruction lights will be placed on all surrounding structures in accordance with the requirements of an obstruction to air commerce as required in 14 CFR Part 77. These lights will be independently controlled and powered in accordance with the particular location of each light or set of lights. The final number, location, power source and controls will be defined during detailed design of the various facilities that are identified to be marked with the lights. Obstruction lighting is included in the estimate of probable construction cost for facilities within the airport property.

11.3 Airfield Lighting Vault

The airfield lighting vault will be located within the Operations and ARFF building and will house the CCRs required to power the various visual aids and the lighting control system for the overall airfield lighting system. Currently, a total of six CCRs were identified for the airport with the vault being designed to hold up to 10 CCRs along with a small work shop. The lighting control system shall be designed so the ATCT can operate the system and allow pilots to control the system when the ATCT is not manned. Emergency power will be supplied to the vault via a back-up generator designed for 100% operation.

SECTION 12 - OUTLINE TECHNICAL SPECIFICATIONS

Technical specifications for the infrastructure development are principally based upon Standard FAA Airport Construction Specifications (per Advisory Circular 150/5370-10E) listed below, including recommended customized airport specifications (also listed below) relating to specific site conditions as well as standard Specifications for Highway Construction 2004 (2010 edition) to be used for rough site earthwork, roads and parking lots.

P	101	Surface Preparation
P	151	Clearing and Grubbing
P	152	Excavation and Embankment
P	153	Controlled Low-Strength Material (CLSM)
P	154	Subbase Courses
P	155	Lime Treated Subgrade
P	156	Temporary Air & Water Pollution , Soil Erosion and Siltation Control
P	160*	Contaminated Soil/Groundwater
P	209	Crushed Aggregate Base Course
P	220*	Crushed Aggregate/Geotextile Drainage Layer
P	306	Econocrete Base Course
P	401	Plant Mix Bituminous Pavements
P	403	Plant Mix Bituminous Pavements (Base, Leveling or Surface)
P	501	Portland Cement Concrete Pavement
P	602	Bituminous Prime Coat
P	603	Bituminous Tack Coat
P	605	Joint Sealing Filler
P	609	Seal Coats and Bituminous Surface Treatments
P	610	Structural Portland Cement Concrete
P	620	Runway and Taxiway Painting
P	621	Saw-Cut Grooves
F	162	Chain-Link Fence
D	701	Pipe for Storm Drains and Culverts
D	702	Slotted Drains
D	705	Pipe for Underdrains for Airports
D	751	Manholes, Catch Basins, Inlets, Valve Pits& Inspection Holes
D	752	Concrete Culverts, Headwalls and Miscellaneous Drainage and Utility Structures
D	754	Concrete Gutters, Ditches and Flumes
T	901	Seeding
T	902	Sprigging
T	905	Topsoiling
L	101	Airport Rotating Beacons
L	103	Airport Beacon Towers
L	107	Airport 8-Foot and 12-Foot Wind Cones

L	108	Installation of Underground Cable for Airports
L	109	Installation of Airport Transformer Vault and Vault Equipment
L	110	Installation of Airport Underground Electrical Duct Banks and Conduits
L	115	Electrical Manholes and Junction Structures
L	119	Airport Obstruction Lights
L	125*	Installation of Airport Lighting Systems
L	130*	Static Grounding Systems
L	141*	FAA NAVAID Equipment
L	142*	Power Facilities to FAA NAVAID Equipment

* - Custom specification, as a supplement to FAA Specifications.

SECTION 13 - STATEMENT OF PROBABLE CONSTRUCTION COST

In order to prepare the cost estimate for the Friedman Memorial Replacement Airport, development project cost data was obtained from the FAA Northwest Mountain Region Office in Seattle, Washington. Cost data was provided via project bid tabulations for work at the following five airports: Boise, Cascade, Gooding, McCall and Nampa. All of the bid tabulations covered projects performed during calendar year 2010, which reflect the most current unit prices for airport work in Idaho.

These bid tabs were compared to one another to check for any inconsistencies among unit prices for individual items. Because unit prices for a particular bid item differed slightly depending on the airport and project, the average unit price for the items of work, across the full set of bid tabulations, was used to establish the unit costs for the replacement airport cost estimate. As the magnitude of this project exceeded the sizes of the individual airport project provided by FAA, the Idaho Transportation Department (ITD) bid tabulation report was also obtained and used to validate the unit prices obtained for the airport bid tabulations. Additionally, where unit prices were not available from the airport projects, the unit prices for similar work from the ITD tabulation were used. Finally, where neither, the FAA Northwest Mountain Region or the ITD had comparable unit prices, the estimates of comparable work from other airports projects, outside Idaho, were used to complete the cost estimate.

Detailed quantity take-offs were prepared from the preliminary design plans for development of the airport. The above defined unit prices were then inserted into a cost estimate spread sheet along with each quantified work item for the Friedman Memorial Replacement Airport project. The items of work, unit prices and amounts are identified on the following pages.

SECTION 13 - ESTIMATE OF PROBABLE CONSTRUCTION COST

SITE CIVIL AND INFRASTRUCTURE

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	AMOUNT
	PAVEMENT				
P-1	CRUSHED AGGREGATE BASE COURSE (6-INCH THICK)	SY	93,565	$ 4.00	$ 374,260.00
P-2	CRUSHED AGGREGATE BASE COURSE (8-INCH THICK)	SY	207,737	$ 5.50	$ 1,142,553.50
P-3	CRUSHED AGGREGATE BASE COURSE (10-INCH THICK)	SY	187,498	$ 6.00	$ 1,124,988.00
P-4	CRUSHED AGGREGATE BASE COURSE (SECURITY ROAD)	SY	42,812	$ 4.00	$ 171,248.00
P-5	SUBBASE COURSE (6-INCH THICK)	SY	95,770	$ 3.00	$ 287,310.00
P-6	SUBBASE COURSE (9-INCH THICK)	SY	42,812	$ 4.50	$ 192,654.00
P-7	SUBBASE COURSE (11-INCH THICK)	SY	93,565	$ 5.00	$ 467,825.00
P-8	SUBBASE COURSE (12-INCH THICK)	SY	207,737	$ 5.50	$ 1,142,553.50
P-9	SUBBASE COURSE (13-INCH THICK)	SY	207,863	$ 6.50	$ 1,351,109.50
P-10	SUBBASE COURSE (16-INCH THICK)	SY	187,498	$ 8.00	$ 1,499,984.00
P-11	DRAINAGE LAYER (6-INCH THICK)	SY	303,507	$ 4.33	$ 1,314,185.31
P-12	DRAINAGE LAYER (8-INCH THICK)	SY	207,863	$ 5.78	$ 1,201,448.14
P-13	GEOTEXTILE FABRIC	SY	511,370	$ 0.95	$ 485,801.50
P-14	BITUMINOUS CONCRETE	TON	205,946	$ 70.00	$ 14,416,220.00
P-15	ECONOCRETE BASE COURSE (6-INCH THICK)	SY	95,770	$ 42.00	$ 4,022,340.00
P-16	PCC PAVEMENT NON-REINFORCED (15.5-INCHES THICK)	SY	86,193	$ 98.00	$ 8,446,914.00
P-17	PCC PAVEMENT REINFORCED (15.5-INCHES THICK)	SY	9,577	$ 120.00	$ 1,149,240.00
P-18	BITUMINOUS PRIME COAT	GAL	287,003	$ 2.38	$ 683,067.14
P-19	BITUMINOUS TACK COAT	GAL	55,403	$ 2.38	$ 131,859.14
	SUBTOTAL PAVEMENTS				**$ 39,605,560.73**
	EARTHWORK				
E-1	CLEARING & GRUBBING	AC	742	$ 525.00	$ 389,550.00
E-2	ON-SITE EXCAVATION	CY	4,418,970	$ 8.50	$ 37,561,245.00
E-3	ON-SITE EMBANKMENT	CY	2,723,451	$ 13.32	$ 36,276,367.32
E-4	COMPACT SUBGRADE (6-INCH THICK)	SY	93,565	$ 3.50	$ 327,477.50
E-5	COMPACT SUBGRADE (12-INCH THICK)	SY	756,095	$ 6.00	$ 4,536,570.00
	SUBTOTAL EARTHWORK				**$ 79,091,209.82**
	DRAINAGE				
D-1	NOT USED	LF	0	$ 30.00	$ -
D-2	24" RCP STORM PIPE (CLASS IV)	LF	223	$ 45.00	$ 10,035.00
D-3	NOT USED	LF	0	$ 75.00	$ -

D-4	36" RCP STORM PIPE (CLASS IV)	LF	4,393	$ 90.00	$ 395,370.00
D-5	NOT USED	LF	0	$ 100.00	$ -
D-6	48" RCP STORM PIPE (CLASS IV)	LF	1,424	$ 125.00	$ 178,000.00
D-7	54" RCP STORM PIPE (CLASS IV)	LF	320	$ 200.00	$ 64,000.00
D-8	60" RCP STORM PIPE (CLASS IV)	LF	439	$ 250.00	$ 109,750.00
D-9	72" RCP STORM PIPE (CLASS IV)	LF	935	$ 350.00	$ 327,250.00
D-10	84" RCP STORM PIPE (CLASS IV)	LF	86	$ 500.00	$ 43,000.00
D-11	NOT USED	LF	0	$ 23.00	$ -
D-12	NOT USED	LF	0	$ 32.00	$ -
D-13	NOT USED	LF	0	$ 41.00	$ -
D-14	36" HDPE STORM PIPE	LF	3,169	$ 62.00	$ 196,478.00
D-15	48" HDPE STORM PIPE	LF	184	$ 80.00	$ 14,720.00
D-16	NOT USED	LF	0	$ 1,500.00	$ -
D-17	TRENCH DRAIN	LF	6,660	$ 200.00	$ 1,332,000.00
D-18	EDGE DRAINAGE SYSTEM	LF	51,036	$ 25.00	$ 1,275,900.00
D-19	EDGE DRAINAGE HEADWALLS	EA	90	$ 500.00	$ 45,000.00
D-20	MITERED END SECTION (HEADWALL) 48" ROUND & SMALLER	EA	26	$ 3,000.00	$ 78,000.00
D-21	STRAIGHT END SECTION (HEADWALL) 48" ROUND & LARGER	EA	60	$ 10,000.00	$ 600,000.00
D-22	MANHOLE WITH BAFFLE	EA	12	$ 7,500.00	$ 90,000.00
D-23	MANHOLE	EA	7	$ 9,500.00	$ 66,500.00
D-24	INLET	EA	15	$ 6,500.00	$ 97,500.00
D-25	DE-ICING DRAINAGE SYSTEM	LS	1	$ 200,000.00	$ 200,000.00
D-26	RIP-RAP	CY	27,500	$ 37.00	$ 1,017,500.00
	SUBTOTAL DRAINAGE				**$ 6,141,003.00**
	WATER				
W-1	2" WATER SERVICE	LF	2,750	$ 40.00	$ 110,000.00
W-2	6" DIP CLASS 51 WATER MAIN (FIRE SERVICE)	LF	3,000	$ 75.00	$ 225,000.00
W-3	8" DIP CLASS 51 WATER MAIN	LF	7,168	$ 90.00	$ 645,120.00
W-4	12" DIP CLASS 51 WATER MAIN	LF	19,358	$ 110.00	$ 2,129,380.00
W-5	8" GATE VALVE	EA	21	$ 1,500.00	$ 31,500.00
W-6	12" GATE VALVE	EA	45	$ 2,200.00	$ 99,000.00
W-7	FIRE HYDRANT ASSEMBLY	EA	30	$ 3,500.00	$ 105,000.00
W-8	WATER WELL ASSEMBLY	EA	1	$ 200,000.00	$ 200,000.00
W-9	LIFT STATION (WATER)	LS	1	$ 50,000.00	$ 50,000.00
W-10	WATER TREATMENT PACKAGE PLANT	LS	1	$ 250,000.00	$ 250,000.00
W-11	ABOVE GROUND STORAGE TANK	LS	1	$ 500,000.00	$ 500,000.00
W-12	PUMP STATION (WATER)	LS	1	$ 300,000.00	$ 300,000.00
	SUBTOTAL WATER				**$ 4,645,000.00**
	SEWER				
S-1	6" PVC SANITARY GRAVITY LINE	LF	6,374	$ 40.00	$ 254,960.00

S-2	8" PVC SANITARY GRAVITY LINE	LF	3,166	$ 50.00	$ 158,300.00
S-3	12" PVC SANITARY GRAVITY LINE	LF	5,848	$ 75.00	$ 438,600.00
S-4	SANITARY SEWER MANHOLE	EA	65	$ 3,500.00	$ 227,500.00
S-5	LIFT STATION (SANITARY)	LS	1	$ 85,000.00	$ 85,000.00
S-6	6" DIP SEWAGE FORCE MAIN	LF	25	$ 75.00	$ 1,875.00
S-7	WASTE WATER TREATMENT PACKAGE PLANT	LS	1	$ 400,000.00	$ 400,000.00
S-8	SUB-SURFACE DISPOSAL SYSTEM	LS	1	$1,045,000.00	$ 1,045,000.00
	SUBTOTAL SEWER				**$ 2,611,235.00**
	POWER (ON SITE DISTRIBUTION)				
PW-1	OVERHEAD	LF	12,806	$ 22.00	$ 281,732.00
PW-2	UNDERGROUND	LF	10,358	$ 28.00	$ 290,024.00
	SUBTOTAL POWER				**$ 571,756.00**
	COMMUNICATIONS (ON SITE DISTRIBUTION)				
COM-1	UNDERGROUND	LF	18,054	$ 7.00	$ 126,378.00
	SUBTOTAL COMMUNICATIONS				**$ 126,378.00**
	AIRFIELD LIGHTING				
AL-1	RUNWAY LIGHTS	EA	96	$ 1,100.00	$ 105,600.00
AL-2	TAXIWAY LIGHTS	EA	403	$ 1,000.00	$ 403,000.00
AL-3	AIRFIELD SIGNS	EA	69	$ 4,000.00	$ 276,000.00
AL-4	CONDUIT	LF	68,231	$ 15.00	$ 1,023,465.00
AL-5	CABLE	LF	151,122	$ 2.00	$ 302,244.00
AL-6	REGULATORS	EA	6	$ 70,000.00	$ 420,000.00
	SUBTOTAL AIRFIELD LIGHTING				**$ 2,530,309.00**
	APRON LIGHTING				
APL-1	TERMINAL	LS	1	$ 90,000.00	$ 90,000.00
APL-2	FBO	LS	1	$ 60,000.00	$ 60,000.00
APL-3	ALL REMAINING AIRCRAFT PARKING AREAS	LS	1	$ 100,000.00	$ 100,000.00
	SUBTOTAL APRON LIGHTING				**$ 250,000.00**
	LANDSIDE LIGHTING				
LL-1	TERMINAL PARKING LOT	LS	1	$ 250,000.00	$ 250,000.00
LL-2	ALL OTHER PARKING LOTS	LS	1	$ 75,000.00	$ 75,000.00
LL-2	ROADS	LS	1	$ 50,000.00	$ 50,000.00
	SUBTOTAL LANDSIDE LIGHTING				**$ 375,000.00**
	NAVAIDS				
N-1	MALSR	LS	2	$ 120,000.00	$ 240,000.00

N-2	GLIDE SLOPE	LS	2	$ 80,000.00	$ 160,000.00
N-3	LOCALIZER	LS	2	$ 50,000.00	$ 100,000.00
N-4	AWOS	LS	1	$ 50,000.00	$ 50,000.00
N-5	PAPI	LS	2	$ 50,000.00	$ 100,000.00
	SUBTOTAL NAVAIDS				**$ 650,000.00**
	MISCELLANEOUS				
M-1	MOBILIZATION	LS	1	$6,000,000.00	$ 6,000,000.00
M-2	PERIMETER FENCING	LF	27,833	$ 10.00	$ 278,330.00
M-3	VEHICLE ACCESS POINTS WITH CARD READER	EA	6	$ 500.00	$ 3,000.00
M-4	NOT USED	LF	0	$ 122.00	$ -
M-5	AIRFIELD PAVEMENT MARKINGS	SF	300,000	$ 0.75	$ 225,000.00
M-6	RUNWAY PAVEMENT GROOVING	SY	85,000	$ 3.00	$ 255,000.00
M-7	SEEDING	AC	548	$ 850.00	$ 465,800.00
	SUBTOTAL MISCELLANEOUS				**$ 7,227,130.00**

SUBTOTAL	**$143,824,581.55**
Contingency 15%	**$ 21,573,687.23**
TOTAL	**$165,398,268.78**

SECTION 13 - ESTIMATE OF PROBABLE CONSTRUCTION COST

FACILITIES

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	AMOUNT
F-1	TERMINAL BUILDING	SF	21,000	$ 200.00	$ 4,200,000.00
F-2	AIR TRAFFIC CONTROL TOWER	SF	13,000	$ 200.00	$ 2,600,000.00
F-3	FUEL FACILITIES (USFS & FBO)	LS	1	$1,591,884.40	$ 1,591,884.40
F-4	FIXED BASE OPERATIONS (FBO)	SF	101,655	$ 115.00	$ 11,690,325.00
F-5	CORPORATE GENERAL AVIALTION (MEDIUM HANGARS)	SF	79,070	$ 103.00	$ 8,144,210.00
F-6	CORPORATE GENERAL AVIATION (LARGE HANGARS)	SF	126,492	$ 90.00	$ 11,384,280.00
F-7	ARFF/AIRPORT OPS/AIRFIELD LIGHTING VAULT	SF	31,623	$ 76.00	$ 2,403,348.00
F-8	T-HANGAR	SF	126,000	$ 65.00	$ 8,190,000.00
F-9	CONDO HANGAR	SF	7,200	$ 140.00	$ 1,008,000.00
F-10	U.S. FOREST SERVICE (USFS)/BUREAU OF LAND MANAGEMENT (BLM)	SF	5,000	$ 152.00	$ 760,000.00
F-11	SELF SERVICE FUELING	LS	1	$ 162,000.00	$ 162,000.00
F-12	RENTAL CAR QTA FACILITY	LS	1	$ 519,462.00	$ 519,462.00
F-13	CARGO FACILITY	SF	6,595	$ 92.00	$ 606,740.00
F-14	MAINTENANCE SHOP & STORAGE BLDG.	LS	15,000	$ 90.00	$ 1,350,000.00
				SUBTOTAL	**$54,610,249.40**
				Contingency 25%	**$13,652,562.35**
				TOTAL	**$68,262,811.75**

SECTION 13 - ESTIMATE OF PROBABLE CONSTRUCTION COST

U.S. 20 RELOCATION

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT COST	AMOUNT
X-1	REMOVAL OF BITUMINOUS SURFACE	SY	40,016	$ 1.20	$ 48,019.20
X-2	REMOVE CULVERT	EA	16	$ 1,000.00	$ 16,000.00
X-3	ON-SITE EXCAVATION	CY	156,762	$ 9.00	$ 1,410,858.00
X-4	ON-SITE EMBANKMENT	CY	136,902	$ 13.32	$ 1,823,534.64
X-5	DRAINAGE	EA	16	$ 3,125.00	$ 50,000.00
X-6	BITUMINOUS CONCRETE	TON	16,415	$ 70.00	$ 1,149,050.00
X-7	CRUSHED AGGREGATE BASE COURSE (9-INCH THICK)	SY	50,310	$ 5.70	$ 286,767.00
X-8	SUBBASE COURSE (15-INCH THICK)	SY	50,310	$ 7.75	$ 389,902.50
X-9	ROADWAY PAVEMENT MARKINGS	SY	45,580	$ 0.25	$ 11,395.00
X-10	POWER LINE RELOCATION	LF	15,091	$ 22.00	$ 332,002.00
X-11	COMMUNICATION CABLE RELOCATION (2-200 PAIR CABLE)	LF	30,182	$ 7.00	$ 211,274.00

SUBTOTAL	**$ 5,728,802.34**
Contingency 25%	**$ 1,432,200.59**
TOTAL	**$ 7,161,002.93**

SECTION 14 - SUMMARY AND RECOMMENDATIONS

The Friedman Memorial Airport Authority (FMAA) has proposed to construct and operate a replacement airport for the existing Friedman Memorial Airport within Blaine County, Idaho. The Federal Aviation Administration is evaluating two potential replacement airport sites in greater detail as part of the Environmental Impact Statement (EIS) in order to select the preferred location for the Friedman Memorial Replacement Airport. This report presents the results of a preliminary civil engineering site development analysis for the purpose of developing construction costs estimates for use in further evaluating the two replacement airport sites.

The results of this preliminary engineering effort indicate estimated site development cost for Site 10A of approximately $189,377,205.11, for the initial phase of development, excluding off-site improvements, environmental remediation costs (if any) permit fees, final engineering, and other "soft costs". The site development costs for Site 12 have been estimated to be approximately $240,822,083.46, also excluding off-site improvements, environmental remediation costs (if any) and soft costs.

It is recommended that the information presented in this report be utilized as a factor in selection of a replacement airport site. Once a site selection is made, further survey and geotechnical investigations should be conducted in accordance with Federal Aviation Administration requirements and standard engineering practice, as part of the final engineering design and development for the selected airport site.