# TECHNICAL SPECIFICATIONS
# ASPEN VIEW SUBDIVISION

October, 1994

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SECTION 01010 - SUMMARY OF WORK - *Aspen Wood*

PART 1 - GENERAL

1.01 Description of Work

The extent of this Project includes:

- Road Facilities
- Water Facilities
- Wastewater Collection Facilities
- Drainage Facilities

1.02 Location of Work

The Project is located in the Town of Blue River.

1.03 Pertinent Utilities

Utilities exist around the site. Contractor shall be responsible for locating all utilities prior to any construction.

1.04 Local Utilities

Major utility companies serving the area along with their respective telephone numbers are as follows:

Water - Dot Subdivision Water Company

Wastewater - Breckenridge Sanitation District - 453-6715

Telephone - U.S. West - 1-800-922-1987

Electric and Gas - Public Service Company - 1-800-922-1987

Cable TV - Breckenridge Cablevision - 1-800-922-1987

1.05 Permits

All permits and licenses necessary for the Project shall be the responsibility of the Contractor and paid for by the Contractor.

1.06 Removal of Waste

The Contractor shall dispose of and remove all waste materials and trash from the site.

1.07 Traffic Control

Traffic control in Highway 9 shall be the responsibility of the Contractor.

1.08 Construction Staging Area

A site for a construction staging area and office will be provided. All temporary utilities will be the responsibility of the Contractor.

A chemical toilet of suitable type shall be provided and maintained by the Contractor at all times.

1.09 Monument Protection/Staking

Basic line staking with offsets will be provided by the Owner for grading, water, sewer, drainage and roads. The Contractor shall notify the Surveyor, through the Engineer (453-6394) at least 48 hours in advance for any staking required. Any restaking required by the Contractor for stakes destroyed by the Contractor through his negligence shall be restaked at the Contractor's expense.

The Contractor shall provide an assistant to the Engineer for checking or replacement of stakes, or grades.

Any land monuments destroyed by the Contractor shall be reset by a registered land surveyor at the Contractor's expense.

1.10 Record Drawings

In additional to requirements set forth in Article 6.19 of the General Conditions, the Contractor shall provide, on a bimonthly basis, a current listing and description of changes of the original drawings, which have been incorporated into the construction of the facilities.

1.11 Owner Occupancy

The Contractor shall show all possible cooperation to the adjacent landowners where construction will occur. This shall include cooperation to the general public in this area.

1.12 Progression of Work

It is anticipated that work will progress with the clearing and grading.

End of Section

SECTION 01530 - BARRIERS - *Aspen View*

PART 1 - GENERAL

1.01 Requirements Included

A. Furnish, install, and maintain suitable barriers as required to prevent public entry, and to protect the work, existing facilities, trees, and plants from construction operations; remove when no longer needed, or at completion of work.

1.02 Related Requirements

A. Section 01010 - Summary of Work

PART 2 - MATERIALS

2.01 Materials, General

A. Materials may be new or used, suitable for the intended purpose, but most not violate requirements of applicable codes and standards.

2.02 Fencing

A. Materials to Contractor's option, minimum fence height 6 feet.

2.03 Barriers

A. Materials to Contractor's option, as appropriate to serve required purpose.

PART 3 - EXECUTION

3.01 General

A. Install facilities of a neat and reasonably uniform appearance, structurally adequate for required purposes.

B. Maintain barriers during entire construction period.

C. Relocate barriers as required by progress of construction.

3.02 Tree and Plant Protection

A. Preserve and protect existing trees and plants at site that are designated to remain, and those adjacent to site.

B. Consult with the Engineer, and remove agreed on roots and branches that interfere with construction.

C. Provide temporary barriers, to a height of 3 feet, around each, or around each group, of trees and plants.

D. Protect root zones of trees and plants:

   1. Do not allow vehicular traffic or parking.

   2. Do not store materials or products.

   3. Prevent dumping of refuse or chemically injurious materials or liquids.

   4. Prevent puddling or continuous running water.

E. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.

F. Replace, or suitably repair, trees and plants designated to remain that are damaged or destroyed as a result of construction operations.

3.03 Removal

A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the Engineer.

B. Clean and repair damage cause by installation, fill, and grade areas of the site to required elevations and slopes, and clean the area.

End of Section

SECTION 01570-A - TRAFFIC REGULATIONS - *Aspen View*

PART 1 - GENERAL

1.01 Traffic Control

Projects in existing streets will affect traffic flow in the immediate vicinity. The construction shall comply with the rules of the Town of Blue River. All traffic control shall comply with the "Manual on Uniform Traffic Control Devices" along with the Town's specific requirements. Traffic on Highway shall be maintained and comply with CDOT Standards. In addition, proper detours and lane closures on Four O'Clock Road where the sewer line installation will occur should be considered.

PART 2 - MATERIALS

Not Used

PART 3 - EXECUTION

Not Used

End of Section

SECTION 02110 - CLEARING AND GRUBBING - *Aspen View*

PART 1 - GENERAL

1.01 Work Included

Site clearing and grubbing includes but is not limited to:

1. Protection of existing trees.
2. Removal of trees and other vegetation.
3. Stripping and stockpiling of topsoil.
4. Clearing and grubbing.
5. Removal of debris as designated by Engineer.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.01 Transplanting Existing Materials

A. As determined by the Engineer, existing on-site materials shall be carefully removed and stored on site as directed. Transplanting will be limited to smaller trees and shrubs (0-3-in diameter) and be used primarily for revegetation of pipeline easements. Payment shall be on a per tree basis.

B. Wetlands materials shall be transplanted on site as per the wetlands plan prepared by ERO Resources. Wetlands soils and plant materials are to be stored on site at temporary locations while the area is prepared for final planting.

3.02 Clearing and Grubbing

Clear site of trees, willows, sage brush, shrubs, and other vegetation except those designated to be saved. Completely remove stumps, roots, willows, shrubs, and other debris protruding from the ground. All stumps, roots, willows, shrubs, and limbs are the property of the Contractor and shall be disposed of by the Contractor. Small limbs and shrubs may be chipped on site. Owner will provide an area for storage of chipped material. Hand grubbing may be required in roadway sections to insure that no organic materials will be present in the road section.

3.03 Tree Removal

Trees designated to be cleared shall be the property of the Contractor.

3.04 Topsoil Removal

All topsoil shall be removed and stockpiled at an on-site location as directed by the Engineer.

3.05 Basis of Payment

The accepted quantities will be paid for at the contract unit price for each of the pay items listed below.

| Pay Item | Pay Unit |
|---|---|
| Clearing & Grubbing | Acre |

End of Section

SECTION 02200 - EARTHWORK - *Aspen View*

PART 1 - GENERAL

1.01 Description of Work

The extent of earthwork is shown on the drawings.

1.02 Testing

The Owner will engage soil testing and inspection service for quality control testing during earthwork operations as required by Engineer.

PART 2 - MATERIALS

2.01 Materials

Materials to be used for earthwork include excavated material that is free from roots, organics, rocks larger than 12 inches, and building debris. Additional fill material will be from the M145 AASHTO classification of soil groups.

PART 3 - EXECUTION

3.01 Compaction

All fill areas shall be compacted to 95% Standard Proctor Density for road construction. Compaction shall be accomplished using vibratory or sheep's foot rollers as required.

3.02 Drainage

Drainage facilities will be in place at the time of rough grading. Contractor shall protect facilities as outlined in Contract Documents.

3.03 Tolerances

Top surface subgrade: plus or minus one (1) inch.

End of Section

SECTION 02211-A - BOULDER AND ROCK EXCAVATION - *Aspen View*

PART 1 - GENERAL

Boulder and rock excavation shall be an additional item not considered under normal unclassified excavation.

PART 2 - MATERIAL

Boulder size shall be a minimum of 1.5 cubic yards. Rock excavation shall include solid rock that would require blasting as a result of facilities construction.

PART 3 - EXECUTION

3.01 Measurement and Removal

Boulder size shall be determined through measurement by Engineer and Contractor prior to blasting and/or removal. Boulders excavated may be placed along the roadway area where walls are anticipated.

3.02 Basis of Payment

Payment of boulder excavation will include removal of boulders, replacement of material where required, and hauling of boulders to the private drive.

Payment of rock excavation shall be on a cubic yard basis as measured in place prior to removal. Price includes removal, replacement and hauling of rock to designated area on site.

End of Section

SECTION 02215 - EXCAVATION DEWATERING - *Aspen View*

PART 1 - GENERAL

1.01 Scope

This section shall apply to all natural ground water as required to be removed from an excavation for the normal construction activities of the project.

All water required to be removed that is "human-made" and known to the Contractor or caused by the action or inaction of the Contractor shall not be included as part of this section. Only natural ground water removed shall be paid by the Owner as specified herein.

PART 2 - MATERIALS

Does not apply.

PART 3 - EXECUTION

3.01 Time of Excavation

The Contractor shall limit work in areas where it is possible that natural ground water may be encountered to that time within the construction time limits where there is the least possibility of encountering ground water.

3.02 Requirements

The Contractor shall dewater all excavations as approved by the Engineer and maintain them free of water during the construction work. All equipment and materials for dewatering shall be provided by the Contractor.

3.03 Disposal

All removed water shall be disposed of as approved by the Engineer to minimize any environmental damage. Any erosion problems caused by the removal of the water shall be repaired and the area affected returned to its original condition with no additional compensation.

3.04 Payment

Dewatering shall be incidental to waterline and sewerline construction.

End of Section

SECTION 02221 - EXCAVATION AND BACKFILL, TRENCHES, STRUCTURES
*Aspen View*

PART 1 - GENERAL

All excavation shall be done in accordance with the project plans and typical trench section drawings in these specifications.

PART 2 - MATERIALS

See Typical Trench Section Drawings

PART 3 - EXECUTION

3.01 Excavation

The trench shall be excavated to at least four inches below bottom of pipe in normal conditions and six inches in solid rock areas. Bedding material shall then be placed and hand tamped to the spring line of the pipe. Special care should be taken to avoid bridging of the pipe at the bell ends.

3.02 Backfill

Backfilling of the trench shall commence with the cover material outlined in the Typical Trench Section drawings. The remaining trench shall be backfilled with native materials.

Final grade of the trenches shall match existing and be smooth and driveable.

3.03 Compaction

All trenches in roadway areas shall be compacted to a density of at least 95% of maximum as determined by the Standard Proctor Method (American Society for Testing Material D-698-66T). Trenches outside of roadway shall be compacted to 90% Standard Proctor Density.

Special attention shall be taken to backfilling and compaction around manholes, inlets and vaults.

3.04 Groundwater

Groundwater may be encountered in excavating trenches for pipe or for installation of structures. Groundwater shall be disposed of in order to perform construction in dry conditions. Disposal shall be in accordance with the Summit County Water Quality and Sediment Control Regulations.

End of Section

SECTION 02226 - PAVING AND SURFACING - *Aspen View*

PART 1 - GENERAL

1.01 Bituminous Pavement

The work covered by this section of the Specifications shall conform to Sections 400 through 412 of the Standard Specifications of the Colorado Division of Transportation (CDOT) except as revised below:

Section 401 - Plant Mix Pavements - General (revised)
Subsection 401.03 - Aggregate

PART 2 - MATERIALS

2.01 Materials

The paving aggregate shall meet the CDOT Grading C and CX Aggregate Gradation unless otherwise required by the project plans. The Contractor shall supply certification of same prior to placement of any asphalt.

Other aggregate gradations may be accepted by the Engineer upon evidence provided by the Contractor that the said gradation will provide an acceptable bituminous plant mix.

Asphalt Grade shall meet CDOT requirements for AC-10.

PART 3 - EXECUTION

3.01 General

The work covered by this section of the Specifications shall conform to Sections 400 through 412 the Standard Specifications of CDOT except as noted herein.

3.02 Tack Coat

Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal/sq yd of surface.

3.03 Placing the Mix

Mixing: Comply with ASTM D995 for materials storage, control, mixing, and for plant equipment and operation.

Placing: Placement, including temperature specifications, shall be in compliance with section 401 of CDOT specifications.

3.04 Compaction

Compaction of asphalt shall be in compliance with section 401 of CDOT specifications. Minimum compaction shall be 95% of the maximum theoretical density.

3.05 Rolling

Begin rolling when mixture will bear roller weight without excessive displacement.

Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

Accomplish breakdown or initial. rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

Follow with second rolling as soon as possible, then proceed with third rolling before mixture is cold.

Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

Erect barricade to protect paving from traffic until mixture has cooled and attained its maximum degree of hardness.

3.06 Patching Defective Paving

Cut out and fill with fresh, hot asphaltic concrete. Remove deficient areas for full depth of surface and base course. Cut sides vertically, perpendicular and parallel to direction of traffic for extent of failure. Apply tack coat to exposed surfaces before placing new pavement. Compact and finish to specification.

3.07 Joining to Existing Work

Cut sides vertically and apply tack coat to exposed asphalt surfaces before placing new pavement. Meet existing thickness of surface and base courses, but not less than specified for new work.

Where new work joins existing asphaltic concrete paving on public right-of-way, comply with the requirements of local authorities for surface and base course thickness.

3.08 Manholes and Valve Boxes

All manholes and valve boxes shall be set to 1/4 inch below final grade prior to paving of streets.

End of Section

SECTION 02232 - ROADWAY BASE - *Aspen View*

PART 1 - GENERAL

The work covered by this section of the specifications shall conform to Section 304 of the Colorado Department of Highways specifications.

PART 2 - MATERIALS

2.01 Base Materials

The aggregate used for all base course shall meet Colorado State Department of Highways Class 6 Aggregate Base Course Gradation.

PART 3 - EXECUTION

3.01 Subbase Placement

Following utility construction, subbase materials shall be placed to the minimum depth as shown on the plans. Compaction shall be to a minimum density of 100% as determined by laboratory test method, T-99, AASHTO.

End of Section

SECTION 02240 - SOIL STABILIZATION - *Aspen View*

PART 1 - GENERAL

1.01 Scope

This section of the specifications shall cover all work required to furnish and install the item known as soil stabilization.

Soil stabilization considered under this section is the complete removal of all unsuitable soils and replacement with stabilization material. Replacement shall include required compaction of stabilization material to 95% of Standard Proctor Density.

1.02 Requirements

The approximate extent, location, and requirements of soil stabilization shall be noted on the project plans. It will be necessary for the Engineer to determine the necessity of soil stabilization during the construction process.

1.03 Related Sections

Section 02241 - Soil Stabilization Engineering Fabric

Section 02210 - Site Grading

Section 01010 - Summary of Work

PART 2 - MATERIALS

2.01 Dredge Rock

A. The item commonly known as dredge rock shall consist of rounded cobbles 3 to 12 inches in diameter and containing approximately 10% fines by weight.

B. All dredge rock shall come from the dredge tailings north of Town. Other sources subject to approval by Engineer.

C. Engineer may reject any shipment if, in his opinion, it will not satisfy the requirements for road stabilization.

2.02 Other Stabilization Material

Material other than dredge rock will be considered for stabilization material only when the Contractor provides sufficient information to the Engineer, prior to placement of the material, to prove it has physical characteristics that will provide an equal stabilized road structure.

PART 3 - EXECUTION

3.01 Removal of Excess Material

The requirements of Section 01010 shall dictate the Contractor's responsibilities for removal of excess material.

3.02 Measurement and Payment

A. Unit Price Contract - Payment per ton in place as shown on weight tickets rounded to the nearest ton.

B. Lump Sum Contract - As part of the Lump Sum Contract with no reference to the units required.

End of Section

SECTION 02260 - FINISH GRADING - *Aspen View*

PART 1 - GENERAL

1.01 Work Included

A. Finish grade subsoil.

B. Cut out areas to receive stabilizing base course materials for paving and sidewalks.

C. Place, finish grade and compact topsoil.

1.02 Related Work

A. Section 02210 - Site Grading.

1.03 Protection

A. Prevent damage to existing fencing, trees, landscaping, natural features, benchmarks, pavement and utility lines. Correct damage at no cost to the Owner.

PART 2 - MATERIALS

2.01 Products

A. Topsoil - Friable loam free from subsoil, roots, grass, excessive amount of weeds, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum 25% organic matter. Use topsoil stockpiled on site if conforming to these requirements.

PART 3 - EXECUTION

A. Cut out areas, to subgrade elevation, that are to receive stabilizing base for paving and sidewalks.

B. Bring subsoil to required levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

C. Slope grade away from building minimum 2 inches in 10 feet unless indicated otherwise on the drawings.

D. Cultivate subgrade to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

E. Compact subsoil to 85%-90% Modified Proctor Density.

3.02 Placing Topsoil

A. Place topsoil in areas where seeding, sodding or planting is to be performed.

Place to the following minimum depths, up to finished grade elevations:

1. 6 inches for seeded areas.

42. 4-1/2 inches for sodded areas.

3. 24 inches for shrub beds.

4. 18 inches for flower beds.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles and contours of subgrade.

D. Remove stone, roots, grass, weeds, debris and other foreign material while spreading.

E. Manually spread topsoil around trees, plants, building and to prevent damage that may be caused by grading equipment.

F. Lightly compact placed topsoil.

3.03 Surplus Material

A. Remove surplus subsoil and topsoil from site.

B. Leave stockpiled areas and entire job site clean and raked, ready to receive landscaping.

End of Section

SECTION 02453 - SIGNAGE - *Aspen View*

## PART 1 - GENERAL

### 1.01 Scope

This section specifies the requirements for all materials and construction methods for the placement of all signage for the project. All referenced specifications are for the latest revisions.

### 1.02 Other Applicable Specifications

A. Manual on Uniform Traffic Control Devices. U.S. Department of Transportation, Federal Highway Administration.

B. State of Colorado Division of Highways Standard S-614.

C. Road plans for general sign location.

D. Street name signs of responsible entity.

## PART 2 - MATERIALS

### 2.01 Posts

A. Regulatory and information signs.

1. "Town of Breckenridge-style" light post bases or equal.

B. Street name signs - Galvanized 2-3/8 inch OD. Ten-foot length with post cap design - ornamental - square center rod.

### 2.02 Signs

A. Regulatory and information signs - Panels for steel 0.0598-inch minimum thickness, aluminum 0.100-inch minimum thickness. Reflectorized lettering.

B. Street name signs - Reflectorized per entity standards with bracketed frames.

### 2.03 Hardware

A. Bolts, nuts, and washers shall be galvanized or cadmium plated.

### 2.04 Delineators

Plastic, hermetically sealed reflector housed in aluminum frame.

PART 3 - EXECUTION

3.01 General

A. For sign placement, see appropriate standards.

B. All signage placed in state highway right-of-way shall be supplied and erected by the Colorado State Highway Department.

C. Contractor to coordinate with responsible entity for purchase and placement of street name signs to match existing standard.

3.02 Posts

A. Note standard detail drawing.

B. All posts below ground line to be treated with a pentaprime wood preservative.

C. All posts shall be erected true and plumb in all directions.

D. All metal posts painted green.

E. All wood posts unpainted.

3.03 Signs

A. See Colorado Highway Department Standard for mounting or manufacturer standards for street name signs.

B. All signs shall be mounted on wood posts except street name signs, which shall be on metal posts.

C. Exposed bolt heads and fiber washers on the face of the sign panel shall be painted to match the surrounding color.

End of Section

SECTION 02481 - LANDSCAPING - *Aspen View*

PART 1 - GENERAL

This specification shall outline the requirement for the restoration of off-road sites. All restoration shall be placed after all compaction is obtained and the surface is brought to final grade and level or sloped to match existing grades.

PART 2 - MATERIALS

2.01 Grass Seed Mixture

All grass seed used on this project shall be mixed as the following with an allowable 2% variation in mixture. Other hardy native grass mix may be substituted if approved by the Engineer.

Grass Mix

| | |
|---|---|
| Manchar Smooth Broomegrass | 30% |
| Western Wheatgrass | 10% |
| Latar Orchardgrass | 10% |
| Durar Hard Fescue | 20% |
| Park Kentucky Bluegrass | 20% |
| White Dutch Clover | 10% |

2.02 Fertilizer

All areas to be seeded shall have fertilizer added at the time of seeding. Fertilizer shall be mixed as follows:

| | |
|---|---|
| Nitrogen (available) | 33% |
| Super phosphate | 67% |

2.03 Mulching

Straw or hay mulch shall be used.

PART 3 - EXECUTION

3.01 Seeding Requirements

All off-road areas shall be reseeded as per the table on the following page:

| Item | 8% and Less Slope | Slopes >8% |
|---|---|---|
| Seed Coverage | 40 #/acre of 100% germination | 60 #/acre of 100% germination |
| Application Method | Hand mechanical seeder | Hand mechanical seeder |
| Fertilizer Coverage | 130 #/acre | 150 #/acre |
| Mulching | 1 inch straw/hay | 2 inches straw |
| Netting | Not required | Required for area >200 $ft^2$ |
| Erosion Control Bars | None | Spaced every 200 ft slopes > 15% |

3.02 Seeding Operation

Topsoil stockpiled from clearing and grubbing operation shall be uniformly spread over areas to be reseeded prior to seeding. Seeding, mulching, and netting shall commence immediately after topsoil placement.

Allowances in the Contract completion time will be made for seeding and mulching only. Where a hand mechanical seeder is used in seeding, the areas shall be hand raked before and after the seed and fertilizer is applied.

3.03 Basis of Payment

Payment for this item shall be on a square yard price with maximum width of disturbance being 25 feet.

End of Section

SECTION 02500 - SITE DRAINAGE - *Aspen View*

PART 1 - GENERAL

This work shall consist of the complete construction of drainage facilities as shown on the project plans.

PART 2 - PRODUCTS

2.01 Corrosion Resistant Culvert

This work shall consist of furnishing and installing corrosion resistant culvert pipe in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

Materials shall meet the requirements shown on the plans and the specifications as indicated below for the type of culvert pipe furnished.

| Abbreviations Specification | Description |
|---|---|
| PVC Smooth<br>Ribbed | Polyvinyl Chloride - ASTM F 794, PS 46 or ASTM F 679, PS 46 Interior, Smooth or Exterior |
| PE Smooth<br>or<br>Exterior | Polyethylene - AASHTO M 294, Type S or ASTM F 894, RSC 63 for H< 15 ft., RSC 120 for H> 15 ft. (H=depth of cover over pipe) Interior, Ribbed Corrugated |

Use of the initials ADS refers to Advance Drainage Systems pipe, or approved equivalent. An approved equivalent shall conform to the "PE" pipe listed above. Connecting bands with gasketed seals shall be the same material as the pipe with which they are used.

2.02 Bedding and Cover

Bedding and cover shall consist of 1 1/2" screened rock, covered by native material per the trench section detail.

2.03 Outlets

End sections are required at pipe outlets.

PART 3 - EXECUTION

3.01 Excavation

Trenches shall be excavated to a width as detailed on the typical sections or sufficient to allow for proper jointing of the conduit and thorough compaction of the bedding and backfill material under and around the conduit. Where feasible, trench walls shall be vertical.

The completed trench bottom shall be firm for its full length and width.

When pipe conduits are to be installed in new embankments, the embankment shall first be constructed to the required height as shown on the plans, and for a distance each side of the conduit location of not less than five times the diameter of the conduit, after which the trench will be excavated and the conduit installed.

3.02 Bedding

Bedding shall be per the trench detail.

3.03 Placing Conduit

The conduit laying shall begin at the downstream end of the conduit line. The lower segment of the conduit shall be in contact with the prepared bedding throughout its full length. Outside circumferential laps of flexible conduits shall be placed facing upstream. Flexible conduit shall be placed with longitudinal laps or seams at the sides.

Elliptical shaped pipe and circular pipe with elliptical reinforcement shall have the top clearly marked with paint, with lifting eye holes in which laying pins can be used, or with imprinted letters. Holes shall be finished smooth with grout or with plugs. Conduits shall be placed with the vertical axis with 5 degrees of a vertical plane through the longitudinal axis of the conduit.

Pipe sections shall be placed and aligned to within three-fourths of an inch of the adjacent section and shall be firmly joined with coupling bands.

Where existing pipe culverts are to be extended, damaged ends shall be cut off or repaired in an approved manner. All ends of pipes requiring extensions shall be cleaned within the area necessary for proper installation of connecting bands.

3.04 Backfilling

After the conduit or section of conduit is installed it shall be inspected before any backfill is placed. Any conduit found to be damaged shall be replaced, and conduit found to be out of alignment or unduly settled shall be taken up and relaid. The trench shall then be backfilled with material in accordance with Section 2.03, Bedding and Cover.

Special care will be required when backfilling around conduit to bring the backfill materials up on both sides of the pipe, evenly and simultaneously. Protection of pipe conduits during construction shall be the Contractor's responsibility. Any damage to the pipe due to Contractor's operations shall be repaired or replaced by the Contractor at his expense.

End of Section

SECTION 02511 - EXTERIOR CONCRETE FLATWORK - *Aspen View*

PART 1 - GENERAL

1.01 Scope

This work shall include furnishing all materials, labor, equipment and miscellaneous items necessary for the construction of concrete curb, gutter, sidewalk, handicap ramps, driveway or any combination thereof, all in accordance with these specifications and in close conformity with the lines, grades, and typical sections as shown on the Plans or established in the field.

1.02 Related Work Specified Elsewhere

Section 02200 - Earthwork
Section 02260 - Finish Grade
Section 03300 - Cast-in-Place Concrete

PART 2 - MATERIALS

The materials shall conform to the requirements specified in the following:

Section 02232 - Roadway Base
Section 03300 - Cast-in-Place Concrete

PART 3 - METHODS AND PROCEDURES

3.01 Excavation

Excavation shall be made to the required depth and width to permit the installation and compaction of Class 6 roadway base and bracing of the forms. The foundations shall be shaped and compacted to a firm, even surface conforming to the section shown on the plan. Material determined to be unsuitable or uncompactable by the Engineer will be removed and replaced.

3.02 Forms

Forms shall be wood or metal and shall extend for the full depth of the concrete. All forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in alignment both horizontally and vertically until removal. Satisfactory slip forms may be used when approved. Use of a curbing machine will be permitted providing line and grade tolerances can be met.

Steel plates that can be shaped to the desired radius shall be used on all short radii. Open joints shall be formed with a steel separator plate conforming to the section being installed.

All forms must be oiled and cleaned prior to placement of concrete.

3.03 Mixing and Placing

The foundations shall be thoroughly moistened immediately prior to the placing of the concrete. Compaction of the concrete shall have thorough consolidation achieved by tamping, spading, vibrating or other acceptable methods. Forms shall be left in place until the concrete has set sufficiently to prevent deformation due to removal. Upon removal of the forms, the curb face shall be immediately finished to a uniform surface. In the case of matching existing concrete finishes, an approved method shall be used.

Concrete in slabs shall be thoroughly consolidated with the use of vibrating bridge screeds, roller pipe screeds, or other approved means. These surfaces shall not be manipulated prior to finishing operations.

3.04 Finishing

The surface shall be floated with a wood or magnesium float and given a broom finish. No plastering of the surface will be permitted. All outside edges of slabs and joints shall be rounded to a ¼-inch radius. Broom marks to be perpendicular to traffic or pedestrian flow.

3.05 Joints

Expansion joints shall be made using ½-inch premolded expansion joints. Construction joints, using a ½-inch premolded joint filler, shall be placed at the end of day's run or during a day's work if there is more than a 20-minute delay in concrete delivery.

Construction joints shall be formed around all appurtenances such as manholes, utility poles, adjacent structures, etc., extending into or abutting the work. Premolded expansion joint filler ¼-inch thick shall be installed in these joints. Expansion joint filler shall be installed between concrete sidewalks and any fixed structure.

Scoring joints (contraction joints) shall be made by a forming tool to a depth of one quarter of the section with a width of 1/8 inch to ¼ inch in width. Dummy joints in lieu of open joints will be permitted with use of curbing machine.

Joint spacing shall be located as follows:

A. Expansion joints: Every 100 feet on center; at end of corner radius; at driveway sections.

B. Construction joints: As required during construction; at appurtenances and structures through or abutting work.

C. Scoring joints: Every 10 feet on center for curb and gutter, and for sidewalks equal to width of sidewalk to approximate squares as shown on drawings.

D. Saw cuts: If saw cut joints are required or permitted, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses have developed sufficiently to induce cracking. The saw cut depth shall be 1/4 slab thickness.

3.06 Curing

Immediately upon completion of the finishing, concrete shall be moistened and kept moist for a minimum of 72 hours in accordance with Section 03300 of these specifications. In lieu of wetting, use of a membrane curing compound, at the direction of the Engineer, will be permitted. Covering of finished concrete shall be required using insulated blankets for a minimum period of seven (7) days.

3.07 Excessive Temperature Protection, Protection from Injury, and Testing Requirements

Requirements for these items shall be in accordance with Section 03300 of these specifications.

3.08 Backfilling

After the concrete has set sufficiently, the areas behind the curb shall be backfilled to the required elevations and shall be thoroughly compacted, in accordance with Section 02200 - Earthwork.

End of Section

SECTION 02660 - WATER SYSTEMS CONSTRUCTION - *Aspen View*

PART 1- GENERAL

1.01 Scope

The extent of water line, service line and appurtenances work is shown on the plans.

1.02 Regulations and Standards

All improvements associated with this specification shall conform to the regulations and standards of the:

Colorado Health Department
American Water Works Association (AWWA)
American National Standards Institute (ANSI)
American Society for Testing Materials (ASTM)
National Fire Protection Association (NFPA)

PART 2 - MATERIALS

2.01 Ductile Iron Pipe

All ductile iron pipe shall be manufactured in accordance with American Water Works Association Standard C-151. Push-on single gasket conforming to American Water Works Association C-111 shall be used. Class 52 pipe with cement mortar lining and conductivity straps which will conduct a minimum of 600 amps is required.

2.02 Gate Valves

All gate valves shall conform with the American Water Works Association Standard C-509 (Resilient Seat Gate Valve). All valves shall open counterclockwise.

2.03 Fire Hydrants

All fire hydrants shall conform with American Water Works Standard C-502. The pumper nozzle shall be placed 42 inches above ground line. Hydrant shall be a Mountain Spec Mueller Centurian Model 423, or Mountain Spec Waterous WB-100 only. Hydrants shall be painted with two coats of international yellow paint and include a hydrant marker.

2.04 Ductile Iron and Cast Iron Fittings

Cast iron fittings shall conform with American Water Works Association Standard C-104, C-110, or C-111. Conductivity straps or cad welds capable of conducting a minimum of 600 amps shall be used for cast iron fittings.

2.05 Services

A. Pipe

All service lines shall be 3/4-inch Type K copper tubing.

B. Corporation Stops and Curb Stops

All corporation and curb stops shall conform to American Water Works Association Standard C-800. Corporation and curb stops shall be Mueller H-15008 and H-15209, respectively, or an approved equal.

2.06 Miscellaneous

A. Pipe Insulation

Insulation where specified shall be closed-cell, rigid plastic foam, form-fitted with an insulation value U of 0.26 per inch.

B. Curb Boxes

Curb boxes shall be Mueller H-10314 or approved equal.

C. All Thread Rods

All thread rods shall conform to American Society for Testing Materials Standard A-36 (Mild Steel).

D. Polyethylene Encasement

Polyethylene encasement where specified, shall conform to AWWA C105/A 21.5-88.

PART 3 - EXECUTION

3.01 Testing

Water lines shall be hydrostatically tested in accordance with American Water Works Association Standard C-600-82. Pipe shall be field-pressure tested at a minimum static pressure of 150 psi. All testing shall be done after the backfilling of the water line. Service lines shall be tested in conjunction with water mains.

Testing shall be done through a corporation stop. No testing will be allowed through a fire hydrant.

3.02 Disinfection

All mains shall be disinfected in accordance with American Water Works Association Standard C-601-81. The Contractor shall be responsible for coordination and fees associated with bacteriological testing. Summit County Health Department shall conduct the test. Samples shall be collected for 500 foot intervals of water line construction. A copy of the Certificate of Acceptance must be submitted to the Engineer prior to final approval.

End of Section

SECTION 02710 - WASTEWATER COLLECTION SYSTEM CONSTRUCTION
*Aspen View*

## PART 1 - GENERAL

### 1.01 Scope

The extent of the wastewater collection line, service line, and manhole work is shown on the plans. This specification supplements requirements set forth by Breckenridge Sanitation District.

### 1.02 Regulations and Standards

All improvements associated with this specification shall conform to the regulations and standards of the:

Breckenridge Sanitation District
Colorado Health Department
National Sanitation Foundation (NSF)
American Water Works Association (AWWA)
American Society for Testing Materials (ASTM)

### 1.03 Inspection

Installation of all work covered by this specification shall be subject to the inspection and approval of the Engineer and the Breckenridge Sanitation District.

### 1.04 Unit Price - Measurement and Payment

Measurement shall be by the linear foot measured in place. Payment shall include, but is not limited to, excavation, bedding, pipe, pipe installation, backfill and compaction.

## PART 2 - MATERIALS

### 2.01 Polyvinyl Chloride (PVC) PSM Pipe

All polyvinyl chloride pipe shall be manufactured in accordance with American National Standards Institute/American Society for Testing Materials Standard 3034. Push-on type joints shall conform with American Society for Testing Materials Standard D-3212. SDR-35 pipe shall be used for wastewater collection system construction.

### 2.02 PVC Fittings (PSM Pipe)

All PVC fittings for PSM pipe shall be manufactured in accordance with American National Standards Institute/American Society for Testing Materials Standard D-3034. Fittings shall be SDR-35 type

with elastomeric gasket joints.

2.03 Cast Iron and Ductile Iron Fittings

Cast iron fittings shall conform with American Water Works Association Standard C-104, C-110, or C-111.

PART 3 - EXECUTION

3.01 Low Pressure Air Test for Line Acceptance

A. Equipment. The low pressure air test shall be performed on all PVC or ductile iron pipelines. The low pressure air test shall be performed with Air-Loc equipment manufactured by Cherne Industrial, Inc., Hopkins, Minnesota, or approved equal. The test shall be observed and accepted by District personnel. The test equipment shall meet the following minimum requirements.

1. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

2. Pneumatic plugs shall resist internal test pressure without requiring external bracing or blocking.

3. All air used shall pass through a single control panel.

4. Three individual hoses shall be used for the following connections.

   a. from control panel to pneumatic plugs for inflation.
   b. from control panel to sealed line for introducing the low pressure air.
   c. from sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

B. Test Procedure. The pipe installation shall be tested with low pressure air according to the following procedure:

1. The pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psi. The sealed pipe shall be pressurized to 5 psi. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe. The plugs shall then be placed in the line at the manholes, which terminate the reach to be tested and inflated to 25 psi.

2. Low pressure air shall be introduced into this sealed section of line until the internal air pressure exceeds by 5 psi the external pressure of any ground water that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the air pressure shall be adjusted to 3 1/2 psi greater than the average back pressure of any groundwater that may be over the pipe. Air pressure in reaches crossing water lines shall be 10 psi for the air test. The air hose from the control panel shall then be disconnected and the test commenced.

3. The portion of the line being tested shall be considered acceptable if the time required for the pressure to decrease from 3 1/2 psi to 2 1/2 psi (greater than the average back pressure of any groundwater that may be over the pipe) shall be greater than the time given by the following formula:

T = 0.0850 DK/Q
T = Time in Seconds
K = 0.000419 DL, but not less than 1.0
Q = Specified rate of loss, 0.003 cu. ft./min./sq. ft. of internal surface
D = Pipe Diameter, inches
L = Length of pipe being tested, feet

For the 10 inch line, the minimum time is 4 minutes and 43 seconds for pipe lengths up to 200 feet. Time for longer lengths will be computed using the following:

Time = 1.187L (seconds)

4. No sealant may be used in any new sewer construction without the prior approval of the District.

5. Proper precautions must be taken during testing to insure against injury to personnel by not allowing personnel in or above manholes while the line is pressurized.

6. If the leakage in any reach exceeds the allowable maximum, the line shall be repaired and re-tested at no expense to the District.

End of Section

SECTION 03100 - CONCRETE FORM WORK - *Aspen View*

PART 1 - GENERAL

All form work for specified structures requiring forms shall be in accordance with the standards.

PART 2 - PRODUCTS

2.01 Forms

Forms lumber for all exposed concrete surfaces shall be dressed at least on one side and two edges and shall be constructed so as to produce mortar-tight joints and smooth, even concrete surfaces.

Forms for unexposed finish concrete may consist of plywood lumber, metal or other acceptable materials.

2.02 Form Ties

Metal ties or anchorages within the forms shall be constructed as to permit their removal to a depth at least 1/2 inch from the face without injury to the concrete. The cavities shall be filled with cement mortar and the surface left sound, smooth, even and uniform in color.

2.03 Form Coatings

Provide commercial formulation from compounds that will not bond with stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesive.

PART 3 - EXECUTION

3.01 Placement

Not Used

End of Section

SECTION 03200 - CONCRETE REINFORCEMENT - *Aspen View*

PART 1 - GENERAL

Details of concrete reinforcement shall be in accordance with these specifications and the project plans. Details of concrete reinforcement not covered herein shall be in accordance with "Building Code Requirements for Reinforced Concrete" (ACI 318), the latest edition.

Before fabrication of reinforcing steel the Contractor shall submit to the Engineer for review, shop drawings of the bar lists and fabrication and setting drawings for all required reinforcing steel.

PART 2 - MATERIALS

2.01 Reinforcing Steel

Reinforcing bars less than No. 4 shall conform to the requirements of the Standard Specifications for Deformed and Billet-Steel Bar for Concrete Reinforcement, American Society for Testing and Materials (ASTM), ASTM A615-76, Grade 40, unless otherwise marked on the drawings.

Reinforcing bars No. 4 and larger shall conform to the requirements of the Standard Specifications for Deformed and Billet-Steel Bar for extra concrete reinforcement, ASTM A615-76, Grade 60.

2.02 Welded Wire Fabric

Welded wire fabric shall be electrically welded wire fabric of cold drawn wire (70,000 psi yield point) of gage and mesh size shown on the drawings, and shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM A-185-70).

PART 3 - EXECUTION

3.01 Fabricating and Places Tolerances

Bars used for concrete reinforcement shall meet the following requirements for fabricating tolerances:

| | |
|---|---|
| Sheared length | ± 1 Inch |
| Depth of truss bars | ± 0 Inch |
| Stirrup, ties and spirals | ± 1/3 Inch |

| | |
|---|---|
| All other bends | ± 1 Inch |

Bars shall be placed to the following tolerances:

| | |
|---|---|
| Concrete Cover to Formed Surfaces | ± 1/4 Inch |
| Minimum Spacing Between Bars | ± 1/4 Inch |
| Top Bar in Slabs and Beams: | |
| Member 8 Inches Deep or Less | ± 1/4 Inch |
| Members more than 8 inches, but not over 2 feet deep | ± 1/2 Inch |
| Members more than 2 feet deep | ± 1 Inch |
| Crosswise of Member | Spaced evenly within 2 Inches |
| Lengthwise of Members | ± 2 Inches |

3.02 Placing

All reinforcing bars shall be supported and wired together to prevent displacement by construction loads of the placing of concrete. On ground and where necessary, supporting concrete blocks may be used. Over formwork, approved bar chairs and spacers shall be furnished. Where the concrete surface will be exposed to the weather in the finished structure, the portions of all accessories in contract with the formwork shall be galvanized or shall be made of plastic.

Mesh shall lap at least three meshes, plus an extension of wires, but not less than 1/2 inch in structural slabs and shall extend across supporting beams and walls. Mesh must be located not less than two inches from the top of slabs on ground or 1/2 inch above formwork for structural slabs.

Vertical bars in columns shall be offset at least one bar diameter at splices. To insure proper placement, templates shall be furnished for all column dowels.

All splices not shown on the drawings must have prior approval of the Engineer. Reinforcement shall not be bent after being partially embedded in hardened concrete, except as approved by the Engineer.

Laps in tension splices shall be 36 bar-diameters and 30 bar-diameters in compression splices, or as noted.

3.03 Construction Joints

All reinforcing steel and/or welded wire fabric shall be extended through the joints or dowels.

End of Section

SECTION 03300 - CAST-IN-PLACE CONCRETE - *Aspen View*

PART 1 - GENERAL

1.01 Description

The extent of the concrete work is shown on the drawings and shall be in accordance with these specifications.

1.02 Codes and Standards

All work shall comply with the codes and standards below except where more stringent requirements are shown or specified.

ACI 301 - Specifications for Structural Concrete for Buildings
ACI 304 - Recommended Practice for Measuring , Mixing, Transporting and Placing Concrete

ACI 318 - Building Code Requirements for Reinforced Concrete

PART 2 - PRODUCTS

2.01 Concrete Materials

The following materials and specifications shall be used in the batching of concrete:

Portland Cement: ASTM C 150, Type I, unless otherwise specified herein.

Normal Weight Aggregates: ASTM C 33, except local aggregates of proven durability, may be used where acceptable to the Engineer.

Coarse Aggregate: 67%-100% passing 1-inch sieve.

Fine Aggregate: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.

Water: Clean, drinkable.

Air-Entraining Admixture: ASTM C 260.

Water-Reducing Admixture: ASTM C 494, Type A, and contain not more than 1% chloride ions.

Water-Reducing, Retarding Admixture: ASTM C 494, Type D, and contain not more than 1% chloride ions.

Calcium chloride not permitted.

RELATED MATERIALS:

Waterstops: Provide flat, dumbbell-type or centerbulb-type waterstops of either rubber (CRD-C-513) or PVC (CRD-C-572).

Nonshrink Grout: CRD-C 588, factory premixed grout.

Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard, complying with AASHTO M 182, Class 2.

Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.

Waterproof paper
Polyethylene film
Polyethylene-coated burlap.

Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.

Products: Subject to compliance with requirements, provide one of the following:

"Maxseal"; Maxement Company.
"Kure-N-Seal"; Sonneborn-Contech.
"Hydrozo Concrete Aire."

Bonding Compound: Polyvinyl acetate, rewettable type.

Epoxy Adhesive: 100% solids, two component material suitable for use on dry or damp surfaces.

Joint Fillers: Homex 300; Homosote.

2.02 Proportioning

A. Strength. The compressive strength of reinforced concrete structures shall be 3500 psi at 28 days.

B. Durability. All concrete subjected to freezing and thawing while wet shall have an air content of 5%-7% and a maximum water-cement ratio of 0.45.

C. Slump. Slumps in the following construction shall be in accordance with the table on the following page.

SLUMPS FOR VARIOUS KINDS OF CONSTRUCTION

| | Slump, Inches | |
|---|---|---|
| | Maximum | Minimum |
| Reinforced Footings | 3 | 1 |
| Plain Footings, Substructures | 3 | 1 |
| Beams, Reinforced Walls | 4 | 1 |

Slumps shall be measured in accordance with ASTM C-143 - Method of Test for Slump of Normal Cement Concrete.

D. Proportioning of Ingredients

General. The proportion of ingredients shall be selected to produce the proper placeability, durability, strength, and other required properties.

The proportion of ingredients shall be such as to produce a mixture that will work readily into the corners and angles of the forms and around reinforcement by the methods of placing and consolidation employed on the work, but without permitting the materials to segregate or excessive free water to collect on the surface.

The mix design shall be proportioned in accordance with Section 4.3 (Field Experience) or Section 4.4 (Trial Batches) of ACI 318.77.

If trial batches are used, they shall be performed by an independent testing laboratory approved by the Engineer. The cost of mix designs and testing shall be borne by the Contractor.

Before any concrete is placed on the job, the Contractor shall submit to the Engineer the concrete mix design he proposes to use. These mix designs must be approved by the Engineer prior to their use on the project.

2.03 Ready-Mix Concrete

A. General. Ready-mix concrete shall be furnished to the concrete contractor at the construction site, and he shall furnish and provide all equipment necessary to receive and install the ready-mix concrete as soon as it is received at the site. Mix certificate shall be furnished to Contractor by ready-mix driver for each load of ready-mix concrete delivered to the job. All materials and the proportioning of same shall conform in every respect to those specified heretofore. Ready-mixed concrete shall be mixed and delivered in accordance with

"Specifications for Ready-Mixed Concrete" (ASTM C-94).

B. Retempering. Indiscriminate addition of water to increase slump shall be prohibited.

Concrete shall be mixed only in quantities required for immediate use. Concrete that has set shall not be retempered, but shall be discarded.

When concrete arrives at the project with slump below that which is suitable for placing, water may be added only if neither the maximum permissible water-cement ratio nor the maximum slump is exceeded. The water must be incorporated by additional mixing equal to at least half of the total mixing required. Such additional water must be approved by the Engineer.

C. Cold-Weather Concreting. To maintain the temperature of the concrete above the minimum placing temperature of 50°F, the as-mixed temperature shall not be less than 55°F when the mean temperature falls below 40°F.

If water or aggregate has been heated, the water shall be combined with the aggregate in the mixer before cement is added. Cement shall not be added to mixtures of water and aggregate when the temperature of the mixture is greater than 100°F.

## PART 3 - EXECUTION

### 3.01 Placing Embedded Items

All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting. Columns and beams shall be sleeved and chased only where approved by the Engineer.

All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids and sleeves, inserts, and anchor slots shall be filled temporarily with readily removable materials to prevent the entry of concrete into the voids.

3.02 Placing Concrete

A. Preparation. Before placing of concrete is begun, hardened concrete and foreign materials shall be removed from the inner surfaces of the mixing and conveying equipment.

Prior to deposit of concrete, formwork shall have been completed; ice and excess water shall have been removed; reinforcement shall have been secured in place; expansion joint material, anchors, and other embedded items shall have been positioned; and the entire preparation shall have been approved by the Engineer.

B. Conveying. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods that will prevent separations or loss of ingredients and in a manner that will assure that the required quality of the concrete is obtained.

Conveying equipment shall be of size and design to insure a continuous flow of concrete at the delivery end and shall be approved by the Engineer. Conveying equipment and operations shall conform to the following requirements:

Truck mixers, agitators, and nonagitating units and their manner of operation shall conform to the applicable requirements of "Specifications for Ready-Mixed Concrete" (ASTM C-94).

Chutes shall be metal or metal-lined and shall have a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements may be used, provided they discharge into a hopper before distribution.

Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. The equipment shall be cleaned at the end of each operation.

C. Placing. Prior to the placing of concrete, the Contractor shall submit to the Engineer a placing schedule showing the amount and the limit of each pour in walls and columns, as well as all slabs. This schedule is for the purposes of establishing the location of all construction joints, as well as a method of correlating the test cylinders to the area in which that particular batch of concrete was placed.

Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for in the drawings, or as approved by the Engineer. Placing shall be carried on at such a rate that the concrete that is being integrated with fresh concrete which is still plastic. Concrete that has partially hardened or has been contaminated by foreign materials shall not be deposited. Temporary spreaders in forms shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. They may remain embedded in the concrete only if made of metal or concrete and if prior approval has been obtained.

Concrete shall be deposited as nearly as practicable in its final position to avoid segregation caused by handling or flowing. Concrete shall not be permitted to fall free more than five feet, and shall not be dripped through reinforcing steel or into a deep form nor subjected to any other procedure that will cause segregation.

Where a surface mortar is to be the basis of the finish, the coarse aggregate shall be worked back from the forms with a suitable tool as to bring a full surface of mortar against the form without the formation of excessive surface voids.

All concrete shall be consolidated by vibration, spading, rodding, or forking so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of honeycombing, putting, or planes of weakness.

Mechanical vibrators shall have a minimum frequency of 8,000 vpm and shall be operated by competent workmen. Over-vibrating and use of vibrators to transport concrete within forms shall not be allowed. Vibrators shall be inserted and withdrawn at many points, from 18 to 30 inches apart, for periods of 5 to 15 seconds.

D. Bonding. The hardened concrete of joints between footings and walls or columns, between walls and columns and beams of floors they support, joints in unexposed walls, and all others not mentioned below shall be dampened (but not saturated) immediately prior to placing fresh concrete.

The hardened concrete of joints in exposed work, joints in the middle of beams, girders, joints, and slabs, shall be dampened (but not saturated), and the bonding compound "Euco Weld" by the Euclid Chemical Company or "Weldcrete" by Larsen Company shall be applied. Fresh concrete shall be placed after the bonding compound has dried.

Joints in work designed to contain liquids and other joints as directed by the Engineer shall be dampened and the epoxy adhesive, "Euco Epoxy #463 or #615" by the Euclid Chemical Company or "Sikadur Hi-Mod" by Sika Chemical Corporation shall be applied. Preparation of the hardened concrete surface and application of the epoxy adhesive shall be in strict accordance with the directions of the manufacturer.

Fresh concrete shall be placed while the adhesive is still tacky.

3.03 Repair of Surface Defections

A. Removal. After forms have been removed, any concrete that is not as shown on the drawings, that is out of alignment of level beyond required tolerance, or that shows a defective surface that cannot be properly repaired or patched shall be removed.

B. Repairing and Patching. All tie holes and all repairable defective areas shall be patched immediately after form removal.

C. Defective Area. All honeycombed and other defective concrete shall be removed to sound concrete, but in no case to a depth of less than one inch. The area to be patched and an area of at least 6 inches surrounding it shall be dampened to prevent absorption of water from the patching mortar. The bonding compound "Euco Weld" by the Euclid Chemical Company or "Weldcrete" by Larsen Company shall be applied. The edges of the patch shall be vertical, or if possible, undercut.

The patching mixture shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and mortar shall consist of not more than one part cement to 2 1/2 parts sand by damp loose volume. Use White Portland Cement as required to produce a color matching the color of the surrounding concrete, as determined by a trial patch.

The quantity of mixing water shall be not more than necessary for handling and placing. The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.

After the bonding compound has dried, the premixed patching mortar shall be applied. The mortar shall be thoroughly consolidated into place and struck off so as to leave the patch slightly higher than the surrounding surface. To permit initial shrinkage, it shall be left undisturbed for at least one hour before being finally finished. The patched area shall be kept damp for seven days. Metal tools shall not be used in

finishing a patch in a formed wall that will be exposed.

D. Tie Holes. After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

E. Structural. With prior approval of the Engineer, as to method and procedure, all structural repairs shall be made by using the specified epoxy adhesive and/or epoxy mortar.

3.04 Finishing of Formed Surfaces

A. Plywood Finish. All exposed surfaces shall be finished equal to plywood finish unless otherwise called for on drawings.

B. Rubbed Finishings. The following finishes, where specified on the drawings, shall be produced on concrete that has been cast against plywood faced forms, or metal forms.

1. Smooth-Rubbed Finished. Smooth-rubbed finish shall be produced on green concrete. All necessary patching shall have been done immediately after forms have been removed, and rubbing shall be completed not later than the following day. Surfaces shall be wetted and rubbed with corborundum brick or other abrasive until a uniform color and texture are produced. No cement grout or slush shall be used other than the cement paste from the green concrete itself by the rubbing process.

2. Sand-Floated Finished. The forms shall be removed before the surface has fully hardened. The surface shall be wetted and rubbed with a wood float by a uniform circular motion, with fine sand being rubbed into the surface until the resulting finish is even and uniform in color and texture.

3.05 Flatwork

A. Edge Forms and Screeds. Edge forms and intermediate screed strips shall be set accurately to produce the designed elevations and contours in the finished surface, and shall be sufficiently strong to support vibrating bridge screeds or roller pipe screeds if the nature of the finished specified requires the use of such equipment.

The concrete surface shall be aligned to the contours of screed strips by the use of strike-off templates or approved compacting-type screeds.

When a formwork is cambered, screeds shall be set to a like camber to maintain the proper concrete thicknesses.

B. Jointing. Joints in slabs on grade shall be located and detailed as indicated in the drawings. Unless otherwise shown, maximum joint spacing shall be 20 feet. If saw-cut joints are required or permitted, cutting shall be timed properly with the set of the concrete. Cutting shall be started as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses have developed sufficiently to induce cracking. The saw cut depth shall be 1/4 slab thickness.

C. Consolidation. Concrete in slabs shall be thoroughly consolidated with the use of vibrating bridge screeds, roller pipe screeds, or other approved means. These surfaces shall not be manipulated prior to finishing operations.

D. Finishes.

1. Scratched Finish. After the concrete has been placed, struck off, consolidated and leveled, the surface shall be roughened with stiff brushes or rakes before final set.

2. Floated Finish. After the concrete has been placed, struck off, consolidated, and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared, and/or when the mix has stiffened sufficiently to permit the proper operation of a power-driven float. The surface shall then be consolidated with power-driven floats of the impact type, except in thin sections, such as pan slabs. Hand floating with wood or corkfaced floats shall be used in locations inaccessible to the power-driven machine. Trueness of surface shall be rechecked at this stage with a ten-foot straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure to produce planes checking true under the straightedge in any direction, with tolerances so that depressions between high spots do not exceed 5/16 inch under a ten-foot straightedge. The slab shall then be refloated immediately to a uniform, smooth, sandy texture.

3. Troweled Finish. Where a troweled finish is specified, the surface shall be finished first with impact power floats, as specified above where applicable, then with power trowels, and finally with hand trowels. The first troweling after power floating shall be done by a power trowel and shall produce a smooth surface that is relatively free of defects, but that may still contain some trowel marks. Additional troweling shall be done by hand after the surface has hardened sufficiently. The final troweling shall be done when a ringing sound is produced as the trowel is moved over the surface. The surface shall be

thoroughly consolidated by the hand troweling operations. The finished surface shall be free of any trowel marks and shall be uniform in texture and appearance. On surfaces intended to support floor coverings, any defects of sufficient magnitude to show through the floor coverings shall be removed by grinding. Depressions between high spots shall not exceed 1/8-inch to 3/16-inch under a ten-foot straightedge.

4. Curing and Sealing Compound. All exterior slabs, sidewalks, curbs, etc., shall be cured with the specified clear styrene butadiene curing and sealing compound.

   All exterior exposed floor surfaces shall receive a second coat of the curing and sealing compound. Application shall be made in strict accordance with the directions of the manufacturer and just prior to completion of construction.

5. Broom or Belt Finish. Sidewalk slabs, and slabs in other locations so specified, shall be given a coarse transverse-scored texture by drawing a broom or burlap belt across the surface. This operation shall follow immediately after floating. Floating shall be performed as outlined in Paragraph 2.

6. Topping. The scratched base or twin slab finish shall be protected from contamination from time of placing until time of topping. Any oil, grease, asphalt, paint, clay strains, or other contaminants shall be mechanically removed, leaving a clean surface.

   Prior to placement of topping, the roughened slab surface shall be thoroughly dampened and left free of standing water. The bonding compound, "Euco Weld" by the Euclid Chemical Company or "Weldcrete" by Larsen Company shall be applied. The topping mix shall be placed after the bonding compound has dried.

7. Related Work. Before laying concrete slabs on grade, fill all trenches level with the surface of the ground, and water-settle and tamp after all underfloor piping has been installed. Walks shall be sloped to drain away from buildings and finished with broomed finish. Surface texture shall be as instructed by the Engineer. Exterior concrete steps shall be pitched to drain out with a fall of 1/4 inch to one foot 0 inch. Flatforms shall also be pitched as shown on Drawing to drain off water. Steps shall be finished on the risers with a sand-flat finish. Treads and platforms shall be finished with an approved nonslip aggregate applied at the rate of 25 pounds per 100 square feet. The surfaces shall be given a single

steel-trowel finish.

3.06 Curing and Protection

A. General. Freshly deposited concrete shall be protected from premature drying and excessively hot and cold temperatures, and shall be maintained without drying at a relatively constant temperature for the period of time necessary for the hydration of the cement and proper hardening of the concrete.

B. Initial Curing. Initial curing shall immediately follow the finishing operation. Concrete shall be kept continuously moist at least overnight. One of the following materials or methods shall be used:

Ponding or continuous sprinkling.

Absorptive mat or fabric kept continuously wet.

Continuous steam (not exceeding 150°F) or vapor mist bath.

Curing and sealing compounds as specified in Section 3.05, Paragraph D, and 4 shall be used on all surfaces as noted within.

Other slabs and surfaces must be cured with one of the above mentioned methods to assure proper bond of subsequently applied materials.

C. Final Curing. Immediately following the initial curing and before the concrete has dried additional curing shall be accomplished by one of the following methods or materials:

Continuing the method used in initial curing.

Waterproof paper conforming to "Specifications for Waterproof Paper for Curing Concrete" (ASTM C-171)

Other moisture-retaining coverings as approved.

D. Duration of Curing. The final curing shall continue until the cumulative number of days or fractions thereof, not necessarily consecutive, during which temperature of the air in contact with the concrete is above 50°F, has totaled seven days. If high early strength concrete has been used, the final curing shall continue for a total of three days. Rapid drying of the end of the curing period shall be prevented.

E. Formed Surfaces. Steel forms heated by the sun and all wood forms in contact with the concrete during the final curing period shall be kept wet. If forms are to be removed during the curing period, one of the above curing materials or methods

shall be employed immediately. Such curing shall be continued for the remainder of the curing period.

F. Cold-Weather Temperature. When the mean daily temperature of the atmosphere is less than 40°F, the temperature of the concrete shall be maintained between 50°F and 70°F for the required curing period. When necessary, arrangements for heating, covering, and insulating of housing shall be made in advance of placement and shall be adequate to maintain the required temperature and moisture conditions without injury due to concentration of heat.

G. Temperature. When necessary, arrangements for installation of wind breaks, shading, fog spraying, sprinkling, ponding, or wet covering of a light color shall be made in advance of placement, and such protective measures shall be taken as quickly as concrete hardening and finishing operations shall allow.

H. Excessive Temperature Changes. Changes in temperatures of the concrete shall be as uniform as possible and shall not exceed 5°F, in any one hour, or 50°F in any 24-hour period.

I. Protection from Mechanical Injury. During the period, the concrete shall be protected from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage caused by construction equipment, materials, or methods, and by rain or running water.

Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.07 Testing

Standard tests of the strength of concrete will be made by the Engineer. Testing shall be in accordance with ASTM C-39: one set of three cylinders for each 50 cubic yards or fraction thereof. The Owner will bear the costs of testing during construction. When the strengths of field-cured specimens indicate deficiencies in protection and curing, or when the concrete fails to conform to the strength requirements, Engineer may require tests in accordance with ASTM Designation C-42 - Standard Methods of Obtaining the Testing Drilled Core and Solid Beams of Concrete.

End of Section

SECTION 03400 - PRECAST CONCRETE - *Aspen View*

PART 1 - GENERAL

1.01 Scope

The extent of precast/prestressed concrete shall include manufacture, transportation and installation of the precast portions of the structure including both conventionally reinforced and pretensioned members, as shown on the contract drawings.

1.02 Standards

The following specifications, standards and codes shall govern where applicable with modifications as specified herein:

ACI 318-77 Building Code Requirements for Reinforced Concrete.

ACI 301-72 (revised 1975) Specifications for Structural Concrete for Buildings.

AWS D12.1 Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.

ANSI/ASTM C 478-79 Standard Specification for Precast Reinforced Concrete Manhole Sections.

ANSI/ASTM C 76-78 Standard Specifications for Reinforced Concrete Culvert, Storm Drains and Sewer Pipes.

All designs for precast concrete shall be for H-20 bridge loading.

PART 2 - MATERIALS

2.01 Concrete

Concrete shall conform to the requirements of Section 03000 and Section 03300 except as follows:

A. Cement Type I may be used on all units except a wet well. Type II cement must be used for the wet well.

B. Compressive strength shall be 4,000 psi in 28 days for all units except the wet well, which may be 3,500 psi.

C. Release strengths shall be a minimum of 3,500 psi for all prestressed units unless otherwise shown on the contract drawings.

2.02 Reinforcing Steel

Reinforcing steel and welded wire fabric shall conform to Section 03200.

2.03 Prestressing Steel

Strands for prestressed concrete shall conform to specifications for Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete (ASTM A 416).

2.04 Product Deviations

Deviations from the exact cross section as shown on the contract drawings will be permitted to enable more manufacturers to make submittals. Such deviations may also include reinforcing, connections, inserts, etc. enabling manufacturers to best adapt their manufacturing procedures. Deviations shall provide an installation equivalent to the basic intent without incurring additional cost to the Owner.

Such deviations will be permitted only with the Engineer's approval. The manufacturer shall be required to submit to the Engineer complete design calculations and drawings of the proposed design, bearing the seal and signature of an Engineer registered in the State of Colorado.

Design of members for lifting and handling stresses is the responsibility of the manufacturer.

2.05 Tolerances

The dimensions of units and location of anchors and inserts shall be as shown on the contract drawings. Variations from these requirements will be acceptable as long as they are within the tolerances common to the trade, as set forth by the Prestressed Concrete Institute, and do not constitute a weakness to the structural integrity for function of the structure as determined by the Engineer.

PART 3 - EXECUTION

3.01 Finishes

The underside or inside finish shall be that resulting from casting against approved forms using good industry practice in cleaning of forms, design of concrete mix, placing, and curing. Small surface holes caused by air bubbles, normal form joint marks and minor chips and spall will be tolerated, but no major or unsightly imperfections, honeycombing or structural defects will be permitted as approved by the Engineer.

The top or outside surface finish shall be produced using a vibrating screen with additional hand troweling as required to eliminate indentations. Normal color variations, minor indentations due to required covering, and minor chips and spalls will be tolerated but not major imperfections, honeycombing or structural defects will be permitted as approved by the Engineer.

3.02 Transportation and Erection

Manufacturer shall inspect all concrete structures at the plant before transporting to the job site to insure that the structures were cast according to approved shop drawings. Patching of minor defects in structure appearance shall be accomplished at the plant. If structural defects are detected or if inserts and blockouts are misplaced, the product shall not be shipped from the plant with the hope that its arrival at the job site will insure its repair and use on the product.

Care shall be used in transporting units to the job site. The structures shall be handled in such a manner as to prevent excessive stresses, spalling or cracking.

Erection of concrete structures shall be performed by the manufacturer or a competent erection contractor having experience in erection of product. Materials shall be lifted by means of suitable cranes at points provided and designed by the manufacturer. Temporary shoring and bracing, as required, shall comply with the manufacturer's recommendations.

Structures shall be properly aligned and leveled as required by the plans.

Structures damaged during erection or not cast according to approved shop drawings and/or contract drawings shall be inspected by the Engineer to determine whether the unit is acceptable for use, prior to that unit's erection. The component shall be repaired or modified according to the Engineer's instructions, or discarded and replaced by a new piece as directed by the Engineer.

End of Section

SECTION 16118 - ELECTRICAL - *Aspen View*

PART 1 - GENERAL

1.01 Scope

Furnish and install complete lighting systems as shown on the drawings and as specified herein including conduit, with trenching and backfill, wire, light bases, light installation and bulb installation.

1.02 Applications

All applications are subject to applicable electrical codes.

A. PVC conduit shall be suitable for underground installation shown on the drawings and as restricted by the electrical code.

B. All conduit of given type shall be the product of one manufacturer.

C. All junction boxes shall be metal.

D. Exposed switch, outlet and control station boxes and fittings shall be cast or malleable iron.

E. Electrical wire shall conform to NEC Standards.

PART 2 - MATERIALS

2.01 General

All new material or equipment furnished under this section shall be new and shall be UL listed or recognized and shall bear the UL listing label or the UL "RU" label if a UL standard exists for the material or equipment.

2.02 Rigid Non-metallic Conduit

A. Rigid non-metallic conduit is hereinafter and on the drawings referred to as PVC.

B. PVC shall conform with US number 651, NEMA TC2 for EPC-40, and Article 347 of the National Electrical Code. It shall be UL listed for use with 90 C conductors.

C. PVC shall be of polyvinylchloride with a minimum tensile strength of 7,000 psi at 23 C, minimum flexural strength of 11,000 psi and minimum compressive strength of 8,600 psi. PVC shall be schedule 40.

D. All joints shall be solvent welded in accordance with the manufacturer's recommendations.

E. PVC, fittings, elbows and cement shall be produced by the same manufacturer.

F. PVC may be used where specifically called for on the drawings, or elsewhere specified.

2.03 Boxes and Fittings

A. Pressed steel switch and outlet boxes shall be hot-dipped galvanized as manufactured by the Raco Manufacturing Company, Adalet Company, O.Z. Manufacturing Company or equal.

B. Terminal boxes, junction boxes, pull boxes, etc., shall be sheet steel unless otherwise shown on the drawings. Boxes shall be galvanized and have continuously welded seams. Welds shall be ground smooth and galvanized. Box bodies shall be flanged and shall not have holes or knockouts. Box bodies shall not be less than 14 gauge metal and covers shall not be less than 12 gauge metal. Covers shall be gasketed and fastened with stainless steel screws. Boxes shall be as manufactured by Hoffman Engineering Company or equal.

C. All boxes and fittings used with PVC coated conduit shall be furnished with a PVC coating bonded to the metal, the same thickness as used on the coated steel conduit.

D. Cast or malleable iron boxes and fittings shall have cadmium-zinc finish with cast covers and stainless steel screws as manufactured by the Crouse-Hinds Company, L.E. Mason Company or equal.

E. Steel elbows and couplings shall be hot-dipped galvanized. Elbows and couplings used with PVC coated conduit shall be furnished with a PVC coating bonded to the steel, the same thickness as used on the coated steel conduit.

F. Conduit hubs shall be as manufactured by Myers Electric Products, Inc., Raco Division, Appleton Electric Company, or equal.

G. Conduit wall seals shall be type WSK as manufactured by the O.Z. Electrical Manufacturing Company, or equal.

2.04 Wiring

Provide electrical wires, cables and connectors of manufacturers standard materials for the complete installation of lighting. Provide for the proper wire selection as determined by installer to comply with the project's installation requirements, NEC and NEMA Standards selected from the following UL types:

Type THW

Type USE

All wire shall provide copper conductors unless otherwise indicated.

PART 3 - EXECUTION

3.01 Conduit Installation

A. Conduit terminating in pressed steel boxes shall have double locknuts and insulated bushings.

B. Conduit terminating in gasketed enclosures shall be terminated with conduit hubs.

C. Conduits shall be installed using threaded fittings. Threadless fittings may be used in isolated instances when approved by the Engineer.

D. Liquid tight flexible metal conduit shall be used for all motor terminations and other equipment where vibration is present.

End of Section