SPECIFICATIONS
INDEX

SECTION 02270 – TEMPORARY SOIL EROSION CONTROL

PART 1 – GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Submit three (3) sets of the erosion control materials for approval by the Engineer. Furnish all labor, materials, services, equipment and related items necessary to implement the temporary erosion control measures, submitted separately, as required by these specifications and as ordered by the Engineer during the life of the contract to control water pollution through the use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

A. Temporary erosion and siltation control measures as described herein shall be applied to any erodible material within this project, including local material sources and work areas.

B. The Contractor shall be responsible for providing the necessary erosion control measures which are shown on the plans or which may be ordered by the Engineer. All grading operations shall be performed in conformance with the applicable provisions of the "Water Pollution Control and Water Quality Standards" contained in the "Public Health Regulations," State Department of Health.

C. The Contractor shall be responsible for promptly (next day after storms) removing all silt and debris resulting from his work and deposited in drainage facilities, roadways, neighboring lands, and other areas.

1.03 RELATED WORK IN OTHER SECTIONS

Site Earthwork .....Section 02210

PART 2 – PRODUCTS

2.01 MATERIALS

A. Mulches: To be bagasse, hay, straw, fiber mats, netting, wood cellulose, bark, wood chips, or other suitable material acceptable to the Engineer and shall be reasonably clean and free of noxious weeds and deleterious materials.

B. Slope Drains: To be constructed of fiber mats, plastic sheets, or other materials acceptable to the Engineer.

C. Catch Basin Inlet Filters: "True Dam" sediment filter (by Dandy Products, Inc.) or approved equal.

PART 3 – EXECUTION

3.01 TEMPORARY EROSION CONTROL

A. The Construction Manager has the authority to limit the surface area exposed by clearing and grubbing and to limit the surface area exposed by excavation, borrow and fill operations. The Construction Manager may also direct the Contractor to provide immediate, permanent, or temporary pollution control measures to prevent contamination of streams, drainage channels and pipes, roads, neighboring lands, and other areas.

Except for specified measures which may be shown on the plans, the Contractor shall determine the appropriate erosion control measures to use. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, and slope drains, and the use of temporary mulches, mats, and grassing, or the construction and use of other control devices or methods as necessary to control erosion.

B. The Contractor shall incorporate all erosion control measures shown in the plans. The erosion controls may be modified as necessary to adjust to conditions that develop during construction. All modifications are subject to approval by the Engineer.

C. The Contractor shall limit the surface area exposed by grubbing, stripping of topsoil, and grading to that which is necessary for him to perform the next operation and which is within his capability and progress in keeping the finish grading, mulching, grassing, and other such pollution control measures current.

The grubbing of the vegetative root mat and stumps and the stripping of topsoil shall be confined within the limits of grading which can be actively and continuously prosecuted within 15 calendar days. The area to be graded shall be limited to the minimum area necessary to accommodate the Contractor's equipment and work force and shall not at any time exceed 15 acres, unless otherwise stated on plans, without prior approval of the Construction Manager.

Any area remaining bared or cleared for more than 10 calendar days and which is not within the limits of active construction shall be immediately hydro-mulch seeded or remedied as directed by the Engineer at the Contractor's expense without cost to the Department. All areas where finish grading has been completed shall be grassed within three calendar days after the completion of grading for that area.

D. The Contractor shall, at the end of each work operation in any one day, shape the earthwork in such a manner as to control and direct the runoff to minimize the erosion of soils. He shall construct earth berms along the top edges of embankments or along the property line with adjacent properties, streams and

water channels, to intercept any runoff. Temporary slope drains shall be provided to carry runoff from the top of cuts and fills. Temporary facilities for controlled discharges shall be provided for runoff impounded, directed, or controlled by project activities or by any erosion control measure employed.

E. Cut slopes shall be shaped, topsoil added if necessary, and planted as the work progresses. In no case shall the exposed surface be greater than 15 feet in height. Whenever major excavation is suspended or halted and the slope is bared for more than 15 consecutive days, the exposed surfaces shall be hydro-mulch seeded or protected as directed by the Engineer at the Contractor's expense without cost to the Department of Hawaiian Home Lands.

Fill slopes shall be finished as specified and in accordance with the requirements outlined for cut slopes above.

F. Construction of berms, cofferdams, or other such construction in or near the vicinity of streams, ponds, waterways, or other bodies of water shall be with approved materials.

G. The temporary erosion and siltation control measures outlined in these specifications are minimum requirements and shall not preclude the provision of any additional measures which the Contractor may deem necessary. Damages caused by the erosion of soils and the pollution of downstream areas shall be the responsibility of the Contractor and all costs for repairing, correcting, replacing and cleaning damaged or polluted facilities shall be borne by the Contractor.

END OF SECTION

SECTION 02444 – CHAIN-LINK FENCING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: This Section includes the installation of new fencing and construction of walkways connecting the existing Kanehili Subdivision and Kualakai Parkway sidewalks. Work shall be governed by Section 607 – Chain Link Fences And Gates of the DOT Standard Specifications, and DOT Standard Plan D-03. Salvaged fence material is stored in DHHL Warehouse in Kalaeloa (see map below).

1.03 GENERAL REQUIREMENTS

A. Submittals: Submit the following in accordance with the Special Provisions.

1. Shop Plans: Submit shop plans for approval.

PART 2 - PRODUCTS

2.01 MATERIALS: All fence material, with physical and chemical characteristics equal to or better than those required herein.

A. Fabric: Steel chain-link fabric. The top edge of all fence fabric shall be knuckle finished and the bottom shall be barbed salvage.

B. Posts and rails: The base material for the manufacture of steel pipe used for posts, braces, top rail braces, top rail, and gate frames shall conform to ASTM A120. Sizes of posts, rails and braces shall be called for in the DOT Standard Specifications or as indicated on the plans.

C. Fittings, Wires, and Rods: All fittings and hardware shall be galvanized. Couplings shall be of the outside sleeve type and at least 7 inches long. Tension wires shall be at least 7-gage galvanized coil spring wire. Ties to fasten the fabric to posts, rails and gate frames shall be not less than 12-gage galvanized steel.

Truss of tension rods used in trussing gate frames and line posts adjacent to end corner, slope, or gate posts shall be adjustable 3/8-inch galvanized steel rod.

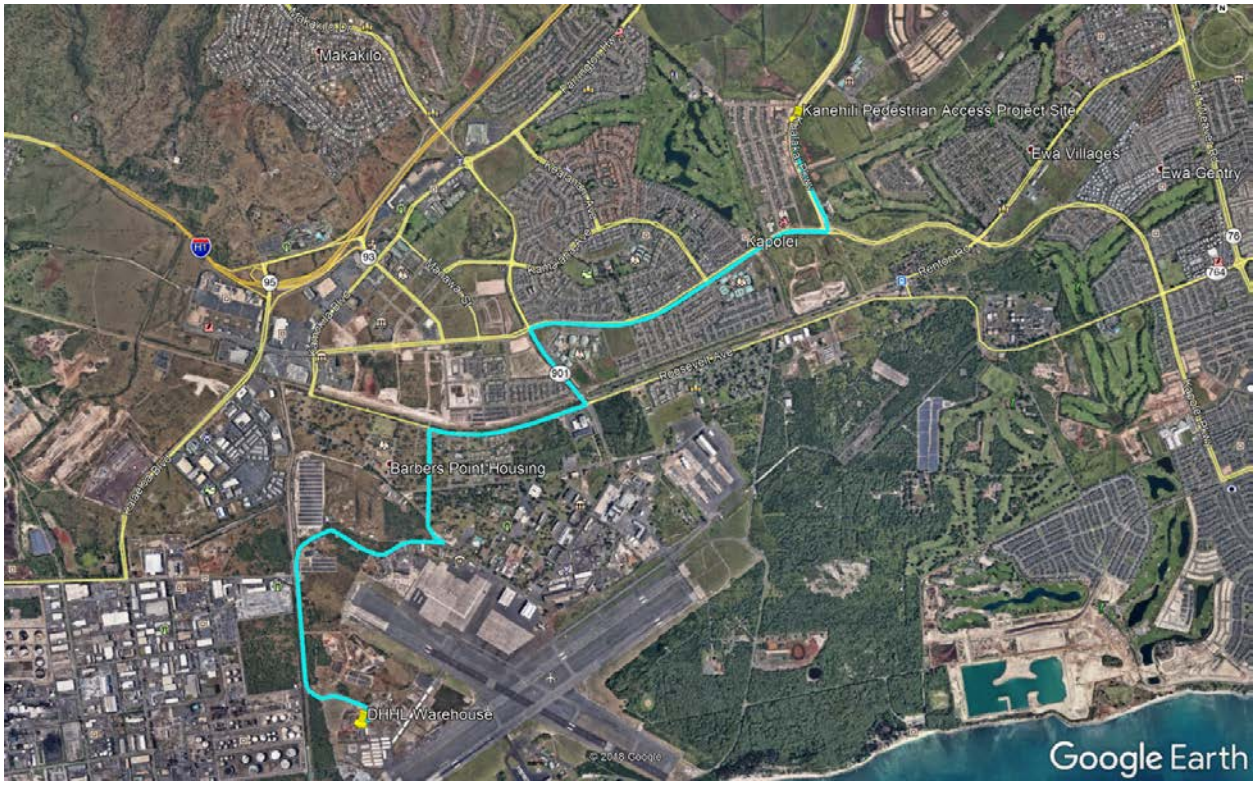
D. Repair of Galvanized Surfaces: All surfaces cut, broken, burned, or abraded shall be coated with “Galvalloy,” “Galvicon,” or an approved equal.

E. Concrete for footings shall be “Class D” as specified in Section 601-Structural Concrete of the DOT Standard Specifications.

PART 3 - EXECUTION

3.01 HAULING

A. Salvaged chain link fence material (approximately 1,875-lf) is stored in DHHL Warehouse. The location is approximately 5.2 miles away from the project site.



3.02 INSTALLATION

A. Line posts shall be spaced at not more than 10-foot intervals and shall be placed vertically plumb.

B. All posts shall be set in "Class D" concrete footing as shown on the plans. The top of the footings shall be crowned ½-inch high to drain water away from the post.

C. End, corner, and slope posts shall be braced to the nearest line post or posts with diagonal braces with turnbuckles. Change in line or grade where the angle of deflection is 30 degrees or more shall be considered as corner and slope points, respectively; and corner or slope posts shall be installed at these points. Unless specified, all fences shall be installed with top and bottom tension wire, and diagonal braces per DOT Standard Plan D-03 .

3.03 CLEANUP: Clean up and remove all debris accumulated from construction operations from time to time, when and as directed by the Construction Manager. Upon completion of the construction work and before final acceptance of work, remove all surplus materials, equipment, etc.

END OF SECTION

SECTION 02520 – CONCRETE CURBS, GUTTERS, SIDEWALKS AND CURB RAMPS

PART 1 – GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Furnish all labor, materials, tools, equipment and related items necessary to complete, in place, concrete sidewalks, and ramps in conformity with the dimensions, profiles, sections and details shown on the construction plans.

1.03 APPLICABLE SECTIONS: Work shall be in accordance with the following sections of the DPW Standard Specifications, except as amended on the plans and/or in the specifications herewith:

Portland Cement Concrete .....Section 39
Sidewalk.....Section 42
Reinforcing Steel .....Section 48

PART 2 – PRODUCTS

2.01 MATERIALS: Materials shall conform to the sections of the Standard Specifications noted hereinbefore.

PART 3 – EXECUTION

3.01 INSTALLATION: The Contractor shall be responsible for precisely laying out the sidewalks and ramps as shown on the construction plans in accordance with the sections of the Standard Specifications noted hereinbefore.

3.02 QUALITY CONTROL FOR SIDEWALKS AND RAMPS: The Contractor shall install sidewalks and ramps to the dimensions and grades shown in the construction. Installation of the sidewalks and ramps shall be within the tolerance range shown in the table below.

CONSTRUCTION TOLERANCE		
Surface Slope per Plans	Allowable Slope Tolerance	Allowable Flatness Tolerance
Less than 5%	+0.9% max.	1/4” max. gap
5% - 8.3%	+1.2% max.	3/8” max. gap
Greater than 8.3%	+1.5% max.	1/2” max. gap

For Horizontal Plan Measurements, Length of Intended Dimension	Horizontal Tolerance Allowed
Less than 12”	+1/4” or -1/4”
12” - 36”	+3/8” or -3/8”
Greater than 36”	+1/2” or -1/2” in each 10’

The method of measuring the surface requires a 24” long digital level to be placed so, when set on the measured sloped surface; it reads the steepest slope of any part of the measured surface.

The method of measuring flatness requires a 24” long level to be placed so it is centered over any trough or balanced on a ridge with equal gap at both ends of the level. Measure the gap under the level at troughs and at the end of the level at ridges.

Horizontal measurements are to be made with a steel tape.

3.03 MEASUREMENT AND PAYMENT FOR SIDEWALKS AND RAMPS:

The price includes full compensation for excavating; backfilling; installing reinforcing steel, concrete expansion joint materials, construction joints, special drop curbs, bed course material and detectable warning devices; and furnishing labor, materials, equipment, tools and incidentals necessary to complete the work.

END OF SECTION

SECTION 02840 - TRAFFIC SIGNS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Furnish all materials, labor and equipment required to accomplish the installation of all traffic signs as indicated on the plans and specified herein.

1.03 SUBMITTALS: A list of component parts indicating the description of each part, the material from which it has been fabricated (including ASTM numbers where applicable) and a statement certifying compliance to the material specification.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Asbestos Prohibition: No asbestos containing materials or equipment shall be used under this section. The Contractor shall ensure that all materials and equipment incorporated in the project are asbestos-free.

B. Materials shall be in accordance with Section 631 -Traffic Control Regulatory, Warning, and Miscellaneous Signs of the State Standard Specifications, except as shown on the plans or amended in the specifications herewith.

PART 3 - EXECUTION

3.01 INSTALLATION: Installation of signs shall be in accordance with Section 621 - Traffic Control Signs of the State Standard Specifications, except as shown on the plans or amended in the specifications herewith.

END OF SECTION

DIVISION 3 - CONCRETE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Cast-in-place concrete and reinforcing steel for concrete slabs and footings. Work shall be in conformance to Section 39 - Portland Cement Concrete and Section 48 - Reinforcing Steel of the DPW Standard Specifications.

1.03 QUALITY ASSURANCE

A. Codes: Comply with the provisions of the following codes, specifications and standards, except as otherwise shown or specified.

1. Concrete Reinforcing Steel Institute, “Manual of Standard Practice”

2. ACI 318 “Building Code Requirements for Reinforced Concrete”

3. ACI 304, “Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete”

4. ACI 311, “Recommended Practice for Concrete Inspection”

B. Concrete Testing Service

1. The Contractor will employ, at his own expense, a testing laboratory experienced in the testing of concrete materials and mixes to perform material evaluation tests. This laboratory shall be the official testing agency for this project.

2. Materials and installed work may require testing and retesting, as directed by the Construction Manager, at any time during the progress of the work. Allow free access to material stockpiles and facilities at all times. Test, if not specifically indicated to be done at the Department’s expense, including the retesting of rejected materials and installed work, shall be done at the Contractor‘s expense.

3. Tests shall comply with ASTM Standards whenever applicable.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I

B. Aggregates: ASTM C33

1. Fine Aggregates: Clean, sharp, natural sand or rocksand as manufactured locally free from loam, clay, lumps or other deleterious substances.

2. Coarse Aggregates: Clean, uncoated, processed aggregate containing no clay, mud loam or foreign matter.

C. Reinforcing:

1. ASTM A615-51, Grade 60
2. ASTM A185, galvanized welded wire fabric

2.02 CONCRETE ADMIXTURES

A. Air-Entraining Admixtures: ASTM C260

B. Water-Reducing Admixtures: ASTM C494, Type D

C. Set Control Admixtures: ASTM C494, as follows:

1. Type B, retarding
2. Type D, water-reducing and retarding

D. Calcium Chloride: Do not use calcium chloride in concrete.

2.03 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type of concrete; 28-day compressive strengths shall be 3,000 psi (Class A); 2,500 psi (Class B); 2,000 psi (Class C) and in the Standard Specifications.

B. Proportion mixes by either laboratory trial batch or field experience methods, using materials to be employed on the project for each class of concrete required.

C. Unless otherwise noted, Class A concrete shall be used for all electrical ducts, reaction blocks, slabs and walls; Class B concrete for curb and gutter, and sidewalk applications.

2.04 JOINT MATERIALS

A. Premolded Joint Fillers: Premolded material of specified thickness composed of fiberboard impregnated with asphalt.

B. Joint Sealing Compound: Tremco Butyl Sealant or approved equal.

C. Epoxy-Resin Bonding Agent: Two component, mineral filled epoxy polysulfide polymer complying with FS MMM-G-650, Type I or Type II, Grade A.

2.05 MOISTURE BARRIER: Provide moisture barrier over prepared base material where shown on plans. Use only materials which are resistant to decay when tested in accordance with ASTM E154, as follows: Polyethylene sheet not less than 6 mils thick.

2.06 CURING MATERIALS

A. Curing compounds for membrane curing shall conform to ASTM C309.

B. Liquid Curing - Hardening Compound: Aqueous solution of sodium silicate with non-acid penetrating agent, reacting chemically with free lime in concrete to form a hard, non-dusting surface which will not inhibit bonding with future finishes. Products offered by manufacturers to comply with the requirements for liquid curing hardening compounds include the following:

1. Demicon: Castle Chemical Corp.
2. Eucosil: Euclid Chemical Co.
3. Chem Hard: L&M Construction Chemicals

2.07 EPOXY GROUT: Manufactured grout with built-in bonding material subject to approval of the Engineer.

PART 3 - EXECUTION

3.01 PREPARATION: Pre-Placement Inspection -- Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts involved in ample time to permit the installation of their work; cooperate with other trades in setting such work, as required.

3.02 CONCRETE PLACEMENT

A. General: Place concrete in compliance with the practices and recommendations of ACI 304 and as herein specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to

cause the formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as herein specified. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.

2. Screen concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.

3. Do not use concrete which becomes non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign materials. Do not use retempered concrete. Remove rejected concrete from the project site and dispose of it in an acceptable location.

B. Concrete Conveying

1. Handle concrete from the point of delivery and transfer to the concrete conveying equipment and to the locations of final deposit as rapidly as practicable by methods which will prevent segregation and loss of concrete mix materials.

2. Provide mechanical equipment for conveying concrete to ensure a continuous flow of concrete at the delivery end. Provide runways for wheeled concrete conveying equipment from the concrete delivery point to the locations of final deposit. Keep interior surfaces of conveying equipment, including chutes, free of hardened concrete, debris water, and other deleterious materials.

C. Placing Concrete Slabs

1. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is completed.

2. Consolidate concrete during placing operations using mechanical vibrating equipment, so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

3. Bring slab surfaces to the correct level with a straightedge and strike off. Use bull floats or darbies to smooth the surface, leaving it free of humps or hollows. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to beginning finishing operations.

4. Maintain reinforcing steel in the proper position continuously during concrete placement operations.

D. Dowel installation where shown. Prepare for bonding of dowels and anchors to existing concrete by using drilled holes and a two-component epoxy which is manufactured for this specific purpose. Install in accordance with manufacturer's requirements to develop strength of dowels.

3.03 CONCRETE SLAB FINISHES

Slabs: Finish by tamping the concrete to force aggregate away from the surface and screen at the proper level. Float the surface and lightly trowel. When concrete has set sufficiently to ring under the trowel, give a second troweling to produce a smooth, dense surface free from trowel marks and sweeps, air bubbles or other imperfections of troweling.

3.04 CONCRETE CURING AND PROTECTION

A. General

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperature, and maintain without drying at relatively constant temperature for the period of time necessary for hydration of the cement and proper hardening of the concrete.

2. Start initial curing as soon as free moisture has disappeared from the concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 72 hours.

3. Begin final curing procedures immediately following initial curing and before the concrete has dried. Continue final curing for at least 7 days and in accordance with ACI 301 procedures. Avoid rapid drying at the end of the final curing period.

B. Curing Methods

1. Perform curing of concrete by moist curing, or by moisture retaining cover curing, by membrane curing, or by combinations thereof, as herein specified for a continuous period of 14 days.

2. Liquid Curing-Hardening Compound: Apply to horizontal surfaces when concrete is dry to touch by means of power spray, hand spray, or hair broom in accordance with manufacturer's directions.

C. Curing Unformed Surfaces

1. Initially cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by moist curing, whenever possible.

2. Moist cure surfaces to receive fluid applied waterproof membranes and composition flooring. Do not cure by membrane curing or curing compounds.

3. All slabs not receiving a finish floor material shall receive a liquid curing-hardening compound in accordance with the manufacturer's recommendations.

4. Final cure unformed surfaces, unless otherwise specified, by any of the methods specified above, as applicable.

D. Protection from Mechanical Injury: During the curing period, protect concrete from damaging mechanical disturbances including load stresses, heavy shock, excessive vibration, and from damage caused by rain or flowing water. Protect all finished concrete surfaces from damage by subsequent construction operations.

3.05 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures from the passage of work by other trades, unless otherwise shown or directed, after the work or other trades is in place. Mix, place and cure concrete as herein specified, to blend with in-place construction. Provide all other miscellaneous concrete filling shown or required to complete the work.

B. Epoxy Adhesive: For application on corrective work where the ordinary methods of remedy are deemed inadequate by the Engineer. Type of adhesive shall be subject to the approval of the Engineer.

3.06 CONCRETE SURFACE REPAIRS

A. Repair of Unformed Surfaces

1. Test unformed surfaces such as monolithic slabs, for smoothness and to verify surface plane to the tolerance specified for each surface and finish. Correct low and high areas as herein specified.

2. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having the required slope. Correct high and low areas as herein specified.

3. Repair finish unformed surfaces that contain defects which adversely affect the durability of the concrete. Surface defects, as such, include cracks in excess of 0.03 inch wide or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.

4. Correct high areas in unformed surfaces by grinding, after the concrete has cured sufficiently so that repairs can be made without damage to adjacent areas.

5. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to the Engineer.

B. Finishing of Formed Surfaces

1. Joint marks and fins shall be removed and surfaces left smooth and dense. Tieholes and honeycombing shall be repaired with cement and sand mortar.

2. Exposed concrete surfaces shall be vigorously and thoroughly rubbed with a sand cement mortar the consistency of a thick paint to fill all voids and provide a smooth surface. There shall be no discernible thickness of mortar on the surface.

END OF SECTION

SECTION 05520 - HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of work.

1.02 WORK INCLUDED: This Section includes the installation of new stainless steel pipe handrails, rails, balusters, and fittings.

1.03 REFERENCES

A. The latest publications listed below form a part of this specification to the extent referenced. The publications are referred in the text by the basic designation only.

B. American Society of Testing and Materials (ASTM)

1. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

2. ASTM A 123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

3. ASTM A 153 - Zinc-Coating (Hot-Dip) on Iron and Steel Hardware.

4. ASTM A 167 - Stainless and Heat-Resisting Steel Chromium-Nickel Steel Plate, Sheet, and Strip.

5. ASTM A 276 - Stainless and Heat-Resisting Steel Bars and Shapes.

6. ASTM A 312 - Seamless and Welded Austenitic Stainless Steel Pipe.

7. ASTM F 593 - Stainless Steel Bolts, Hex Cap Screws, and Studs.

8. ASTM F 594 - Stainless Steel Nuts.

9. ASTM F 844 - Washers, Steel, Plain (Flat) Unhardened for General Use

C. American Welding Society (AWS)

AWS D1 .1 - Structural Welding Code – Steel

D. Commercial Index Descriptions (CID)

CID A-A-1924 - Shield, Expansion (Self Drilling Tubular Expansion Shell)

E. National Association of Architectural Metal Manufacturers (NAAMM)

NAAMM PR - Pipe Railing Manual

1.04 DESIGN REQUIREMENTS

A. Railing assembly, wall rails, and attachments shall comply with O.S.H.A. Specifications 1910-23, and shall meet all specified and specific loading requirements.

B. Handrail shall resist a concentrated load on 250lbs in any direction at any point of the top of the rail or 20lbs per foot applied horizontally to top of the rail whichever is more severe.

C. Stainless steel rails are 316 alloy stainless steel schedule 40 pipe.

1.05 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

B. Certificates of Compliance: Submit certificates of conformance for the following:

1. Steel pipe
2. Stainless steel pipe, shapes, plates and fasteners.
3. Bolts, nuts, and washers

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Rails and Posts: Stainless Steel Pipe ASTM A 790, Schedule 40.

B. Stainless Steel Shapes: ASTM A 276, Type 316 alloy.

C. Non-Shrink Metallic Grout: ASTM C 1107, grout shall be nonmetallic.

D. Anchors and Fasteners:
   1. Stainless Steel Bolts: ASTM F 593, Type 316 alloy.
   2. Stainless Steel Nuts: ASTM F 594, Type 316 alloy.
   3. Stainless Steel Washers: fabricated of Type 316 stainless steel conforming to ASTM A 276 to the applicable requirements of ASTM F 844.

E. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

F. Stainless Steel Pipe Railings and Handrails: Pipe railings and handrails shall resist a concentrated load of 250 pounds in any direction at any point of the top of the rail or 20 pound per foot applied horizontally to top of the rail, whichever is more severe. Provide the size of rail and post NAAMM PR. Steel pipe rails shall conform to ASTM A 790, Schedule 40. Steel rails shall be 1-1/2-inch nominal size, radius corners, weld post to top rail and intermediate rails, welded joints ground smooth, free from all cracks, burrs, sharp edges, and other defects. Secure pipe railing as indicated.

G. Finish: Anodized to Dark Bronze color.

2.02 FABRICATION

A. Fit and shop assemble components in largest practical sizes, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

E. Continuously seal joined pieces by intermittent welds and continuous welds.

F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

G. Accurately form components to suit stairs and landings, to each other and to building structure.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete and or embedded in masonry with setting templates, to appropriate Sections.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Provide anchors, plates angles required for connecting railings to structure. Anchor railing to structure.

D. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 ERECTION TOLERANCES

A. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION