
**UTAH NATIONAL GUARD CAMP WILLIAMS
ROADWAY SURFACING IMPROVEMENTS
DFCM PROJECT NO. 10241480**

SPECIFICATIONS AND PLAN SHEETS

DIVISION OF FACILITIES CONSTRUCTION
AND MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UT 84114

September 2010

Civil Science, Inc.
3160 West Clubhouse Drive
Lehi, UT 84043
(801) 768-7200

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*DFCM Standard Specifications - Provided by King Engineering, Inc.

SECTION 01010 - SUMMARY OF WORK

PROJECT LOCATION

The project is located at Camp Williams, 117800 South Camp Williams Road, Riverton, UT. Access to the site is through the Camp Williams main gate. Two forms of picture I.D. are required for entry to the site.

WORK UNDER THIS CONTRACT

The work under this contract generally includes the removal of existing asphalt, removal of existing roadway bed material, placement of base course material and replacement of asphalt. Adjustments as required to valve boxes and manholes and utility boxes including concrete collars. Locations for improvements include:

- Base Bid
 - 1st Street
 - 2nd Street
 - 3rd Street
 - Camp Williams Road (Academy Street to 2nd Street)
 - Utah Avenue
 - Nevada Avenue
 - Wyoming Avenue (2nd Street to 3rd Street)
- Additive Alternative 1
 - Wyoming Avenue (1st Street to 2nd Street)
 - Access Road (East of 2nd Street between Wyoming Avenue and Maintenance Avenue)
- Additive Alternative 2
 - UTES E. Road
 - Idaho Avenue
- South Parking Road

The project includes, but is not limited to, construction of the following:

ASPHALT PAVING

Remove existing asphalt and base material.

Placement and compaction of untreated base course and asphalt.

Application of tack coat where necessary.

UTILITY ADJUSTMENTS

Adjust rim, grate, and valve elevations to new design grade. Provide adjustable rims and rings where necessary.

Placement of concrete surface collar around all utilities

MISCELLANEOUS

Bonds and insurance

Submittals

Mobilization

Asphalt Pavement Saw Cut

Erosion control including Storm Water Pollution Prevention Plan

Grading of existing gravel along shoulders where necessary

NOTE: Contractor will arrange compaction testing with an owner approved testing agency. The costs for initial testing will be paid by the owner. Additional testing, if required will be paid by the Contractor.

SUBSURFACE INFORMATION

The submission of a Proposal shall be conclusive evidence that the Bidder has investigated the site and is satisfied as to the conditions to be encountered, the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the Contract Documents.

CONTRACT DRAWINGS

Where Contractor bases his bid upon quantities from Contract Drawings and field verification.

SECTION 01080 - APPLICABLE CODES

The Contractor shall comply with the following and all applicable local codes, standards, rules and regulations of any authority having jurisdiction over the project site or the work to be performed.

Rules and Regulations Governing Excavation Work

Utah Occupational Safety and Health Administration

Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596

American Public Works Association, Utah Chapter, Standard Plans and Specifications, 2007.

NOTICE: Protection of life, health, and public welfare as it relates to execution of the construction contract is the responsibility of the Contractor. Neither the Owner nor the Engineer will provide observation, inspection, supervision, or any comment on plans, procedures, or actions employed at the project as they relate to safety of life, health, or public welfare. If conditions are imposed by the Engineer or Owner which interfere with, or imply actions detrimental to safety, written notice shall be issued by the Contractor and a decision shall be returned to the Contractor for action prior to effecting any unsafe procedure or condition.

CONFLICTS: In case of conflict between codes, the one having the more stringent requirements shall govern. Drawings and specifications which exceed code requirements shall govern.

SECTION 01200 - PROJECT MEETINGS

JOBSITE PROGRESS MEETINGS

Conduct periodic jobsite meetings at intervals to be determined by the Owner, for the purpose of reviewing, scheduling and coordinating project progress, as well as other matters of general interest to the project. Contractor to provide a work schedule prior to start and updates at periodic meetings.

SECTION 01300 - SUBMITTALS

INSURANCE CERTIFICATES

Submit updated certificates as necessary to verify current coverage.

PROJECT DATA SUBMITTAL SCHEDULE

List all anticipated submittals of project data as required by the Contract Documents and such additional data as considered necessary by the Contractor. Show proposed submittal dates for each so that Engineer may schedule timely review of submittals. Update monthly to reflect current status.

SCHEDULE OF VALUES

Where payment is to be based on unit bid prices, correlate schedule of values with bid items. Where payment is to be based on fixed price, correlate schedule of values with Divisions and Sections of Specifications. If separate payment is to be requested for materials suitably stored but not installed, segregate delivered costs, including taxes, from installation which include overhead and profit.

SHOP DRAWINGS, SAMPLES AND PRODUCT DATA

General - Submittals on component parts forming a system, or that are interrelated, shall be submitted at one time as a single submittal in order to demonstrate that the items have been properly coordinated and will function as a unit. Specific submittal requirements are as follows and are required for the items of equipment and materials noted in the Submittal Register at the end of this section.

Shop Drawings - Furnish office-prepared shop drawings to scale clearly showing the interrelationship of the various portions of work including the relationship to the work of other trades prior to commencing fabrication or installation of the work. As needed, provide a written description of the methods to be used in completing the work. Include location of each item, pertinent dimensions affecting construction, description of materials, and connections. Connection details shall show size and locations of bolts and size, shape, and lengths of each weld. Identify details by reference to sheet and detail numbers shown on Contract Drawings. Use same symbols wherever practicable. Reproductions of Contract Drawings are acceptable as shop drawings only when specifically authorized in writing by the Engineer.

Samples - Submit all required physical examples to illustrate materials, equipment or workmanship, which establish standards by which completed work is judged. Must be of sufficient size and clarity, and in sufficient quantity to clearly illustrate functional characteristics and full range of colors, patterns, textures or other properties which will be actually produced.

Product Data - Submit manufacturer's schematic drawings, catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, test reports, certificates of compliance,

and other descriptive data not included on shop drawings. Modify standard descriptive data to delete information which is not applicable, and clearly identify pertinent data. Show dimensions and clearances required, performance characteristics and capacities, wiring diagrams and controls, and any other pertinent data applicable to the project.

Certificate of Compliance - Furnish manufacturer's Certificate of Compliance certifying to compliance with specification requirements, applicable reference standards, and test data requirements. Include reference to the specification section and paragraph with which the product or material is intended to comply.

Submission Requirements

Submittals shall be made with a letter of transmittal to the Engineer by the Contractor, and not by subcontractors, suppliers or manufacturers.

Submit samples in number specified, or if not so specified, in triplicate.

Submit Project Data in the quantities shown in the Submittal Register located at the end of this section.

Identify all submittals with the following information, as applicable:

Project title and Engineer's project number.

Name of Contractor, Engineer, originating subcontractor or supplier.

Submittal date, and all revision dates.

Identify each product or material submittal by reference to specification section and page no., drawing no., or any other contract document reference applicable thereto.

Applicable conformance standards.

Include certification of Contractor review and conformity to contract requirements per General Conditions. Identify any deviations from Contract Documents. Provide 3" x 3" minimum space for Engineer's review stamp.

EQUIPMENT MANUALS

Installation instructions, start-up and operating instructions, inspection and maintenance instructions, replacement parts list, and manufacturer's as-built diagrams.

PROJECT RECORD DOCUMENTS

Maintenance of Documents

Maintain at jobsite one record copy of Contract Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, other modifications to the Contract, field test records and other approved documents submitted by Contractor in compliance with specification requirements.

Maintain documents at the project apart from documents used for construction. Do not use record documents for construction purposes. Maintain documents in clean, legible condition. Make documents available at all times for inspection of the Engineer and Owner.

As-built information shall be kept current in both drawings and Project Manual and shall be inserted by the Contractor and appropriate subcontractors as the project progresses under the supervision of the resident project representative. Each person making a change shall identify the change marked with the date and initials in a code and manner approved by the Engineer. Progress billings will not be paid until the resident project representative has reported to the Engineer that all record documents are complete and up-to-date as of the current billing.

Upon completion of the project, the record documents will be consolidated and delivered by the Engineer to the Owner. The Engineer will not verify the accuracy of information furnished by the Contractor, and the Contractor shall be responsible for any damage to the Owner or the Engineer arising from any errors or omissions relating to the data furnished by the Contractor, his subcontractors, suppliers and employees.

Recording

Label each document "PROJECT RECORD COPY" in 2" high printed letters. Keep record documents current. Do not permanently conceal any work until required information has been recorded.

Contract Drawings - Refer to Section 01010 -SUMMARY OF WORK

Legibly mark most appropriate drawing to record, where applicable:

Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

Field changes of dimension and detail made during construction process.

Changes made by Change Order or Field Order

Details not on original Contract Drawings.

Shop Drawings - Maintain as record drawings. Legibly annotate shop drawings to record changes made after review. Use red felt tip marking pen for all recording.

Submittal

At completion of project, deliver record documents to the Engineer. Accompany submittal with transmittal letter, in duplicate, containing:

Date, project title and number.
 Contractor's name and address.
 Title and number of each record document.
 Certification that each document as submitted is complete and accurate.
 Signature of Contractor or his authorized representative.

Submittal Register

Provide the following submittals:

Work	Item	Type of Submittal	Time of Submittal	# Of Copies
Misc.	Compaction Tests	Certificate	Within 36 Hrs. of Test	3
	Asphalt	Mix Design	Prior to Shipment	3
	Roadbase	Mix Design	Prior to Shipment	3
	Concrete	Mix Design	Prior to Shipment	3

Refer to Sections 02230, 02511, and 03300 for detailed specifications of these materials.

SECTION 01400 - QUALITY CONTROL

TESTS AND INSPECTIONS

The Contractor will arrange compaction testing with an owner-approved testing agency. The costs for initial testing will be paid by the owner. Additional testing, if required, will be paid by the Contractor.

Base Course - Section 02230
Asphalt Concrete Paving - Section 02511

REQUIREMENTS FOR INDEPENDENT TESTING CONSULTANTS

Test Reports

Testing agency shall be instructed to submit directly to Engineer, 3 copies of all reports of tests or inspections made, showing compliance, irregularities or deficiencies, identifying project, date of test, location in project, applicable specification section, applicable standard(s) for compliance, observations relating to compliance, name and signature of inspector.

CONTRACTOR RESPONSIBILITIES

Furnish above qualification data and expedite submittals when testing consultant is employed by Contractor. Provide access to the work and furnish casual labor and facilities to accommodate inspections and tests. When tests fail to meet specified requirements, Contractor shall arrange for re-testing after conditions have been corrected. Conduct such retesting at no additional expense to the Owner.

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

GENERAL

Contractor shall be responsible for providing or arranging with subcontractors for all temporary utilities, facilities and controls during the construction period.

TEMPORARY UTILITIES

Water

Water for construction purposes is available in limited quantities from the current system at Camp William.

Electric Power and Lighting

The Contractor shall provide necessary transformers or other equipment, make necessary connections and provide necessary distribution lines for use by all trades during construction at locations so that power can be secured at any working area with no more than 100-foot extension.

SANITARY FACILITIES

Contractor shall provide and maintain, throughout project duration, adequate temporary toilet facilities in a neat and sanitary condition for all employees and authorized visitors at the site. Place facilities at approved locations near the work.

FIELD OFFICES AND STORAGE FACILITIES

Provide and maintain storage sheds, trailers or other facilities as necessary to store and protect materials, tools and equipment.

Coordinate location of all temporary office and storage facilities with Camp Williams staff.

FENCES AND BARRICADES

Provide and maintain temporary fences, barriers, lights, guardrails and barricades as indicated in the Contract Documents, or as necessary to regulate vehicular and pedestrian traffic, to secure the work and adjacent property, and to protect persons and property. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate controls.

SECTION 01550 - MEASUREMENT AND PAYMENT

BASE BID - LUMP SUM

Payment is to be made on a lump sum basis for all work shown on the drawings and detailed in the specifications. Contractor is responsible for preservation and protection of all neighboring facilities not being demolished or reconstructed. If damage occurs during removal, proper restoration of all damage is required at no additional cost. Contractor shall also provide a sq-ft cost for any additional pavement repairs that may be necessary through a change order.

ALT #1 BID - LUMP SUM

Payment is to be made on a lump sum basis for all work shown on the drawings and detailed in the specifications. Contractor is responsible for preservation and protection of all neighboring facilities not being demolished or reconstructed. If damage occurs during removal, proper restoration of all damage is required at no additional cost. Contractor shall also provide a sq-ft cost for any additional pavement repairs that may be necessary through a change order.

ALT #2 BID - LUMP SUM

Payment is to be made on a lump sum basis for all work shown on the drawings and detailed in the specifications. Contractor is responsible for preservation and protection of all neighboring facilities not being demolished or reconstructed. If damage occurs during removal, proper restoration of all damage is required at no additional cost. Contractor shall also provide a sq-ft cost for any additional pavement repairs that may be necessary through a change order.

ALT #3 BID - LUMP SUM

Payment is to be made on a lump sum basis for all work shown on the drawings and detailed in the specifications. Contractor is responsible for preservation and protection of all neighboring facilities not being demolished or reconstructed. If damage occurs during removal, proper restoration of all damage is required at no additional cost. Contractor shall also provide a sq-ft cost for any additional pavement repairs that may be necessary through a change order.

SECTION 01600 - MATERIAL AND EQUIPMENT

PRODUCTS LIST

After date of Purchase Order, submit to Engineer a complete list of all products which are proposed for installation. Tabulate list by, and be complete for, each specifications section. Include with listing of each product the name and address of manufacturer, trade name, model or catalog designation, reference standard, manufacturer's performance and test data, and subcontractor, as applicable.

REFERENCE STANDARDS

Reference in the specifications to standard specifications or publications or technical societies or governmental agencies, such as ASTM, ANSI, AISC, ACI, AWS, Federal Specifications, or Commercial Standards shall refer to latest edition adopted and published 30 days prior to receiving bids, unless specifically noted otherwise in the Contract Documents. It shall be understood that all manufacturers, producers and their agents, of materials required shall have such reference standards available for reference and be fully familiar with their requirements as pertains to their product, material or equipment.

In case of conflict between reference standards and project specifications, project specifications shall govern. In case of conflict between reference standards and codes, the one having the more stringent requirements shall govern.

MANUFACTURER'S INSTRUCTIONS

Contractor shall obtain and distribute necessary copies of manufacturer's instructions, including two copies to the Engineer. If a conflict exists between the manufacturer's instructions and the Contract Documents, notify the Engineer in writing and obtain his instruction prior to proceeding.

PRODUCT DELIVERY, STORAGE AND HANDLING

Deliver materials, products and equipment to the project site in undamaged condition in manufacturer's original, unopened containers or packaging with identifying labels intact and legible. Arrange deliveries in accordance with the Construction Schedule and in ample time to facilitate inspection prior to installation to avoid unnecessary delays in the construction process.

Store and handle products as prescribed by manufacturer or as specified in the Contract Documents in a manner to protect from damage by moisture, weather, abuse or construction operations.

SECTION 02230

BASE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Subgrade preparation to lines and grades shown on the plan.
- B. Place, grade and compact base and sub-base course materials.
- C. Dust and surface water control.

1.02 RELATED WORK

- A. Section 02511 - Asphaltic Concrete Paving

1.03 REFERENCES

- A. American Society for Testing Materials (ASTM).
- B. American Association of Safety and Highway Transportation Officials (AASHTO)

PART 2 PRODUCTS

2.01 BASE COURSE MATERIAL

- A. Road Base for Concrete Sidewalks, Concrete Curb and Gutter, and Waterways.
 - 1. Unwashed, hard, durable, angular pit run gravel or crushed natural stone.
 - 2. Shall be free from shale, silt, clay, loam, friable or soluble materials.
 - 3. Shall be free from noticeable concentrations of alkali, salt, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectional or deleterious.
 - 4. Shall be graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
1"	100
3/4"	90-100
1/2"	30-60
3/8"	0-20
#4	0-5

B. Road Base for Pavement Preparation:

1. Shall be untreated natural stone
2. Shall not be lumpy or frozen.
3. Shall be free from noticeable concentrations of alkali, salt, shale, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectional or deleterious.
4. Shall be graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
1"	100
1/2"	70-100
No. 4	41-68
No. 16	21-41
No. 40	10-27
No. 200	4-13

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. Prior to placing base course materials, the subgrade shall be scarified to a depth of not less than 6", moistened or dried to optimum moisture content, and compacted to at least 96% maximum Modified Proctor Density as determined in accordance with ASTM D1557 (AASHTO T-180), and shall be within 2% of optimum moisture content.
- B. The subgrade shall then be proof rolled in the presence of the Engineer by passing loaded rubber-tired construction equipment uniformly over the surface at a constant rate. At least two (2) passes shall be made over all subgrade areas.
- C. If excessively soft, loose, or disturbed soils are encountered, they shall be removed as directed by the Engineer to a maximum depth of two feet (2') and replaced and

recompacted to 96% maximum Modified Proctor Density using approved subgrade stabilizing material.

- D. Ensure subgrade is to required lines and elevations.

3.02 PLACEMENT OF BASE COURSE

- A. Protect against "pumping" moisture to surface by limiting travel on exposed subgrade. Where it is determined by the Owner that construction vehicle traffic (other than proof rolling) has caused subgrade instability, remove disturbed soils and replace with sand backfill at no additional cost to the Owner.
- B. Apply water soluble herbicide for nonselective control of annual and perennial weeds in strict accordance with manufacturers instructions and all laws and regulations.
- C. Place base course material on the prepared and accepted subgrade. The material shall be back-dumped and spread in a uniform lift thickness.
- D. Handle and spread materials in a manner that will prevent segregation of sizes. When vibrating or other acceptable types of compaction equipment are used, the entire course may be placed in one layer, provided the ability of the equipment to achieve specified compaction to the full layer depth is demonstrated. In no case shall compacted lift thickness be greater than 8".
- E. When base course is constructed in more than one layer, the previously placed layer shall be cleaned of loose and foreign matter. Upper layer of base course shall not be less than 1-1/2", nor shall fine materials be added to reach final grade.
- F. Overstressing the subgrade soil and base course shall be avoided by utilizing equipment in spreading and dumping that exerts only moderate pressures on the soil. Avoid excessive travel on lower base course lifts. Severe rutting, cracking or yielding is an indication of overstressing the soil. Any ruts or cracks which develop in the base course during spreading or compacting shall be repaired as directed at no additional cost to Owner.
- G. Base course shall be compacted to no less than 96% maximum Modified Proctor Density, as determined by ASTM D1557 (AASHTO T-180). Moisture content shall be maintained to within 1.5% of optimum throughout placing and compaction operations.
 - 1. Compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted.

2. Compaction equipment shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted.
- H. Base course shall be substantially true to line and grade as indicated on the drawings. The surface shall be within 1/2" of required grade. Completed thickness of base course shall be within 1/2" of indicated thickness, with average thickness not less than that indicated.
 - I. The top surface of compacted base course shall be finished by blading or rolled with equipment designed for that purpose.
 - J. Temporary Graded Surface
 1. When allowed by the local jurisdiction having authority, where trenches are excavated in paved traffic lanes, the surface course may be temporarily replaced by a surface consisting of base course material. The base course shall be removed and replaced with pavement as soon as conditions permit, or as required by local jurisdiction having authority.
 2. The surface shall be maintained to provide for a smooth flow of traffic without holes, bumps, etc., until final acceptance of the work.

3.03 DUST AND SURFACE WATER CONTROL

- A. Dust control measures shall be implemented by application of water to all work areas, storage areas, haul and access roads, or other areas affected by work.
- B. All work shall be in compliance with the Federal, State and local air pollution standards, and not cause a hazard or nuisance to personnel and the public in the vicinity of the work.
- C. Provide and operate at least one (1) mobile tank sprinkling unit during the contract period.
- D. Other methods of dust control for haul and access roads may include chemical treatment, light bituminous treatment or other method as approved by the Owner.
- E. Surface water shall be controlled to the extent that the areas to receive pavement, walks or slabs are not allowed to become wet from runoff from adjacent areas. Surface water shall be directed away from these areas but not directed toward adjacent property, buildings, or any improvement that may be damaged by water. Surface water shall not be allowed to enter sanitary sewers.

3.04 FIELD QUALITY CONTROL

- A. Testing and inspection of placed Base Course will be provided by the Owner. Tests provided by the Owner are as follows:

<u>Item</u>	<u>Type</u>	<u>Frequency</u>
Base Course Aggregate Sampling	ASTM D75	Each day or 1 test/500 sq. yd., or as required.
Atterberg Limits	ASTM D2419, D423, and D424	As required
Sieve Analysis	ASTM C136	As required
Bearing Ratio	ASTM D1883	As required
Maximum Density	ASTM D1557, Method D	As required
In-place Density	ASTM D2167, D2922 and D3017	As required

- B. If tests indicate that sub-base and/or base course do not meet specified requirements, remove defective work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 02511

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Proof roll base course to reveal soft and yielding spots.
- B. Place and compact asphaltic concrete paving.
- C. Pavement Markings.
- D. Protection of newly placed pavement.

1.02 RELATED WORK

- A. Section 01300 - Submittals: Asphaltic concrete paving mix design.
- B. Section 01400 - Quality Control: For testing.
- C. Section 02230 - Base Course

1.03 QUALITY ASSURANCE

- A. Do not place asphaltic concrete paving when the air temperature in the shade and/or the roadbed temperature are below 50° F, or during rain, when the base course surface is wet, or during other adverse weather conditions.
- B. Do not place tack coat when air temperature in the shade and the roadbed temperature are below 50° F, or during rain, fog, or other adverse weather conditions.
- C. All work shall be performed by experienced and qualified workmen with equipment standard with the industry.
- D. Approval by Engineer of sources of supply of materials shall be obtained prior to delivery of materials.
- E. Comply with federal, state and/or local codes and regulations.

1.04 REFERENCES

- A. American Society for Testing Materials (ASTM):
 - 1. D1557, "Tests for Moisture - Density Relationship of Soils using 10 lb (4.5 kg) Rammer in 18 inch (457 mm) Drop".

2. D1559, "Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus".
 3. D2041, "Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures".
 4. D2170, "Kinematic Viscosity of Asphalts (Bitumens)".
- B. THE ASPHALT INSTITUTE (A.I.) Specification Series No. 2 (SS-2).
- C. American Association of State Highway and Transportation Officials (AASHTO):
1. Materials and compaction tests.
 - a. AASHTO T-180
- D. State of Utah Standard Specifications for Road and Bridge Construction, latest edition including Supplement #2.
1. Section 704.03 Asphaltic Cement.

1.05 SUBMITTALS

- A. An asphaltic concrete paving mix design prepared by a certified laboratory and materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements shall be submitted for review and approval at least two weeks prior to commencement of the work.
- B. Written certification of compliance for pavement marking paint.

1.06 WARRANTY

- A. See General Conditions.

1.07 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

- A. No measurement will be made.
- B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Asphaltic cement:
1. Viscosity Graded original, AC-10, conforming to requirements of ASTM D-3381

King Engineering, Inc.
Standard Specifications

(AASHTO M-226, Table 2), and Section 704.03 - State of Utah Standard Specifications for Road and Bridge Construction.

2. Shall not foam when heated to 350° F.

B. Mineral aggregate:

1. Shall consist of crushed stone, crushed gravel, or crushed slag, or a combination thereof; free of clay, silt, organic matter or other deleterious materials.
2. Gradation shall be in accordance with the following:
 - a. Asphaltic concrete surface course:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1/2"	100
#4	55 - 85
#16	24 - 38
#50	9 - 21
#200	4 - 8

- b. Asphaltic concrete base course:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
3/4"	100
3/8"	75 - 91
#4	60 - 80
#16	28 - 48
#50	11 - 23
#200	5 - 9

3. Course aggregate, retained on the No. 4 sieve shall consist of clean, hard, rough, durable and sound fragments, with not less than 50 percent of particles by weight with at least one mechanically fractured face or clean angular face.
4. Fine aggregate passing the No. 4 sieve may be either a natural or manufactured product. The aggregate shall be clean, hard grained and moderately sharp, and shall contain not more than 2 percent by weight of vegetable matter or other deleterious substances.
5. That portion of the fine aggregate passing the No. 40 sieve shall be nonplastic when tested in accordance with ASTM D-424.

6. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, shall not exceed 6 percent of the total sample weight. That portion of fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with ASTM C-117.
7. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 100 pounds per cubic foot when tested in accordance with ASTM C-29.
8. The aggregate shall have a percentage of wear not exceeding forty when tested in accordance with ASTM C-131 and C-535.
9. The aggregate shall have a weighted loss not exceeding 12 percent by weight when subject to five cycles of sodium sulfate and tested in accordance with ASTM C-88, D-1073, and D-692.

2.02 ASPHALTIC CONCRETE PAVING MIXTURE

- A. Combine mineral constituents and asphalt cement in proportions per mix design at a central plant to produce an asphaltic concrete pavement mix.
- B. Mix design shall be based on the Marshall Method. The combined mineral aggregate plus any approved additives when mixed with the asphaltic cement in accordance with ASTM D-1559 shall conform to the following requirements:
 1. Marshall Stability: 1200 pounds minimum
 2. Flow (0.01 inch): 10 - 18
 3. Voids Content: 1.5% to 3%
 4. Asphaltic Cement Content: 5% to 6% by weight
- C. The asphaltic cement shall be heated at the mixing plant to a temperature at which it can be applied uniformly to the aggregate.
- D. Coarse and fine aggregate shall be stored separately at the mixing plant in a manner that will prevent intermingling.
- E. When it is necessary to blend aggregates from one or more sources to produce the combined gradation, each source or size of aggregate shall be stockpiled individually. Aggregate from the individual stockpiles shall be fed through separate bins to the cold elevator feeders. They shall not be blended in the stockpile.

- F. Cold aggregates shall be fed carefully to the plant so that surpluses and shortages will not occur and cause breaks in the continuous operation.
- G. The aggregate shall be dried and heated to provide a paving mixture temperature in conformance with placing conditions, but not to exceed 163°C (325°F).
- H. The heated and dried aggregates shall not contain enough moisture to cause the mixture to slump, the asphalt to foam, or the aggregate to segregate during hauling and placing.
- I. The shortest mixing time consistent with satisfactory coating of the aggregate shall be used. The mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 96 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The required mixing time, as determined above, shall be in accordance with ASTM D-2489.
- J. If a dryer drum mixing process is used, the mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 98 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The moisture content of the asphaltic cement sampled behind the laydown machine prior to compaction shall not exceed 1 percent by weight.

2.03 TACK COAT

- A. Emulsified asphalt CSS-1H or SS-1H.

2.04 MARKING PAINT

- A. Alkyd resin, white in color (No. 780), factory mixed, quick-drying, and non-bleeding, complying with Section 713.07 of the Utah State Department of Transportation Standard Specification for Road and Bridge Construction.

PART 3 EXECUTION

3.01 PREPARATION

- A. Proofroll base course surface. Replace wet, spongy, soft, uncompactable or other unsuitable material with new base course material at no additional cost. Finish and compact repaired area as specified in Section 02230 - Base Course.
- B. Ensure base course surface is to required elevation. Remove loose material from base course surface.
- C. Do not place prime coat or asphaltic concrete paving until base course installation has been approved by the Construction Manager.

3.02 TRANSPORTING THE ASPHALTIC CONCRETE PAVEMENT

- A. Transport time from the mixing plant to the job site shall not exceed 1 hour.
- B. Hauling truck shall have no direct frame contact with the paver or bear down on the paver during dumping operations.

3.03 TACK COAT

- A. Prior to placing pavement, tack coat shall be applied to the vertical edges of concrete and "cold" pavement (over 1/2 hour old) which will be in contact with new pavement. Tack coat shall extend 12 inches onto adjacent base course material. The tack coat shall be carefully applied at a rate of 0.15 gal/SY. Tack coat shall also be applied uniformly at the same rate to the horizontal top surface of each lift of bituminous pavement prior to placing the next lift of bituminous pavement to promote a bond between the two courses of pavement. None of the material shall penetrate into the pavement and for this reason the application should be limited.
- B. Prior to applying the material, the surface to be treated shall be swept or flushed free of dust or other foreign material.
- C. Protect all surfaces not required to receive tack coat from any inadvertent application.
- D. The temperature range of the tack coat at the time of application shall be such that the viscosity will be between 50 and 100 centistokes as determined in accordance with ASTM Designation D-2170.
- E. Under no circumstances shall traffic be permitted to travel over the tacked surface. If detours cannot be provided, restrict operation to a width that will permit at least one-way traffic over the remaining portion of the roadbed. If one-way traffic is provided, the traffic shall be controlled in accordance with governing authority.
- F. After application of tack coat, sufficient time shall be given to allow for complete separation of asphalt and water before paving operations begin. The tack coat shall be applied on only as many surfaces as will be paved against in the same day.

3.04 PLACEMENT OF ASPHALTIC CONCRETE PAVEMENT

- A. Place asphalt pavement to provide a compacted depth as indicated on the plans. Placing the pavement shall be a continuous operation. The machine shall spread mixture and shall strike a finish that is smooth, true to cross section, uniform in density and texture, and free from hollows and other irregularities. If any irregularities occur, they shall be corrected before final compaction of the mixture. The paving machine shall be self-propelled, equipped with hoppers, distributing screws, adjustable screeds and equalizing devices, capable of spreading hot asphaltic concrete paving mixtures without tearing, shoving or gouging, and of producing a finished surface of specified quality.

Place inaccessible and small areas by hand.

- B. Ensure asphalt pavement temperature is between 150 and 300 centistokes as determined with ASTM D-2170 when mixing with a pugmill, or between 220°F and 260°F when using the dryer-drum mixing process, immediately after placing and prior to initial rolling.
- C. Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Carefully make joints to insure a continuous bond between old and new pavement, or between successive day's work. A continuous bond between adjoining work is required.
- D. If more than 1/2 hour elapses between adjacent paving passes, the "cold joint" shall have tack coat applied to the "cold" pavement prior to placing the adjacent pass.

3.05 COMPACTION

- A. Roll and compact to specified density before temperature of the mixture drops below 180°F.
- B. Compact asphalt paving course to required density, with a steelwheeled tandem roller, steel three-wheeled roller, vibratory roller, or a pneumatic-tired roller, weighing not less than five tons. Start compaction as soon as pavement will bear equipment without checking or undue displacement. Speed of roller shall be slow enough to avoid displacement of hot mixture, and any displacements occurring as a result of changing the direction of the roller, or from any other cause, shall at once be corrected by the use of rakes and of fresh mixture where required. Ensure each pass of roller overlaps previous passes by at least 1/2 of the roller width to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material. Rolling shall continue until roller marks are eliminated and no further compression is possible. The finished compacted pavement shall have a density of 93% minimum, (no test less than 93% of the density determined in accordance with ASTM D-2041), as determined by ASTM D2170.
- C. Leave pavement with a uniform, dense surface.
- D. Perform hand tamping in areas not accessible to rolling equipment. Thorough compaction must be achieved, and joints between curbs, headers, manholes and similar structures must be effectively sealed.
- E. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

3.06 PAVEMENT MARKING

- A. Unless otherwise directed by Construction Manager, the painting of parking stripes shall

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be commenced not earlier than 15 days after completion of the asphaltic concrete paving.

- B. Prior to painting, broom or sweep the surface to remove dirt, loose stones or other foreign material. Solvent material that will damage pavement shall not be used as cleaning agents.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Inspection
- B. Preparation
- C. Placing Concrete
- D. Hot Weather Concreting
- E. Cold Weather Concreting
- F. Expansion, Contraction and Construction Joints
- G. Finishing
- H. Curing
- I. Field Quality Control
- J. Protection

1.02 RELATED WORK

- A. Section 03100 - Concrete Formwork
- B. Section 03200 - Concrete Reinforcement

1.03 QUALITY ASSURANCE

- A. Qualifications of Workmen:
 - 1. Use workmen thoroughly trained and experienced in placing and finishing the types of concrete specified.
- B. Comply with federal, state and local codes and regulations.
- C. Comply with hot or cold weather requirements as applicable.

1.04 REFERENCES

- A. The American Concrete Institute (ACI):
 - 1. 306R, "Cold Weather Concreting"

2. 305R, "Hot Weather Concreting"
3. 318-83, "Building Code Requirements"

- B. American Society for Testing and Materials (ASTM):
1. C-150, "Portland Cement"
 2. C-33, "Concrete Aggregates"
 3. C-94, "Ready-Mixed Concrete"

1.05 SUBMITTALS

- A. A mix design and information based on trial batch test results shall be submitted to Owner at least two weeks prior to commencement of the work.
- B. Results from a reputable independent testing laboratory showing concrete aggregates comply with applicable sections of ASTM C-33. Contractor shall pay for necessary tests as directed by Engineer. A minimum of one test shall be made on the aggregate used for the first 5 cubic yards of concrete and for each 50 cubic yards thereafter. Should the Engineer deem that additional testing of aggregate is necessary, he may select samples from any of the aggregate to be used and have these samples tested by a recognized laboratory of his choice. Such material shall not be used in the work until the test reports are available. Should the material fail to meet the specified requirements, the aggregate will be rejected and the expense of testing shall be borne by the Contractor. Should the tests show the aggregate to be satisfactory, the cost of additional testing will be borne by the Owner.
- D. Submit manufacturer's information (catalog data) for all products.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Ready-mixed concrete: Concrete shall be mixed only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80° F and sixty minutes for temperatures above 80° F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.
- B. Materials shall be delivered, stored, and handled so as to prevent damage by water or inclusion of foreign materials. Packaged materials shall be delivered and stored in original package, marked with brand and maker's name, until ready for use. Packages of materials showing evidence of water or other damage shall be rejected. Bulk cement shall be identified by shipping and delivery statements.
- C. Cement shall not be stored longer than 4 months before usage.

1.07 MEASUREMENT AND PAYMENT

- A. Payment for Cast-In-Place concrete will be included in the Lump Sum Bid Price(s) for the item requiring Cast-In-Place concrete. Such price shall include full compensation for the furnishing and placing of materials required to complete the Cast-In-Place concrete, and for all labor, equipment, tools and incidentals needed to complete the work in conformity with the plans and specifications.

- B. If any individual compressive strength test is below the specified required strength, the concrete may be accepted at a reduced price, Owner option. If Owner elects to accept at a reduced price, the price reduction shall apply to the amount of concrete represented by the strength test in accordance with the following schedule:

<u>PSI BELOW SPECIFIED STRENGTH SPECIFICATION</u>	<u>PAY FACTOR</u>
1-100	98
101-200	94
201-300	88
301-400	80

Concrete with a compressive strength of more than 400 psi below the required specified strength shall be evaluated by the Engineer for capabilities necessary to the integrity of the structure. The Engineer may accept this concrete at a pay factor of 0.80, or require that it be replaced with acceptable material. The Engineer shall make the final decision.

1.09 WARRANTY

- A. Shall be for two (2) years in accordance with applicable laws and regulation. See General Conditions.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement:
1. Portland cement shall be Type II, low alkali, complying with ASTM C-150, unless otherwise specified.
 2. No air-entraining type of cement will be allowed.
- B. Coarse Aggregates:
1. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, air-cooled blast furnace slag, or crushed hydraulic-cement concrete, or a combination thereof, conforming to the requirements of ASTM C-33.
 2. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
 3. Coarse aggregate size shall be graded within the following limits.

Coarse Aggregate Size (Nominal)	Percent Passing (by weight)					
	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4
3/4"	100	95-100	-	25-60	-	0-10

C. Fine aggregate:

1. Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the requirements of ASTM C-33.
2. Shall not be used in the work until approval by the Engineer of the tests performed by the independent testing laboratory.
3. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
4. Fine aggregate shall be uniformly graded from coarse to fine within the following gradation:

<u>Sieve Size</u>	<u>Percent Passing (by weight)</u>
3/8"	100
No. 4	95-100
No. 16	45-80
No. 50	10-30
No. 100	2-10

D. Water:

1. Water used in washing aggregate and mixing concrete shall be of a potable quality clean and free from oil, acid, salt, injurious amounts of alkali, organic matter or other deleterious substances.

E. Admixtures:

1. The air-entraining admixture shall conform to ASTM Designation C-260 and be added at the mixer, not the job site.
2. Flyash shall NOT be used in concrete.
3. No other admixtures will be allowed unless approved by the Engineer.

F. Concrete curing compound:

1. Liquid membrane curing compound shall conform to all applicable sections of ASTM C-309.

2.02 CONCRETE MIX

- A. Concrete shall consist of a mixture of Portland Cement, water, fine and coarse aggregates, and an air entraining agent.

- B. The proportions of the concrete materials shall produce a mixture that will work readily into corners and angles of forms and around reinforcing steel. The mixture shall have a water content which does not exceed the maximum specified amount, and which shall have the required compressive strength.
- C. The methods of measuring concrete materials shall permit proportions to be accurately controlled and easily checked. Measurement of materials for ready-mixed concrete shall conform to ASTM C-94. Engineer shall have free access to the mixing plant at all times.
- D. Concrete mix shall be as follows (unless otherwise shown or specified). The proportions given below are intended to give the required strength and shall be carefully followed as to minimum quantity of cement per cubic yard of concrete and as to water/cement ratios and more cement per cubic yare of concrete will be required if tests indicate necessity for such increased quantity to achieve the design strength:

Intended Use	Coarse Aggregate Size (inches)	Min. Cement Content (sacks/CY)	Min. 28-Day Compressive Strength (psi)	Min. 14-Day Flexural Strength (psi)	Slump (inches)	Air Entrainment (percent)	Max. Water/Cement Ratio
Concrete Pavement, Storm Drain Inlet Boxes, Curbs & Walks	3/4	6.5	4000	550	2.5-4.0	5-6.5	0.45

2.04 EQUIPMENT

- A. Mixing equipment shall be subject to approval. Mixers may be of the stationary plant, paver, or truck mixer type.
- B. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed.
- C. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials, and for readily changing the proportions of the material. The batch plant shall be capable of controlling the delivery of all material to within 1% by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
- D. Mixers shall be equipped with a device for automatically measuring and indicating the time required for mixing, which device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period. Neither speed nor volume capacity of the mixers shall exceed manufacturer's recommendations. Excessive over-mixing, requiring additions of water to preserve the required consistency, will not be permitted.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect subgrade surface and verify grade and adequacy of compaction.
- B. Correct grade and compaction deficiencies.
- C. Notify the Engineer in writing of readiness to place concrete in any portion of the work, This notification shall be given as far in advance of the placing of concrete as the Engineer deems necessary for him to make final inspection of the preparations at the location of the proposed concrete placing. All forms, steel, screeds, anchors, ties, and inserts shall be in place before the Contractor's notification of readiness is given to the Engineer.
- D. No concrete shall be placed until forms, reinforcement, etc. has been inspected by the Engineer.

3.02 PREPARATION

- A. Remove all water, wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed.
- B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.
- C. Thoroughly dampen the surfaces which will come into contact with the concrete (except in freezing weather), forms may be oiled instead; remove all standing water. Reinforcement shall be thoroughly cleaned of all ice and other coatings.
- D. Thoroughly clean all transporting and handling equipment.
- E. Erect and maintain suitable barriers to protect the finished surface. Any section damaged from traffic or other causes occurring prior to its official acceptance, shall be repaired or replaced by the Contractor at his own expense in a manner satisfactory to the Owner.
- F. The concrete surface must not be damaged or pitted by rain, hail or snow.
- G. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, and until the form ties at construction joints have been retightened, all sleeves, hangers, pipe, bolts and any other items required to be embedded in the concrete have been placed and anchored and the forms cleaned and coated as specified.

3.03 PLACING CONCRETE

- A. Except by specific written authorization, concreting operations shall not be continued when a descending air temperature, in the shade and away from artificial heat, falls below 40 F, nor shall operations be resumed until ascending air temperature, in the shade and away from artificial heat, reaches 35 F.
- B. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
 - 1. The free fall of concrete from the end of the spout or chute, or from a transporting vehicle, shall not exceed 6 feet, except when beginning a wall pour, in which case the free fall shall not exceed 2 feet.

2. When the distance through which concrete must be dropped vertically exceeds the maximums specified above, a tremie or flexible metal spout shall be used. Flexible metal spouts having sufficient strength to hold the weight of the concrete shall be composed of conical sections not more than 3 feet long, with the diameter of the outlet and taper of the various sections such that the concrete will fill the outlet and be retarded in its flow.
 3. Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Chutes and troughs shall be of metal or metal-lined. When steep slopes are necessary, the chutes shall be equipped with baffle boards or a reversed section at the outlet. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms; or the ends of such chutes shall terminate in vertical downspouts,
 4. Pumping: The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. Before and after this operation, the entire equipment shall be thoroughly cleaned. Water shall not be added to the concrete in the pump hopper.
- C. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum specified slump.
 - D. Place concrete at such a rate that concrete is at all times plastic and flows readily between bare bars. No segregation of coarse aggregate shall occur when placing or dropping between bars.
 - E. When placing is once started, carry it on as a continuous operation until placement of the section is complete.
 - F. Do not pour a greater area at one time than can be properly finished without checking; this is particularly important during hot or dry weather.
 - G. Do not use retempered concrete that has been contaminated by foreign materials.
 - H. Struts, stays, and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached the elevation and strength rendering their service unnecessary. These temporary members shall be entirely removed from the forms.
 - I. Build into concrete any nosings, inserts, anchors, structural members, ties and hangers required to secure abutting or adjacent materials. Waterstops shall be prevented from bending over or being moved out of position.
 - J. Unless necessary materials and equipment are readily available to adequately protect the concrete in place, placing operations may be postponed by the Engineer when, in the

opinion of the Engineer, impending conditions may result in rainfall or low temperatures which will impair the quality of the finished work. The Contractor shall pay for all delay related costs resulting from such postponements including costs for removing and replacing damaged concrete. In case rainfall should occur after placing operations are started, provide ample covering to protect the work.

- K. Whenever it is necessary to continue the mixing, placing, and finishing of concrete after daylight hours, the site of the work shall be adequately lighted so that all operations are plainly visible. Every effort shall be made to enable finishing to be done in daylight.
- L. Clean up all spilled concrete and washings thoroughly. Concrete trucks shall not be washed-out on job site. Wash trucks at off-site location in accordance with all applicable laws and ordinances.

3.04 HOT WEATHER CONCRETING

- A. Hot weather is defined as any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in

abnormal properties. Hot weather concreting shall follow the guidelines of ACI 305R, latest edition.
- B. Undesirable hot weather effects on concrete in the plastic state may include:
 - 1. Increased water demand.
 - 2. Increased rate of slump loss and corresponding tendency to add water at job site.
 - 3. Increased rate of setting resulting in greater difficulty with handling, finishing, and curing, and increasing the possibility of cold joints.
 - 4. Increased tendency for plastic cracking.
 - 5. Increased difficulty in controlling entrained air content.
- C. Undesirable hot weather effects on concrete in the hardened state may include:
 - 1. Decreased strength resulting from higher water demand and increased temperature level.
 - 2. Increased tendency for drying shrinkage and differential thermal cracking.
 - 3. Decreased durability.
 - 4. Decreased uniformity of surface appearance.
- D. Placing and curing:
 - 1. Concrete shall be handled and transported with a minimum of segregation and slump loss. Concrete temperature at time of placement shall be such that the rate of evaporation for the weather conditions shall not cause cracking.
 - 2. The aggregate shall be cooled by frequent spraying in such a manner as to utilize the cooling effect of evaporation. The placement schedule shall be arranged, as approved, in such a manner as to provide time for the temperature of the previously placed course to begin to recede. The mixing water shall be the coolest available at the site insofar as is practicable.
 - 3. Concrete shall be placed where it is to remain.
 - 4. Concrete shall be placed in layers shallow enough to assure vibration well into the layer below.

5. Surfaces exposed to the drying wind shall be covered up immediately after finishing with polyethylene sheets and be water cured continuously as soon as the concrete has set up. Curing compounds, in lieu of water, may not be used.
6. Joints shall be made on sound, clean concrete.
7. Finishing operations and their timing shall be guided only by the readiness of the concrete for them, and nothing else.
8. Curing shall be conducted in such a manner that at no time during the prescribed period will the concrete lack ample moisture and temperature control. Facilities must be ready to protect promptly all exposed surfaces from drying. All work determined by Engineer to be damaged from hot weather shall be removed and replaced at no cost to Owner.
9. All materials and workmanship required to meet the hot weather requirements shall be supplied at the Contractor's own expense.

3.05 COLD WEATHER CONCRETING

- A. Cold weather is generally defined as a period when for more than 3 successive days the mean daily temperature drops below 40 F. When temperatures above 50 F occur during more than half of any 24-hour period, the weather should no longer be regarded as "cold". The times and temperatures given for various conditions and situations are not exact values and should not be used as such. Weather conditions are variable and common sense must be used to protect the concrete. Cold weather concreting shall follow the guidelines of ACI 306R, latest edition.
- B. All materials and workmanship required to meet the cold weather requirements shall be supplied at the Contractor's own expense.
 1. Preparation:
 - a. When specific written authorization is given to permit concreting operations at temperatures below those specified in 3.03 PLACING CONCRETE, arrangements for covering, insulating, housing, or heating materials and/or newly placed concrete should be made in advance of placement and should be adequate to achieve the temperature and moisture conditions recommended herein in all parts of the concrete. All equipment and materials necessary should be at the work site before the first frosts are likely to occur, not after concrete has been placed and its temperature begins to approach the freezing point.
 2. Placement and protection:
 - a. During placement of concrete, tarpaulins, or other readily movable coverings supported on horses or framework should follow closely the placing of the concrete so that only a few feet of concrete are exposed to outside air at any time.
 - b. The housing, covering, or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued.
 - c. All concrete placed in forms shall have a temperature between 55` and 90` after placement. Adequate means shall be provided for maintaining the surrounding air at 60 F for at least seventy-two hours after placing and at no less than 40 F for an additional four days. All methods and equipment for heating shall be subject to approval. Insulating blankets shall be used when required to maintain a satisfactory temperature during the curing period.

- d. No dependence shall be placed on salt or other chemicals for the prevention of freezing.
- e. If heating or other protective measures need to be taken to prevent concrete from freezing, the concrete may require special curing methods to prevent rapid drying, as described in ACI 306R-78.

3.06 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS

- A. Shall be formed and sealed as shown on the drawings or as required in individual Specifications Sections.

3.07 FINISHING

- A. Surface preparation: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.
- B. The finishing shall commence immediately after the concrete is placed. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the placing operation.
- C. The finished surface shall be true to grade and cross section, free from ruts, humps, depression or other irregularities.
- D. Finish Types: Finish shall be as shown on the Drawings or as specified in individual specification sections in accordance with the following:
 - 1. Patched: Remove all fins and irregular projections. Clean form-tie holes thoroughly, coat with suitable epoxy and fill with mortar of dry consistency (see PART 2 - PRODUCTS).
 - 2. Rubbed: Use proper grout mix (see PART 2 - PRODUCTS) and point up voids with cement mortar. Thereafter, rub the entire surface with said grout mix and a carborundum stone to produce a relatively smooth, plane surface without defects and imperfections. Surface shall be properly cured. Use of plaster shall not be permitted. Upon completion of the rubbing, the surface shall be washed thoroughly with clean water.
 - 3. Float: This type of finish shall be an integral finish by float after screeding, to compact the surface evenly. Any excess surface water shall be removed before floating and no mortar shall be used for leveling.
 - 4. Steel Trowel: After striking off the wearing course to the established grade, it shall be compacted by rolling or tamping, and then floated with a wood or magnesium float or power floating machine. The surface shall be tested with a straightedge to detect high and low spots, which shall be eliminated. Floating shall be followed by steel troweling after the concrete has hardened sufficiently to prevent excess fine material from working to the surface. The finish shall be brought to a smooth surface, free from defects and blemishes. No dry cement nor mixture of dry cement and sand shall be sprinkled directly on the surface of the wearing course to absorb moisture or to stiffen the mix. After the concrete has further hardened, additional troweling may be required. This shall be done as may be directed by the Engineer. Trowling shall produce a dense, smooth, impervious surface, free from defects and blemishes.

5. Sandblasting: Sandblasting shall be done using a sharp silica sand. Exterior surfaces of concrete walls shall be sandblasted with #16 silica sand, preferably by the dry sandblasting process before wire wrapping may be started. The concrete surface shall be heavily pitted, leaving no traces of laitance, form-oil and original surface smoothness and surface color. The minimum sand consumption per 100 square feet of surface shall be 150 pounds of silica sand. Sandblasting shall not be started before the completion date of the curing period or before all tieholes have been dry-packed.
 6. Formed: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.
- E. Final finishing:
1. When the concrete has hardened sufficiently, the surface shall be given a broom finish. The broom shall be of an approved type.
 2. The strokes shall be in a transverse direction with adjacent strokes slightly overlapped and shall be made by drawing the broom without tearing the concrete, but so as to produce regular corrugations not over 1/8 inch in depth.
 3. The surface, as thus finished, shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidental disturbing during the final brooming of particles of coarse aggregate embedded near the surface.

3.09 CURING

- A. Protect the concrete from the effects of weather in accordance with HOT WEATHER CONCRETING AND COLD WEATHER CONCRETING in this section.
- B. Water for curing shall be as specified in PART 2 - PRODUCTS.
- C. Other curing requirements may be required in individual Specifications Sections.
- D. Membrane curing compound method:
 1. Surface of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.
 2. The curing compound shall be delivered to the work in ready-mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.
 3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100° F, unless otherwise specified by manufacturer's recommendations.
 4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 150 square feet of area, unless otherwise required by manufacturer's recommendations.
 5. In the event that the application of curing compound is delayed, the application of water as provided in this section shall be started immediately and shall be continued until application of the compound is resumed or started.

3.10 FIELD QUALITY CONTROL

- A. Testing will be provided by a testing laboratory employed by the Owner. The Engineer shall select the testing agency from Owner's list of approved labs. Refer to individual Specifications Sections for other Field Quality Control requirements.
- B. All testing will be paid for by Owner, except for retesting of material which fails to meet these specifications. Such retesting shall be paid for by Contractor at no expense to Owner. Contractor shall pay for curing cylinders. Testing agency shall transport cylinders.
- C. Concrete sampled from a concrete pump shall be sampled from the hose after all of the priming grout has been wasted. The end of the hose shall be placed in a horizontal position before the concrete is discharged into the sampling pan. The concrete shall not be allowed to fall into the sampling pan.
- D. The Contractor, at his expense, shall furnish the concrete required for testing.
- E. Strength, slump and air tests shall be taken in accordance with the following unless otherwise specified in individual Specifications Sections:
 - 1. Strength, slump and air tests may be taken in accordance with the placement rate per day as shown below:

Rate/Day (C.Y.)	Air	Slump	Compress. Strength	Flexural Strength
0-8	1	1	Optional	Optional
8-50	1	1	1	1
For each 50 C.Y. or fraction thereof	1	1	1	1

Additional tests may be made at the discretion of the Owner.

- 2. Compressive strength test specimens shall be made and cured in accordance with ASTM C-31; Specimens shall be tested in accordance with ASTM C-39.
 - a. Three specimens shall be made by the Engineer for each test, and these shall be broken at 7 and at 28 days, with one held in reserve.
 - b. At least one test (3 specimens) shall be made for each class of concrete poured during one day.
- 3. Flexural strength test specimens shall be prepared in accordance with AASHTO Designation T-23 and tested for flexural strength in accordance with AASHTO Designation T-97.
 - a. Four specimens shall be made by the Engineer for each test, and one shall be broken at 7 and two at 14 days, with one held in reserve.

- b. At least one test (4 specimens) shall be made for each class of concrete placed during one day.
- 4. If a slump test does not meet the specification, a second slump test shall be made immediately on the same load. The concrete shall be accepted if the second slump test meets the specification or rejected and removed from the project if the second slump test does not meet the specification.
- 5. If an air test does not meet the specification, a second air test shall be made immediately upon the same load. The concrete shall be accepted if the second air test meets the specification or rejected and removed from the project if the second air test does not meet the specification.
- 6. Slump and air tests shall be made in accordance with ASTM C-143 and C-231, respectively.
- 7. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80 F and sixty minutes for temperatures above 80 F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.
- 8. If a compressive strength test is below the required specified strength, the Engineer shall immediately notify the Contractor or his authorized representative.
- 9. All costs incurred in resampling and retesting shall be paid by the Contractor if the retested strength is below the specified strength, and shall be assumed by the Owner if the retested strength is above the specified strength.

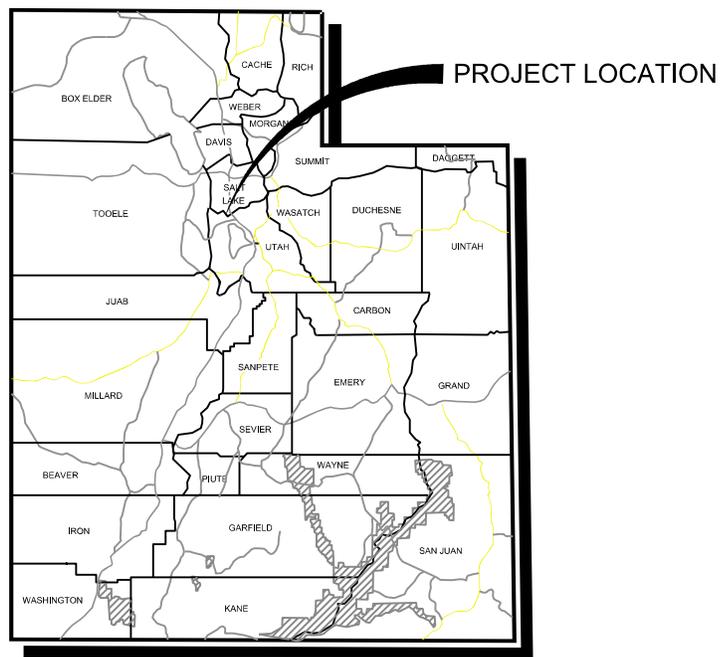
3.11 PROTECTION

- A. Comply with applicable parts of Section 03300 for protection of concrete. Also comply with HOT WEATHER CONCRETING and COLD WEATHER CONCRETING requirements specified herein.
- B. Provide barricades and enclosures to prevent damage to newly placed concrete.
- C. Replace concrete curb, walls and exterior flatwork damaged by construction activities as directed, at no cost to Owner.
- D. Every reasonable precaution shall be taken to protect finished surfaces from abrasions or other damage. Concrete surfaces or edges likely to be injured during the construction period shall be protected by leaving the forms in place or by erecting satisfactory covers. No fire shall be permitted in direct contact with concrete at any time. Concrete shall be adequately protected from injurious drying action by sun and wind, and from pitting by rain.

END OF SECTION

UTAH NATIONAL GUARD CAMP WILLIAMS

ROADWAY SURFACING IMPROVEMENTS



ENGINEERS -- SURVEYORS -- PLANNERS -- SCIENTISTS

3160 West Clubhouse Drive

Lehi, Utah 84043

Phone: 801.768.7200 Fax: 801.768.7201

SEPTEMBER 2010

GENERAL NOTES:

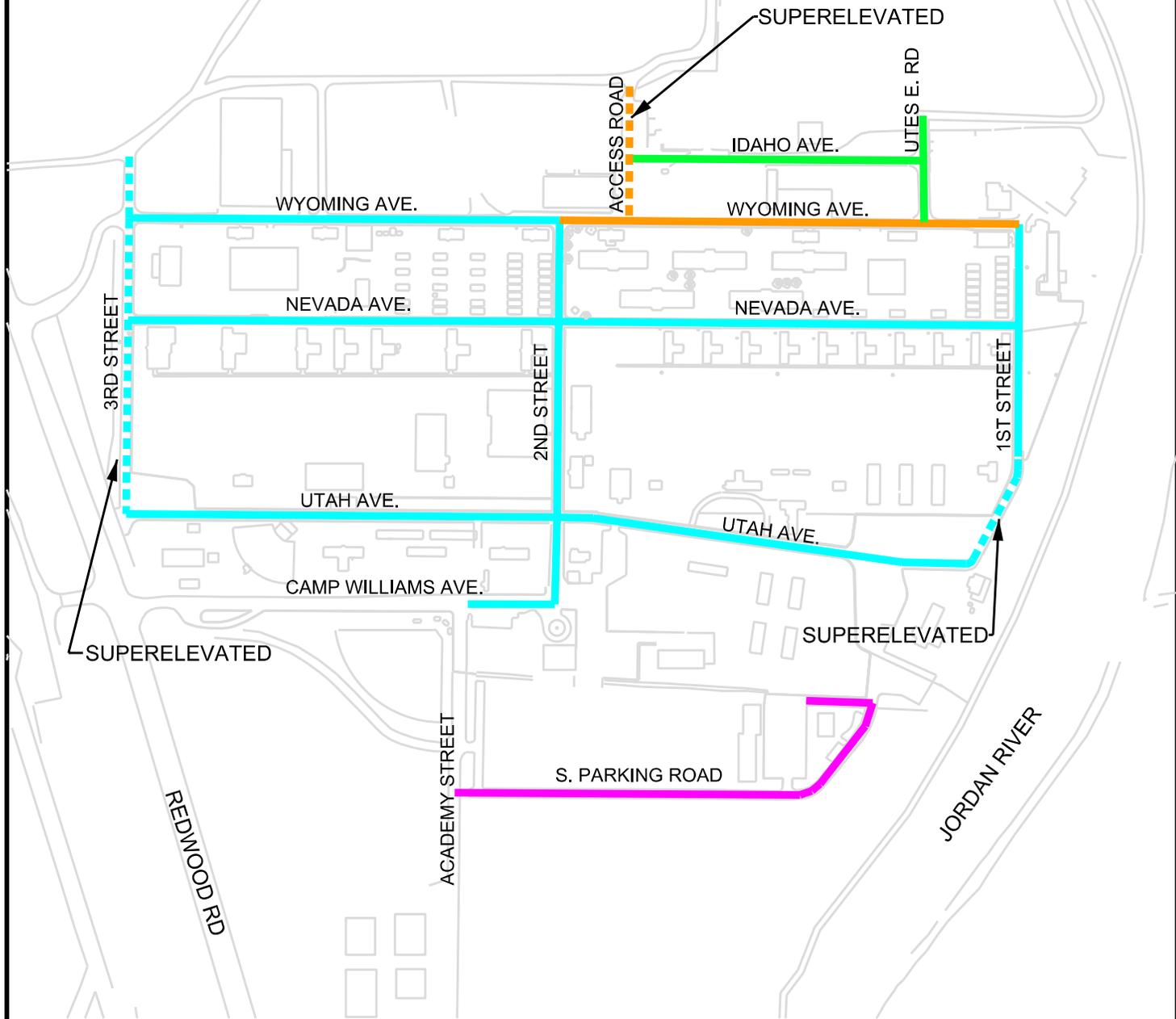
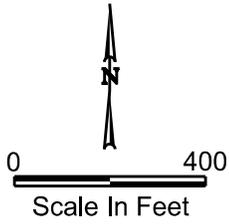
- 1) FOR ANY QUESTIONS RELATED TO CAMP APPROVALS, SCHEDULING, OR PERMITS, CONTACT KENT BARLOW (801-878-5427). FOR UTILITY QUESTIONS, CONTACT DENNIS BORG (801-716-9049).
- 2) CONTRACTOR WILL BE SOLELY RESPONSIBLE TO PROVIDE ADEQUATE MEASURES TO CONTROL AND MAINTAIN ALL STORM WATER WITHIN PROJECT LIMITS DURING CONSTRUCTION. THIS WILL INCLUDE ALL BEST MANAGEMENT PRACTICES FOR THE CONTROL OF EROSION AND PROTECTION OR CONTROL OF RUNOFF PRIOR TO ENTERING ANY STORM DRAINAGE PIPE SYSTEM OR LEAVING THE CONSTRUCTION SITE.
- 3) THE CONTRACTOR SHALL USE EXTREME CAUTION WHEN WORKING NEAR OVERHEAD UTILITIES SO AS TO SAFELY PROTECT ALL PERSONNEL AND EQUIPMENT, AND SHALL BE RESPONSIBLE FOR ALL COST AND LIABILITY IN CONNECTION THEREWITH.
- 4) THE CONTRACTOR SHALL BEAR FULL RESPONSIBILITY FOR THE PROTECTION OF UTILITIES. EXISTING UTILITIES ARE TO BE VERIFIED BEFORE CONSTRUCTION. BLUE STAKING TO BE PERFORMED BY CAMP PERSONNEL UPON 24 HOUR NOTICE BY CONTRACTOR. CONTRACTOR TO LOCATE EXISTING UTILITIES AND VERIFY CLEARANCES PRIOR TO CONSTRUCTION.
- 5) THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT EXISTING UTILITY LINES, STRUCTURES AND STREET IMPROVEMENTS WHICH ARE TO REMAIN IN PLACE, FROM DAMAGE, AND ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR REPLACED SATISFACTORY TO THE CAMP AND AT THE EXPENSE OF THE CONTRACTOR.
- 6) CONTRACTOR SHALL ADJUST ALL EXISTING VALVE BOXES, MANHOLE RIMS, AND SEWER CLEAN OUTS, ETC. TO FINISH GRADE AS APPLICABLE AND SHALL CONSTRUCT A CONCRETE SURFACE COLLAR (6" MINIMUM) AROUND THESE UTILITIES.
- 7) WORK WITHIN A SPECIFIC AREA OR STREET, ONCE BEGUN, SHALL BE PROSECUTED TO COMPLETION WITHOUT DELAY AS TO PROVIDE MINIMUM INCONVENIENCE TO THE CAMP. COORDINATE ALL ROAD CLOSURES WITH CAMP PERSONNEL.
- 8) PROTECTION AND REPLACEMENT OF SURVEY MONUMENTS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.
- 9) ALL EXISTING PAVEMENT WITHIN THE PROJECT LIMITS, INCLUDING 3" ASPHALT ON 8" ROADBASE, SHALL BE REMOVED. CONTRACTOR HAS THE OPTION OF MILLING AND REUSING ASPHALT MATERIAL IF SATISFACTORY TO THE SPECIFICATIONS. IF NOT MILLING, ASPHALT MUST BE REMOVED OFFSITE AT CONTRACTOR'S EXPENSE. CAMP WILLIAMS TO PROVIDE WASTE SITE FOR CLEAN SPOILS LOCATED APPROXIMATELY 12 MILES WEST OF PROJECT SITE.
- 10) CONTRACTOR TO OBTAIN LAND DISTURBANCE PERMIT FROM THE UTAH DIVISION OF WATER QUALITY AND SATISFY ALL REQUIREMENTS INCLUDING THE DEVELOPMENT OF A STORM WATER POLLUTION PREVENTION PLAN AND USE OF EROSION CONTROL AND CONTAINMENT BEST MANAGEMENT PRACTICES.
- 11) CONTRACTOR SHALL COORDINATE ALL ROAD CLOSURES WITH CAMP PERSONNEL.
- 12) DO NOT DISTURB HISTORIC ROCK DITCH ON THE SOUTH SIDE OF UTAH AVENUE BETWEEN 1ST AND 2ND STREETS. CONTRACTOR SHALL RESTORE DAMAGED AREAS AT CONTRACTOR'S COST.

SHEET INDEX

- C COVER SHEET
- GN GENERAL NOTES
- SP SITE PLAN
- TS TYPICAL SECTIONS

\$1 file \$5
 \$5 doc \$5

GENERAL NOTES		UTAH NATIONAL GUARD - CAMP WILLIAMS		SHEET
Project	ROADWAY SURFACING IMPROVEMENTS	DRAWN BY	JC	GN
Project No.	FX10179	QC CHECKED BY	JM	



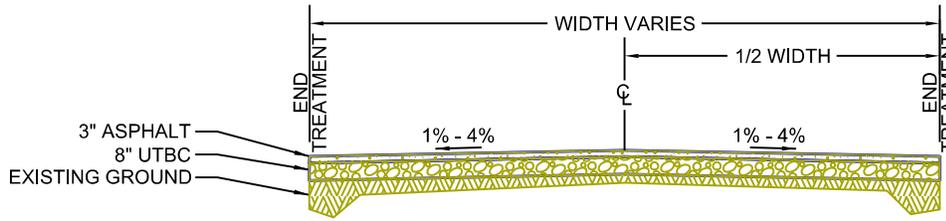
PROJECT TABULATION (LENGTHS ARE APPROXIMATE)

- █ BASE BID (8,780 FEET)
- █ ALT #1 (1,600 FEET)
- █ ALT #2 (1,060 FEET)
- █ ALT #3 (1,400 FEET)

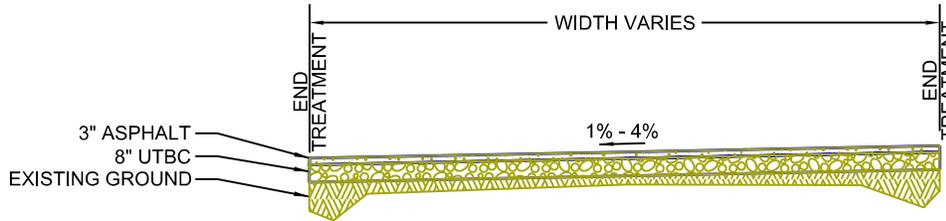
DASHED LINES DENOTE SUPERELEVATION

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SITE PLAN		UTAH NATIONAL GUARD - CAMP WILLIAMS		SHEET
Project	ROADWAY SURFACING IMPROVEMENTS	DRAWN BY	JC	SP
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(A) STANDARD CROWN TYPICAL SECTION



(B) SUPERELEVATED TYPICAL SECTION

END TREATMENT SHALL BE CONSTRUCTED TO MATCH THE EXISTING SURFACES AS FOLLOWS:

- 1) CURB AND GUTTER - EDGE OF ASPHALT SHALL MATCH EXISTING LIP OF GUTTER.
- 2) EXISTING ASPHALT - EDGE OF ASPHALT SHALL BE FEATHERED OUTSIDE ROADWAY WIDTH TO TRANSITION INTO EXISTING ASPHALT (3' MIN).
- 3) GRAVEL SHOULDER - GRADE EXISTING GRAVEL TO PROVIDE ADEQUATE TRANSITION TO NEW EDGE OF ASPHALT (3' MIN).
- 4) STEM/ROCK EDGE - EDGE OF ASPHALT SHALL ABUT EXISTING STEM WALL.
- 5) HISTORIC DITCH - EDGE OF ASPHALT SHALL MATCH EXISTING TOP OF DITCH.

STREET NAME	APPROXIMATE LENGTH	APPROXIMATE WIDTH	TYPICAL SECTION	END TREATMENT	NOTES
BASE BID					
CAMP WILLIAMS AVE	250 FT	40'	A	1, 2	
UTAH AVE	2200 FT	26'	A	1, 2, 3, 4, 5	
NEVADA AVE	2320 FT	20'-22'	A	1, 2, 4	
WYOMING AVE (2ND TO 3RD)	1130 FT	24'-26'	A	1, 3, 4	
1ST STREET (WYOMING AVE TO BLDG 6270)	600 FT	24'-26'	A	1, 2,	
1ST STREET (BLDG 6270 TO ROCK EDGE OF BLDG 8110)	320 FT	24'-26'	B	2, 4	SUPERELEVATE EAST SIDE OF ROAD
2ND STREET	1020 FT	30'-41'	A	1, 2, 4	
3RD STREET	940 FT	28'	B	1, 3	SUPERELEVATE WEST SIDE OF ROAD
ALT #1					
WYOMING AVE (1ST TO 2ND)	1240 FT	26'-30'	A	1, 2, 3, 4	
ACCESS ROAD (WYOMING AVE TO MAINTENANCE AVE)	360 FT	30'	B	2	SUPERELEVATE WEST SIDE OF ROAD
ALT #2					
IDAHO AVE	760 FT	22'	A	2, 3	
UTES E. RD (WYOMING AVE TO BLDG 2510)	300 FT	30'	A	1, 2, 3	
ALT #3					
SOUTH PARKING ROAD	1400 FT	22'-28'	A	1, 3, 4	

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ROADWAY TYPICAL SECTIONS		UTAH NATIONAL GUARD - CAMP WILLIAMS		SHEET	
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