

SECTION 310916: EXISTING UNDERGROUND STRUCTURES

PART 1 GENERAL

1.01 DESCRIPTION

- A. Related requirements specified elsewhere:
 - 1. Section 31 09 13 - Site Conditions
 - 2. See also Plans for location of utilities and underground structures as they are believed to exist.
- B. Requirements of General Conditions and Division 1 apply to all work in this Section.
- C. The Engineer has estimated the approximate location of existing underground structures based on information made available by the Owner. Exact location and completeness are not guaranteed. Contractor shall make the effort to determine the exact location of underground installations.
- D. Prior to opening an excavation, Contractor shall make an effort to determine whether underground installations (i.e., sewer, water, fuel, electric lines, etc.) will be encountered and, if so, where such underground installations are located. When the excavation approaches the approximate location of such an installation, the exact location shall be determined by careful probing or hand digging; and, when it is uncovered, adequate protection shall be provided for the existing installation. All known owners of underground facilities in the area concerned shall be advised of proposed work at least 48 hours prior to the start of actual excavation.

PART 2 PRODUCTION - OWNERS

2.01 UTILITIES AFFECTED

- A. General
 - 1. The Underground Service Alert (USA), (800) 642-2444 or (800) 227-2600, shall be contacted at least 72 hours before any work commences.
- B. Gas and Electric
 - 1. Pacific Power provides electric service. It should be noted that where overhead service to a structure known requiring it does not exist, then underground power service shall be assumed to exist. Pacific Power can be contacted at (866) 870-3419.
- C. Water and Sewer Service
 - 1. Klamath Community Services District (KCSD) provides domestic water and sanitary sewer in the project area.
- D. Telephone

1. Frontier Communications maintains fiber optic lines in the project area. Frontier can be contacted at (800) 921-8102.

E. Drainage

The County of Del Norte has jurisdiction over drainage within the public right-of-way. The County can be contracted by phoning (707) 464-7238. In addition, a U.S. Army Corps of Engineers owns a storm drainage pipeline that runs through the project site. The Corps may be contacted by phoning (415) 503-6916.

F. Roads and Streets

The County of Del Norte has jurisdiction over Klamath Boulevard. They may be contacted by phoning (707) 464-7238. Caltrans has jurisdiction over Highway 101. They may be contacted by phoning (707) 445-6600.

2.02 TEMPORARY FACILITIES

- A. Contractor shall provide temporary facilities as needed to perform the work included in the contract documents.

PART 3 EXECUTION

3.01 LOCATION OF UTILITIES

- A. The Owner has attempted to identify all existing locations that he has knowledge of and has shown these on the Plans.

3.02 CONTRACTOR RESPONSIBILITY

- A. It may be expected that there will be some variation in location of existing utilities from that as shown on the Plans. Actual location can best be determined in the field after pre-marking by the various utilities affected. Contractor is required to contact Underground Services Alert (USA) before beginning any excavations.
- B. The Contractor shall be responsible for determining the location of existing service laterals or appurtenances whenever the presence of such utilities on the site of the construction can be inferred from the presence of other visible facilities, such as building, meter and junction boxes, located on or adjacent to the site.
- C. The Contractor shall promptly notify the Owner in writing in the event that the Contractor discovers utility facilities not identified by the Owner in the Contract Plans or Specifications.
- D. It should be understood that the various utilities are indicated on the Plans to show only the approximate location and must be verified in the field by the Contractor. It may be expected that there will be variation in location from that as shown on the Plans to the actual location. Actual location can best be determined in the field after premarking by the various utilities affected. The various utilities will cooperate with the Contractor to endeavor to familiarize the Contractor with all known underground utilities obstructions, but this will not relieve the Contractor from assuming full responsibility in anticipating and locating their actual location with respect to

utilities which the Contractor must locate and identify under the provisions hereof.

3.03 PRIOR INVESTIGATION

- A. Prior to bidding, the bidders may make their own subsurface investigations, talk to the various utilities affected to secure, for his own information, the knowledge of each utility with the precise location of their facilities so that he may take into account in his bid the difference in location from that believed to exist to that which may actually prove to be the precise location.

END OF SECTION

SECTION 311013: DEMOLITION/DEBRIS REMOVAL

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included:

Demolition and removal of the miscellaneous items shown on the plans, including but not limited to existing vegetation, asphalt concrete, fences, gates, signs, and construction debris.

B. Requirements of General Conditions and Division 1 apply to all work in this Section.

1.02 QUALITY ASSURANCE

A. In addition to complying with all pertinent codes and regulations, comply with the requirements of those insurance carriers providing coverage for this work.

1.03 JOB CONDITIONS

A. Disposition of material:

1. Title to materials:

a. Title to all materials to be removed, except as specified otherwise, is vested in the Contractor upon receipt of notice to proceed. The Owner will not be responsible for the condition or loss of, or damage to, such property after notice to proceed.

2. Reuse of materials and equipment:

a. Carefully remove and store materials and equipment indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

B. Cleanup:

1. Debris and rubbish:

a. Contain, remove and transport debris and rubbish in a manner that will prevent spillage to adjacent areas.

2. General:

a. Use all means necessary to protect existing structures designated to remain and, in the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 SITE INSPECTION

- A. Prior to any clearing, grubbing and debris removal work, carefully inspect the site and determine the extent of work involved.
- B. Report any discrepancy to the Owner's Representative immediately.

3.02 COORDINATION AND SCHEDULING

- A. Coordinate work with other trades and subcontractors.

3.03 SAFETY

- A. All work shall conform to pertinent OSHA regulations and to other State and local codes and ordinances as applicable.

3.04 PROTECTION

- A. Locate, identify, and protect conduits and other underground utilities indicated to remain, from damage as shown on the Plans.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks and existing structures from damage or displacement.

3.05 REMOVAL OF DEBRIS

- A. Remove all debris from the site and leave the site in a neat and orderly condition.

END OF SECTION

SECTION 31 11 00: SITE CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work included:

Work covered in this section consists of removing all objectionable material from the location of the proposed work. Clearing shall normally be performed in advance of other construction operations in accordance with requirements of these Specifications.

B. Related work described elsewhere:

1. Existing Underground Structures: Section 31 09 16
2. Earth Moving: Section 31 20 00

C. Requirements of General Conditions and Division 1 apply to all work in this Section.

1.02 QUALITY ASSURANCE

A. Qualifications of workmen:

Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

1.03 PRESERVATION OF PROPERTY

A. Where construction is to be performed in the vicinity of trees and shrubbery, the work shall be carried on in a manner which will cause minimum damage. Trees which are to be removed will be designated on the drawings. Under no circumstances are additional trees to be removed without written permission from the Owner's Representative. Trees and shrubbery that are not to be removed shall be protected from injury or damage resulting from the Contractor's operations. It shall be the responsibility of the Contractor to alert his men, his suppliers, and all sub-contractors of the intent of these Specifications pertaining to the protection of vegetation. During the execution of his work, the Contractor shall use the same care and protection of all vegetation within his work area.

B. In areas where trees or shrubs may be damaged by construction equipment, the Contractor shall provide protective fencing, padding on tree trunks, tie-back branches or take other necessary actions to prevent damage to the trees, shrubs, or other vegetation. Damage to trees and shrubs shall include, but will not be limited to:

1. Bark damage to trees
2. Breakage of branches on trees or shrubs
3. Breaking or tearing of roots

4. Spilling toxic materials near the root zones
5. Spraying toxic materials on foliage
6. Fire damage to foliage and branches
7. Compaction of root areas under the drip line or damage by fill or storage of materials over the root zone
8. Foot or vehicular damage on low shrubs and groundcover

All damage shall be immediately reported to the Owner's Representative who will file a report so that penalties may be determined.

A sum of \$50.00 per inch of diameter will be deducted from the monies due the Contractor for all trees that are removed which are not designated to be removed, or which do not have the written authorization of the Owner's Representative for removal. The penalty is also applicable to trees damaged to the extent that such damage will, in the Owner's Representative's opinion, cause the tree to die.

Contractor shall exercise caution when working near trees not designated to be removed, so that the trees will not be damaged. No root greater than 1 inch in diameter shall be cut unless it is necessary to do so during access road construction to reach the specified subgrade elevation.

1.04 JOB CONDITIONS

- A. Environmental requirements:
 1. No burning shall be permitted.
 2. Contractor shall be responsible for obtaining all necessary permits required for disposal of material resulting from clearing and grubbing operations.

PART 2 – PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING WORK REQUIRED

- A. Where required and directed by the Owner's Representative, all trees, stumps, large roots, buried logs, decayed vegetable matter, heavy growth of grass and weeds and all other objectionable material shall be removed from the site of work. None of the above types of material will be allowed under fills, future roadways, or within ditch sections. Contractor should mow down grass and stockpile it prior to clearing and grubbing. The top layer of remaining weeds and grass should be scraped off along with a layer of top soil and stockpiled for use in landscaping areas. This stockpile should be sterilized and covered until redistributed into the landscape areas
- B. In the area to be grubbed and in areas required for excavation or buried pipelines, cutoff may be made at sufficient distance from the original ground surface as will facilitate

grubbing for excavation operations.

- C. Trimming of trees and brush that overhang the right-of-way shall be accomplished as required to execute the work.

- D. Removal and disposal of material:

All of the debris type material resulting from the above clearing and other miscellaneous site clearing required by the work or any excavation shall be removed from the site of the work and deposited off site at the Contractor's disposal site.

Burning of any material will be permitted only if approval can be obtained from the various public bodies having authority or authorities in the areas concerned.

- E. Stump removal:

Stump removal shall be performed in accordance with Caltrans Standard Specification, Section 17.

3.02 RESEEDING WORK REQUIRED

- A. The general intent is for the finished worksites to resemble the areas as they existed in the native condition. The restoration is to be accomplished through the implementation of the following efforts.

1. The preservation of the native environment including trees, rocks, and general topographic features through care in planning and workmanship during the construction of the facilities.
2. The replacement of physical objects that must be removed for the construction.
3. The provision of a finished site that will provide for the rapid revegetation of areas to their natural site.

- B. The restoration is to be accomplished through the implementation of the following efforts.

1. The preservation of the native environment including trees, rocks, and general topographic features through care in planning and workmanship during the construction of the facilities.
2. The replacement of physical objects that must be removed for the construction.
3. The provision of a finished site that will provide for the rapid revegetation of areas to their natural site.

- C. All areas of soil disturbance, including but not limited to cut and fill slopes, swales, ditches and open areas, shall be stabilized by hydroseeding and mulching per Section 20 of the 2015 Caltrans Standard Specifications and as indicated on the plans.

END OF SECTION

SECTION 312000: EARTH MOVING

PART 1 GENERAL

1.01 DESCRIPTION

A. This Section includes the following:

1. Preparing subgrades for site improvements and paved and unpaved areas (excluding building pads) including removal of existing fill and other unsuitable soils, and their replacement with structural fill.
2. Excavating and backfilling for site areas, concrete pavement and site utilities (5 feet outside buildings).
3. Subbase course for concrete walks and pavements.

B. Related Sections:

1. Section 31 09 13 – Site Conditions
2. Section 31 09 16 – Existing Underground Structures
3. Section 31 10 13 – Demolition/Debris Removal
4. Section 31 11 00 – Site Clearing and Grubbing
5. Section 31 23 15 – Shoring and Trench Safety

C. References:

1. Requirements of General Conditions and Division 1 specifications apply to this section.
2. Caltrans Standard Specifications – 2015

D. Existing power and telephone lines, trees, fences, pipelines or other conduits, embankments and structures in the vicinity of the work shall be supported and protected from injury by the Contractor during the construction and until the completion of the work.

E. A thorough attempt has been made to show the type, location, and number of all utilities, however, no guarantee is made as to the location and number of such utilities. The Contractor shall repair all utilities damaged in the progress of his work. The Contractor shall notify all owners of utilities of commencement of and sufficiently in advance to have the utilities mark the location of their facilities. The Contractor shall be prepared at all times with labor, equipment, and materials to make repairs on damaged mains or utilities.

F. No backfilling shall be done until the installation to be covered has been inspected and approved for covering. Compaction of backfill shall proceed immediately after backfilling.

1.02 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation or trench.
- B. Trench Bedding: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Trench Cover: Layer placed immediately over the pipe in trench.

- D. Borrow: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Rock Drainage Course or Capillary Water Barrier: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations.
 - 1. Additional Excavation: Excavation below subgrade elevations as directed by Owner's Representative. Additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Layer placed between the subgrade and a concrete pavement or walk.
- J. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, rock drainage course, or topsoil materials.
- K. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- L. Gravel Surface Course: Layer placed above the base course paving for gravel parking areas.

1.03 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.
- B. Wet Ground Areas: If wet areas are encountered during subgrade preparation or grading activities they should be subdrained or stabilized as directed by the Geotechnical Engineer.

1.04 SUBMITTALS

- A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- B. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- C. Samples: Submit 5-gallon bucket samples of each type of fill to Contractors testing laboratory. Submit test results to Engineer prior to incorporating material into construction.
- D. Materials Source: Submit name of imported fill (including but not limited to select fill, aggregate base, bedding, drain rock, and gravel surface course) materials supplier and sieve analysis.

1.05 QUALITY ASSURANCE

A. Qualifications of workmen:

1. Provide sufficient skilled workmen and supervisors who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of construction involved and the materials and techniques specified.

B. Codes and standards:

1. Wherever a test method is referenced in this Section, it shall be made in accordance with the most current test methods in use with ASTM Standards as listed below, unless noted otherwise:

<u>TEST</u>	<u>ASTM Test Procedure</u>
Relative Compaction	ASTM D1557
Specific Gravity	ASTM D854
In-place Density	ASTM D2922
Particle Size Analysis of Soils	ASTM D422
Plastic Limit and Plasticity Index	ASTM D4318
Soil Classification	ASTM D2487
In-place Moisture Content	ASTM D3017

1.06 TESTING

- A. The Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports. The Contractor shall cooperate with the Owner's tester and/or inspector.

1.07 GRADES, LINES, LEVELS, AND PERMANENT MARKERS

A. Staking:

1. The Contractor is responsible for providing all surveying and staking for laying out the earthworks at the site based on bench marks shown on the plans.

B. Responsibility for correctness:

1. Contractor will be held responsible for the correctness of the layout and for establishing the location of possible buried utility lines. In the event there is any conflict between actual conditions and the drawings, Contractor shall notify the Owner's Representative immediately and shall not proceed with the work until directed by the Owner's Representative.

C. Preservation of markers:

1. All stakes, boundary lines, corner markers, bench marks or survey markers, etc., which have been or may be established in any part of the site, shall be carefully preserved and respected by the Contractor and shall be restored at the Contractor's expense if lost or destroyed as a result of his operations.

1.08 ACCURACY OF DATA

- A. Site data given herein and on the drawings are as exact as could be secured, but their absolute accuracy cannot be guaranteed. Exact locations, distances, elevations, etc., shall be finally governed by field conditions and the Engineer's instructions.

- B. The Contractor shall promptly, and before such condition is disturbed, notify the Owner's Representative in writing of soil or subsurface conditions which differ materially from those conditions shown in the Contract Documents or in the records of investigations of soil or subsurface conditions referred to above. The Owner's Representative shall promptly investigate the conditions. If he finds the conditions materially different from those which reasonably should have been anticipated on the basis of a careful consideration of said records of investigations, logs of borings and examination of the site, and finds that said conditions will cause an increase or decrease in the cost of, and/or the time required for performance of the Contract, he will, after approval by the Owner, modify the Contract Terms in writing to provide for an equitable adjustment in cost and/or time of performance. Any claim of the Contractor shall not be allowed unless he has given the required written notice.

1.09 ARCHAEOLOGICAL MONITORING

- A. The Contractor shall notify the Owner's Representative a minimum of 72 hours in advance of any excavation, and will not proceed with any excavation work until cleared to do so by the Owner. A Tribal monitor or archaeologist may be on site during construction activities. The contractor is advised that if any archaeological findings are discovered during construction that the monitor or archaeologist has the authority to slow or stop construction activities as they deem necessary.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

- B. Fill Quality: All fill materials should be composed of soil having a low expansion potential, and be free of organic content, debris, and/or other deleterious matter.

- C. Topsoil - Shall conform to Section 21-2.02C of the Caltrans Standard Specifications, and shall be a natural friable surface soil without admixtures of undesirable subsoil, refuse, asphalt, oils, metals, or foreign materials. It shall be reasonably free from roots, hard clay, coarse gravel, stones larger than two inch in any dimensions, noxious weeds, tall grass, brush, sticks or other material which would be detrimental to the proper development of vegetative growth. Native topsoil may be suitable for use as topsoil provided it meets the requirements above.

- D. Class 2 Aggregate Base: Class 2 aggregate base shall conform to the Caltrans Standard Specifications.

- E. Select Fill/Engineered Fill: Should be free of organic matter, debris, or other deleterious matter, have a low expansion potential, and conform in general to the following requirements:

SIEVE SIZE	PERCENT PASSING (by dry weight)
3 Inch	100
2 Inch	85 – 100
No. 200	5 - 50

Liquid Limit – 40 Percent Maximum
Plasticity Index – 15 Percent Maximum
R-value – 38 Minimum (pavement areas only)

- F. Trench Bedding: Bedding shall be pea gravel
- G. Trench Cover shall be pea gravel or native material as indicated on the plans.
- H. Drain Rock: Free draining, durable, granular material meeting the requirements of Class 2 Permeable Material, per Caltrans Standard Specifications.
- I. Gravel Surface Course: Gravel surface course shall be 3/4" minus well graded crushed rock with less than 5% of fines passing through a #200 sieve.
- J. Geotextile Filter Fabric: 6 ounce/sq.yd., non woven.
- K. Detectable Warning Tape: Polyethylene film warning tape encasing a metallic core, minimum 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility.
- L. Satisfactory Native Backfill: Native material approved by the Geotechnical Engineer for use as backfill in utility trenches below paved or graveled areas.

2.02 OTHER MATERIALS

- A. All other materials not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to the approval of the Engineer.

2.03 MATERIAL APPROVAL

- A. Submit samples of materials and product data to Engineer for approval prior to placing orders. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project.

2.04 COMPACTION REQUIREMENTS

- A. The Contractor shall make all necessary excavations for compaction tests. Costs of excavating, backfilling, and compacting in connection with compaction testing shall be borne by the Contractor. Excavations for compaction tests shall be backfilled with material similar to that excavated and compacted to the specified density by the Contractor. Tests for compliance with Specifications, as determined by the Owner's Representative, and as required in the specifications, will be made and paid for by the Contractor. The Contractor may also be required to pay for all required repeat tests in that area until the required results are obtained.

2.05 COMPACTION EQUIPMENT

- A. All compaction shall be by mechanical means unless the Contractor can demonstrate other means that will accomplish required compaction to the satisfaction of the Owner. Compaction

equipment shall be of suitable type and adequate to obtain the densities specified and approved. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, freezing temperatures or frost, and other hazards created by earthwork operations. Provide protective insulating materials as necessary.
- B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared sub grades, and from flooding Project site and surrounding area.
- D. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

3.02 EXCAVATION

- A. Strip all existing improvements, pavements, debris, vegetation, root systems, dark colored organic rich topsoil, and disturbed/soft/loose soils.
- B. Temporary cut slopes – maximum slope of temporary cut slopes shall be determined by the Owner's Geotechnical Engineer.
- C. Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, and obstructions.
 - 1. Contact the Owner's Representative if excavated materials intended for fill and backfill include unsatisfactory soil materials and rock.
- D. Excavate for pavements, and walks to elevations and dimensions shown on the plans. Extend excavations for placing and removing concrete formwork, for installing services and other construction, and for inspections. Trim bottoms to required lines and grades to leave solid base to receive other work.
- E. Excavate utility trenches to indicated gradients, lines, depths, and invert elevations of uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit.
- F. Scarify, moisture condition, and recompact the upper 6 inches of subgrade soils. Uniformly moisture-condition to -1 to +3 percent of optimum and compact to at least 90 percent (95% in paved areas) relative compaction.
- G. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities.

- H. Contractor shall contact and coordinate with the Owner's Geotechnical Engineer to review the exposed subgrade surfaces for recommendations on suitability of exposed subgrade. The Geotechnical Engineer will evaluate the subgrade for additional material to be stripped based on in place soil density testing or proof rolling of the sub grade.
- I. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom with structural fill, without altering top elevation.
 - 1. Fill unauthorized excavations under other construction or utility pipe as directed by the Owner.
- J. Stockpile borrow materials and satisfactory soil materials, without intermixing, in shaped, graded, drained, and covered stockpiles. Stockpile soil materials away from edge of excavations and outside drip line of any remaining trees.
- K. Cut ditches/swales accurately to the cross sections and grades shown. Take care not to over-excavate ditches, and backfill excessive excavation to grade. Trim all roots, stumps, rock and other foreign matter from the sides and bottom of the ditches. Compact the surfaces of ditch slopes and bottom.
- L. Groundwater may be encountered within the planned excavation depth, including utility trenches. Dewatering may be necessary to accomplish required excavations. The Contractor is responsible for design, operation and maintenance of all temporary dewatering system subject to approval of the Engineer.

3.03 BACKFILLS AND FILLS

- A. Utility Trench Backfill: Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
- C. Fill: Place and compact structural fill as shown on the construction documents and as directed by the Geotechnical Engineer in layers to required elevations.
- D. Cut and fill slopes shall be constructed at slope gradient of 3:1 (horizontal to vertical) or flatter, unless approved by the Geotechnical Engineer in specific areas.
- E. Construct fill slopes by overfilling and cutting the slope to final grade. The Geotechnical Engineer shall observe in the field permanent cut slopes to verify that the exposed soil conditions are as anticipated.
- F. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to optimum moisture content. If compaction is not achieved, remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content and is too wet to compact to specified dry unit weight.
- G. Compaction: Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- H. Compact fill material according to the following (moisture content shall be from -1 to +3 percent optimum):

Location	Compacting Requirements	Test Method
Within 6 inches of Base of Asphalt Pavement or Concrete Slabs (including walkways)	95%	Caltrans Test Method Cal 216 and 231 or ASTM D1557
Top 12 inches of utility trenches within pavement areas	95%	ASTM D1557
Utility trenches beneath landscape areas	85% - 90%	ASTM D1557

- I. Grading: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated. Grade unpaved subgrades to tolerances of plus or minus 1 inch and pavements and paved areas to plus or minus 1/2 inch.
- J. Subbase and Base Courses: Under vehicle pavements, sidewalks, walkways and slabs, place subbase course on prepared subgrade. Place base course material over subbase. Compact to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry density according to ASTM D 1557, including the upper 6 inches of the soil subgrade supporting the subbase and/or the baserock as shown in the table in Section 3.03H.
- K. Building Areas: See Structural Drawings and Specifications.
- L. Fill in lifts allowing time for Contractors materials tester to test each lift for compaction.
- M. Compaction of fill materials by flooding, ponding, jetting or track walking will not be permitted.
- N. Provide 3" minimum topsoil (native or import) on all disturbed areas.

3.04 FIELD QUALITY CONTROL

- A. Inspections and Testing Agency: The Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Contractor shall allow testing agency to test and inspect subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.
- D. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- E. When test results indicate that compaction is not as specified, the material shall be re-compacted to meet specification requirements. Tests on re-compacted areas shall be performed to determine conformance with specification requirements.
- F. The Contractor shall allow adequate time for the Owner to perform the following tests:
 - 1. In-Place Densities
 - a. One test per 100 linear feet of roadway, or fraction thereof, of each lift.

- b. One test per 100 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.
- c. One test per 500 square feet, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.
- d. As directed by the Engineer or Owner.

3.05 PROTECTION AND DISPOSAL

- A. Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction.
- C. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
- D. Disposal: Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION

SECTION 312315: SHORING AND TRENCH SAFETY

PART 1 GENERAL

1.01 DESCRIPTION

A. Work included:

Shoring required for general safety, worker protection and protection of adjacent property from the hazards of caving ground. Includes:

1. Trench excavations
2. Structural excavations

B. Related requirements and work described elsewhere includes:

1. Requirements of General Conditions and Division 1 apply to all work in this Section.
2. Division 2 sections pertaining to site conditions, earthwork, trench excavation and backfill.

1.02 CONTRACTOR'S RESPONSIBILITIES FOR SAFETY

- A. The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons (including employees) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours.
- B. Safety provisions shall conform to U.S. Department of Labor (OSHA), the California Occupational Safety and Health Act, and all other applicable Federal, State, county, and local laws, ordinances, codes, the requirements set forth below, and any regulations that may be detailed in other parts of these Specifications.
- C. Where any of these are in conflict, the more stringent requirement shall be followed.

1.03 PERMIT

- A. For trenches or excavations of depth five feet or deeper, the Contractor shall obtain from the State Division of Industrial Safety a permit for such excavation; submit a copy of the permit to the Engineer, prior to initiating any work requiring said permit.

1.04 SAFETY ORDERS

- A. The Contractor shall have at the worksite, copies or suitable extracts of the Construction Safety Orders of Cal-OSHA.
- B. All work shall comply with the provisions of these and all other applicable laws, ordinances and regulations.

1.05 TRENCH SAFETY PLAN

- A. For trenches and excavations 5 feet or more in depth, the Contractor shall submit to Owner's

Representative a detailed plan design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazards of caving ground.

- B. Such plan shall be submitted at least 10 days before the Contractor intends to begin trenching or excavation work.
- C. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared, sealed and signed by a civil or structural engineer registered in California. Signed and sealed copies of calculations necessary to qualify the system shall be submitted also.
- D. Nothing herein shall be deemed to allow the use of shoring, sloping, or protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety.

1.06 CONTRACTOR'S SUPERVISOR

- A. The Contractor shall appoint a qualified supervisory employee who shall be responsible to determine the shoring system which shall be used depending on local soil type, water table, etc.
- B. This supervisor shall have a minimum of five years experience in the directing of such excavation and shoring work.

END OF SECTION

SECTION 321313: CONCRETE PAVING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. This work consists of furnishing, placing and finishing commercial grade concrete curbs, gutters, islands, traffic separators, driveways, walks, sidewalks, vehicle slabs, and miscellaneous surfaces.

B. Related Sections

1. Section 31 20 00 – Earth Moving

1.02 SUBMITTALS

- A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, dry-shake finish materials, and other data.
- B. Mill Test reports for each heat or melt of steel.
- C. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- D. Laboratory test reports for evaluation of concrete materials and mix design tests.

1.03 QUALITY ASSURANCE

- A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes.

1.04 WARRANTY

- A. Warranty shall provide for repairing and replacing, at no cost to Owner, joint sealants which fail because of leaking, crumbling, hardening, shrinkage, bleeding, splitting, sagging, staining or loss of adhesion within 2 years of substantial completion of work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.
- B. Store reinforcing material in manner to prevent excessive rusting and fouling with grease, dirt, or other bond-weakening coatings.
- C. Take precautions to maintain identification of reinforcing material after bundles are broken.

1.06 SCHEDULING AND SEQUENCING

- A. Plan erection and removal to permit proper sequence of concrete placing without damage to concrete.

1.07 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Temperature and Weather Requirements
 - 1. Do not place concrete when temperature or weather will affect performance or appearance of concrete.
 - 2. Minimum Ambient Temperature: 40°F
 - 3. Precipitation: None expected before concrete can be finished and protected.
- C. Substrate Requirements
 - 1. Do not place concrete on muddy or frozen substrate.
 - 2. Remove mud, dirt, and ice from formwork surface.

PART 2 PRODUCTS

2.01 FORMS

- A. Design of the formwork is the Contractor's responsibility.
- B. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Use flexible or curved forms for curves of a 100-foot or less radius.
- C. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Forms and Formwork Accessories
 - 1. Exposed Plywood Forms: Plyform, Class I or II.
 - 2. Lumber and Steel Forms: Smooth face lumber or steel
 - 3. Chamfer Strip: radius per drawings
 - 4. Steel Pipe Sleeves: ASTM A 53

5. Expansion and Isolation Joint Fillers: Granulated cork, 1/2-inch thick, ASTM D 1752, Type II
6. Form Joint Tape: Closed cell PVC foam with pressure sensitive adhesive on one side.

2.02 REINFORCING MATERIALS

- A. Reinforcing Bars and Tie Bars: ASTM A 615, Grade 60, deformed.
- B. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- C. Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- D. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.
 1. Use supports with sand plates or horizontal runners where base material will not support chair legs.
- E. Welded Wire Fabric: ASTM A185/A185M; in flat sheets or coiled rolls; unfinished.

2.03 CONCRETE MATERIALS

- A Cement: Portland conforming to ASTM C150 Type II
- B Coarse Aggregate: ASTM C33, clean hard, durable uncontaminated, washed, graded, cleaned and screened. Crusher run stone or bank run gravel will not be permitted. Maximum size not to exceed 75% of clear spacing between reinforcement.
 1. Size No. 467 (1 1/2" to No. 4) for footings, foundations, walls not less than 8" thick, slabs on grade or fill and steel reinforced slabs not less than 6" thick.
 2. Size No. 67 (3/4" to No. 4): for other site concrete, including curbs, gutters and sidewalks.
 3. Do not use coarse aggregates that contain substances that cause spalling.
- C Fine aggregate: ASTM C33, natural sand with minimum 15% passing No. 50 sieve, minimum 3% passing No. 100 sieve and fineness modulus 2.0 to 3.0.
 1. Do not use fine aggregates that contain substances that cause spalling.
- D Exposed Aggregate Finish Aggregates: Provide 1/8" – 1/4" smooth, clean, washed pea-gravel aggregate if specified on plans.
- E Water: Potable.

2.04 MINOR CONCRETE MIX

- A Mix concrete in accordance with ASTM C94. Use a homogeneous mixture throughout. Concrete to have 2,800 psi compressive strength at 28 days. Proportion to ACI 211.1 or to ACI 318 based on past strength performance. Cement content to be 470 pounds (5 sacks) per cubic yard, minimum.
- B Slump: 2" minimum to 4" maximum.

C Air Entrainment

1. 5 percent \pm 1 percent.

D Pumped concrete: Per ACI 304.

- E Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.05 EXPANSION JOINTS SEALANT

A Premolded Joint Filler:

1. Multi component polyurethane sealant
2. ASTM C920
3. Shore hardness 35 or greater

- B Acceptable products include Tremco THC-900 or equal.

- C Color to match adjacent concrete.

2.06 MISCELLANEOUS JOINT MATERIALS

- A Primer: Non-staining, as recommended by sealant manufacturer.

- B Backer rod shall be flexible and compressible, formed from

1. closed-cell foam polyurethane or
2. butyl rubber or
3. open and closed-cell polyurethane.

- C Bond breaker tape: polyurethane 4-6 mil thick, pressure sensitive.

2.07 RELATED MATERIALS

- A Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

- B Non shrink grout shall

1. be premixed compound.
2. be a blend of non metallic aggregate, cement, water reducing and plasticizing agents.
3. have compressive strength 2,400 psi in 2 days.
4. have compressive strength 7,000 psi in 28 days.

PART 3 EXECUTION

3.01 GENERAL

- A. All curbs, gutters and sidewalks construction shall conform to the plans and these specifications.

- B. Concrete for curbs, gutters driveways, walks, sidewalks, vehicle slabs, and miscellaneous items shown on the civil drawings shall be minor concrete mix, unless noted otherwise.

3.02 SURFACE PREPARATION

- A. Proof-roll prepare subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.03 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
- B. Check completed formwork and screeds for grade and alignment to following tolerances:
 - 1. Top of Forms: Not more than 1/8 inch in 10 feet.
 - 2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.
- C. Clean forms after each use and coat with form release agent as required ensuring separation from concrete without damage.

3.04 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities or replace units as required before placement. Set mats for a minimum 2 inch overlap to adjacent mats.

3.05 JOINTS

- A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.
- B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings.
 - 1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.

2. Locate expansion joints at intervals of 4 feet, unless indicated otherwise.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints.
1. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
 2. Provide tie bars at sides of paving strips where indicated.
- D. Expansion Joints: Form expansion joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 20 feet, unless indicated otherwise.
 2. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or slip joint filler sections together.
 4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
 5. Cure sealants in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Protect sealants during construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at time of Final Completion.
- E. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.06 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work. Notify Owner's Representative minimum 24 hours prior to commencement of concreting operations.
- B. Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at required finished elevation and alignment.
- C. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- D. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- E. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

1. When concrete placing is interrupted for more than 1/2 hour, place a construction joint.
- G. Place concrete using methods which prevent segregation of the mix. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices. Do not break or interrupt successive pours so that cold joints occur.
 - H. Place concrete to required lines and grades shown on drawings. Grading between required lines and points where elevations are given to be smooth and uniform. Slope finish grades to drain surface water away from buildings unless otherwise shown on drawings. Variations from true plane for both horizontal and vertical surfaces of exposed concrete are not to exceed 1/8" in 10'-0".
 - I. Screed paved surfaced with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
 - J. No cement water or mortar shall be added to the surface during the finishing operation.
 - K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and joining as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete.
 - L. Slip-Form Pavers: When automatic machine placement is used for paving, submit revised mix design and laboratory test results that meet or exceed requirements. Produce paving to required thickness, lines, grades, finish, and jointing as required for formed paving. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
 - M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
 - N. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Do not place concrete when air temperature is expected to fall below 45° F.

3.07 CONCRETE FINISHING

- A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true places within a tolerance of 1/4 inch in 10 feet as determined by a 10 foot long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
 1. Medium-to-Fine Textured Broom Finish: Draw a soft bristle broom across concrete surface perpendicular to line of traffic to provide a uniform fine line texture finish.
- B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to radius shown on drawings. Repeat tooling of edges and joints after applying surface finishes.

Eliminate tool marks on concrete surfaces.

3.08 FINISHING VERTICAL SURFACES

A. Finishing Concealed Vertical Concrete Surfaces

1. Provide rough form finish, complying with ACI 301, Paragraph 10.2.1.
2. Remove fins and projections exceed $\frac{1}{4}$ inch in height and patch tie holes and surface defects.

B. Finishing Exposed Vertical Concrete Surfaces

1. Forms should be stripped and exposed surface finished the same day as the concrete is placed.
2. Provide smooth form finish complying with ACI 301, Paragraph 10.2.2.
3. Remove fins and projections and patch tie holes and surface defects.
4. Provide smooth rubbed finish for exposed curb and walk edges, complying with ACI 301, Paragraph 10.3.1.

3.09 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with the following materials:
 - a. Water
 - b. Continuous water-fog spray
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 JOINING NEW TO EXISTING CONCRETE

- A. Construct suitable connections between new and existing concrete where existing driveways, walks, and other structures are cut back to permit the new construction or where the new construction abuts the existing concrete. Unless shown or directed otherwise, furnish and place minimum 12 mm (1/2 inch) thick performed expansion joint filler between new and existing concrete.

3.11 FIELD QUALITY CONTROL TESTING

- A. The Owner may employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - 2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pours of each type of concrete.
 - 3. Air Content: ASTM C 231, pressure method.
 - 4. Concrete Temperature: ASTM C 1064.
 - 5. Compression Test Specimens: ASTM C 31.
 - 6. Compressive-Strength Tests: ASTM C39.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this section.
- B. Drill test cores where directed by the Owner's Representative when necessary to determine magnitude of cracks or defective, or does not meet the requirements of this section.
- C. Protect concrete from damage. Exclude traffic from paving or at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.
- E. Barricade area containing fresh concrete slabs, stairs, ramps, curbs, and walks for 24 hours minimum.
- F. Cover fresh concrete with 1/2-inch thick, plywood or oriented strand board for 48 hours minimum where exposed to public, pedestrian, and animal traffic.
- G. Protect concrete from shrinkage crack damage until protected by curing procedure.
- H. Protect concrete from physical damage or reduced strength caused by air temperatures below 45°F during curing period, as recommended in ACI 306R.
- I. Protect concrete from physical damage or reduced strength caused by air temperatures above 75°F during curing period, as recommended in ACI 305R.

3.13 REPAIRING EXPOSED VERTICAL CONCRETE SURFACES

- A. Clean, dampen, and brush-coat concrete patch areas with acrylic or epoxy bonding agents.
- B. Fill honeycomb voids and rock pockets with patching compound.
- C. Compact and screed patching compound in place as recommended by patching compound manufacturer.
- D. Finish exposed concrete patches to match adjacent surfaces.
- E. Strike off excess patching compound at exposed surface.
- F. If defects in color and texture of concrete surface cannot be repaired, remove and replace the defective concrete.

END OF SECTION

SECTION 334100: STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.06 DESCRIPTION

A. Section Includes:

1. Storm Drainage Piping
2. Downspout Connections
3. Storm Drain Cleanouts

B. Related Sections:

1. Section 31 20 00 - Earth Moving

C. Requirements of General Conditions and Division 1 apply to all work in this Section.

1.07 SUBMITTALS

A. Product Data: Submit data indicating product and product accessories.

B. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

1.08 QUALITY ASSURANCE

A. Perform Work in accordance with Local standards.

1.09 COORDINATION

A. Coordinate the Work with termination of storm sewer connection outside building, trenching, and connection to foundation drainage system.

PART 2 PRODUCTS

2.01 STORM DRAINAGE PIPING AND FITTINGS

A. 6" and larger: ADS N-12 Dual Wall Corrugated Pipe, bell and spigot joint.

1. Rubber gasket meeting ASTM F477.

B. Less than 6": PVC meeting ASTM D2729 or ABS piping, solvent weld.

2.02 BEDDING AND COVER MATERIALS

- A. Bedding: Bedding as specified in Section 31 20 00.
- B. Cover: Cover as specified in Section 31 20 00.
- C. Backfill: Backfill as specified in Section 31 20 00.

PART 3 EXECUTION

3.01 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with Native material.
- B. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.02 BEDDING

- A. Excavate pipe trench in accordance with Section 31 20 00 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.03 INSTALLATION - PIPE

- A. No pipe shall be laid until the trench subgrade and bedding have been inspected and approved.
- B. Laying of lines shall begin at the lowest point in the direction of flow. All piping, fittings, and accessories shall be assembled per manufacturer's recommendations. Pipe deflections shall be kept to a minimum, any deflection in piping shall be per manufacturer's requirements.
- C. Before lowering pipe into the trench, the pipe shall be inspected. Cracked, chipped, broken, or otherwise defective pipe will be rejected and removed from the job site.
- D. Where sewer lines are being crossed, pipelines of 20 foot lengths shall be used with the length centered to provide 10 feet of distance from the sewer line to the nearest joint.
- E. Install site storm drainage system piping to 5 feet of building. Connect to building storm drainage system.
- F. Install Work in accordance with Local standards.

3.04 INSTALLATION - CLEANOUT

- A. Cleanouts shall be constructed as shown on the Plans.
- B. The end of the bottom wye shall be tightly plugged with mechanical plug if necessary.
- C. The lower wye section shall be encased in concrete to prevent breakage from ditch settlement.
- D. The riser shall be braced in place and properly compacted.
- E. The frame shall be insulated from riser pipe with a flexible asphalt felt or rubber connection so as to exclude water and to prevent direct traffic bearing against riser section.
- F. Cleanout covers and the surrounding concrete ring shall be raised to an elevation slightly above the surrounding road surface so that rainfall does not flow onto the cleanout cover.

3.07 PROTECTION OF FINISHED WORK

- A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
 - 1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
 - 2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION