DIVISION 2 - SITEWORK

Section 02100 - Demolition

Introduction

This section shall be used by the consultant to accurately define the scope of the demolition effort required for the project. Whenever possible a demolition plan shall be created to graphically show the extent of the demolition work.

The scope of the demolition plan should be carefully reviewed and coordinated with Risk Management to ascertain the existence of any hazardous materials requiring special attention. Most laboratory equipment will require decontamination before demolition and/or removal, i.e., fume hoods, laminar flow enclosures, clean benches, biological safety cabinets, etc.

Provisions shall be made in the documents to require that all demolition work be performed without disruption to adjacent occupied areas, i.e., off hours work. Only when the anticipated demolition work will not present a disruption to the user or occupant can the assumption be made that it can be conducted at any time.

Demolition work is usually associated with trash and dust. Appropriate provisions shall therefore be made to address mitigation procedures in the demolition work.

The demolition plan shall identify all materials/equipment, etc., which are to be reused and/or salvaged by either the University or the Contractor. Please keep in mind that all equipment and building material is ultimately the property of the University of Arizona and only when its salvage cost exceeds is usable value is it to be considered unwanted. This determination can only be made by the University of Arizona.

A complete investigation of the area(s) shall be performed so that all existing aspects and elements affected by the project are either removed under the demolition plan or incorporated into the new work with the installation drawings, i.e., existing/abandoned outlets, t-stats etc.

Part 1 - General

- Other than items which are to be reused there are basically two groups of salvageable material presented with nearly all projects. Care must be exercised when handling all salvageable material so as to maintain its value.

- Items which are **always** salvaged by the University.

  - LED exit lights
  - Chalk/White boards
  - EMCS equipment
  - Meters (all kinds)
  - Door hardware
  - Drinking fountains
  - Window blinds
  - Backflow preventers
  - Fire alarm devices
  - Simplex equipment
  - Lab fixtures

- Items which the University may elect to salvage. Depending on the item the University will determine on a case by case basis whether salvage is warranted. The following is a representative, but not conclusive, list of items in which salvage may be considered.

  - Wood/HM doors
  - Electrical panels
  - Mechanical equipment
  - Ceiling diffusers
  - Projection screens
  - Mirrors
  - Irrigation equipment
  - Refrigeration equipment
  - Lab equipment (hoods)
  - Plumbing fixtures
  - Casework
  - Disconnect switches
  - Elevator equipment
  - Soap/Paper dispensers
  - Clocks
  - Access doors
  - Landscape plantings
  - Electrical light fixtures
  - Electrical equipment
  - Starters
  - Windows
  - Transformers
  - Thermostats
  - Shelving
  - HVAC mixing boxes

- Prior to finalizing the construction documents the Architect shall conduct a site meeting with the appropriate Facilities Management personnel and determine precisely what items are to be salvaged. The documents should then clearly identify what is to be salvaged, by whom and where it is to be delivered to or stored. Options include but are not limited to:

    - Removal and transport by contractor.
    - Removal by contractor and transport by UA.
    - Removal and transport by UA.
    - Transportation destinations include the Facilities Management compound, 22nd St. warehouse (Material Management surplus property sales), Sunnyside storage yard or any other location determined during the site meeting.

- Items which are to be surplused and delivered to the 22nd St. warehouse must be accompanied with a completed Request for Property Disposal Form from the Office of Material Management.

- Whenever the UA is to participate in either the removal or transportation of salvage materials a time frame and contact person shall be identified and referenced in the documents.

- All items encountered which contain an affixed University of Arizona Inventory Control tag ("A" tag) require special procedures for dispersal. Consequently these items should be brought to the attention of the UA Project Manager. Items which contain an "A" tag are part of the registered inventory of a particular UA department or unit and dispersal must be coordinated through their respective business manager.

- Fluorescent light fixture tubes and certain light fixture ballasts must be separately disposed of in accordance with applicable environmental regulations. Consequently, the removal and disposal of existing fluorescent light fixtures shall include the following:

    - All fluorescent tubes shall be removed and packaged by the Contractor in cartons supplied by the Facilities Management Electric Shop. The number of tubes in each carton shall be clearly marked on the outside of the carton. Contractor to deliver packaged tubes to the Facilities Management Electric Shop for disposal.
    - Fixture ballasts not clearly marked as containing “No PCB’s” shall be removed by the Contractor and after short clipping all wires place them in a metal drum supplied to the jobsite by University of Arizona Risk Management. After completion of the demolition effort University of Arizona Risk Management will remove the drum for disposal offsite. Apportioned disposal costs are then to be charged to the project.

Part 2 - Products

- No discussion.

Part 3 - Execution

- All electrical services discontinued with the demolition effort shall be properly "tagged out".

- Because all facilities within the University of Arizona campus are classified as NESHAP facilities, the regulatory requirements of the Pima County Department of Environmental Quality apply to all demolition projects. Consult with Risk Management to determine the exact requirements. All permits and fees for demolition are the responsibility of the contractor but these requirements should be specifically identified in the contract documents.

End of Section 02100

DIVISION 2 - SITEWORK

Section 02200- Earthwork

Introduction

Inclusion of the Soil Report in the specifications is not permitted on University projects. The Consultant shall make the Report available at his office for Contractor's inspection if they so desire. It is the responsibility of the structural engineer to interpret the report and include specifications for soil preparation in accordance with his structural design. The Consultant should be aware that earthwork may involve not only preparation of soils for building and structures but for parking lots, slabs on grade (sidewalks) and landscaped areas. Appropriate references to other specification sections should be included.

Determine if construction activity resulting from the project will disturb *1 acre* or more. If *1 acre* or more *is* disturbed a Storm Water Pollution Prevention Plan (SWPPP) will be required and a EPA NPDES Storm Water Construction General Permit must be secured. UA, Risk Management may be contacted for guidance in securing this permit and filing the associated EPA Notice of Intent (NOI).

Part 1 - General

- Surplus material shall become the property of the Contractor and removed from the site.
- Rubble, trash and other demolished materials shall be taken to the appropriate dump sites and disposed of legally.
- Soil testing of compacted fill and/or inspection of caissons will be accomplished and paid for by the University.

Part 2 - Products

- There are no unique University requirements.

Part 3 - Execution

- Comply with City or Tucson and Pima County dust control standards.

End of Section 02200

DIVISION 2 - SITEWORK

Section 02280 - Soil Treatment

Introduction

The work in this section includes treatment of soils under buildings for termites and under paved areas for control of vegetation.

Part 1 - General

- Provide certification as to chemical type, rate of application and a written warranty.
- Warranty for termites and weed growth on new work shall be for 5 years. In alteration/addition work where termite five year warranty is not available, contractor shall certify application rate.

Part 2 - Products

- Chemicals shall be EPA certified and approved.
- Chemical for weed control shall be “Surflan” pre-emergent.

Part 3 - Execution

- Termite treatment is required on new and alteration/addition projects under all footings, along foundation walls and under interior slabs on grade and exterior porch slabs.
- Treatment for weed control shall be applied to soil below paved areas, both asphaltic concrete and concrete flatwork, on open soil area and areas covered with decomposed granite. Application of chemicals shall not be harmful to the roots of adjacent plants.

End of Section 02280

DIVISION 2 - SITEWORK

Section 02500 - Paving and Surfacing

Introduction

A specification section shall be provided for work under this section including Special Provisions and other qualifications as necessary to make the specifications project specific.

Consultants shall tailor their specifications to local practice and University requirements. Testing of materials will be by agencies hired by either the Contractor or the University.

Require repaving and stripping if staging or yard areas for construction are in an existing parking lot or an adjacent street.

The most current version of the Arizona Bicycle Planning and Design Guidelines shall be used for design and specification of paving and signage for bicycle routes and facilities.

Concrete surfaces shall be provided at motorcycle parking and in maintenance areas where oil or gas spillage could occur.

Minimum standard parking space size on the U of A campus is 8'-4" wide x 18'-0" long. Minimum lane width is 20'. The universal 11'-0" wide handicapped space is standard with 5' unload zone, white or blue handicap sign on pavement and HC sign on post complying with ADA requirements.

Handicapped ramps shall be provided when the project is located at an intersection and at other intervals along a street if crosswalks are provided. Inclusion of these ramps should be evaluated with the Project Coordinator.

Part 1 - General

- Damage to existing utilities shall be repaired and made good by the contractor.
- Cold patching may be used only as a temporary measure. Permanent patches must be hot mix.
- The most current versions of the Standard Specifications for Public Improvements and the Standard Details for Public Improvements by Pima County and the City of Tucson shall be used and referenced for this work.

Part 2 - Products

- There are no unique University requirements in this Section. Generally design mixes should conform to City of Tucson standard mixes.

Part 3 - Execution

- The most current versions of the Standard Specifications for Public Improvements and the Standard Details for Public Improvements by Pima County and the City of Tucson shall be used or referenced for this work.
- If asphalt patch is less than 25 sq. ft., hand method of placement and screeding can be used. Materials must be hot mix.
- If asphalt patch is greater than 25 sq. ft. or a critical area, use lay down machine.
- When working at curbs, widen excavation, form and pour curb, cut straight asphalt edge, and patch.
- All asphalt cuts shall be saw cut.

- Manholes and valves shall be adjusted to grade after paving. Final adjustment shall be provided with concrete paving patch to roadway grade.

End of Section 02500

DIVISION 2 – SITEWORK

Section 02610 - Site Chilled Water and Heating Water Utilities

Introduction

Piping of site utilities

CHILLED WATER, HEATING WATER

Part 1 - General

- Refer to Section 15050 common piping materials and methods.
- Refer to Section 15250 for insulation requirements.
- Refer to Section 15980 for meter requirements.

Part 2 - Products

- Pipe Schedule:

Service	Size	Pipe	Fittings	Joints
Chilled Water	4" and larger	Ductile iron, lined	Ductile iron, lined	Bell & spigot or mechanical joint
	16" and over	May Use Concrete cylinder	Concrete cylinder	bell & spigot
	Below 4"	Type K copper seamless Hard drawn	wrought copper	15% silver solder
Heating Water Pre-insulated Pipe System	All sizes	Copper - Type "K" Seamless Hard Drawn	Wrought Copper	15% Silver Brazed
		Or	Or	Or
		Schedule 40 Steel	Forged carbon steel	Bevel welded

- Pipe & fittings
  - Ductile iron pipe and fittings to be cement lined and coated with bituminous material per AWWA.
  - Concrete cylinder pipe and fittings to be cement or cement-mortar lined and coated per AWWA.
  - Pre-insulated pipe system, Terra-Gard System by Perma-Pipe or approved equal
    - Copper carrier tube, ASTM B88, Type K, seamless, hard temper

- Steel carrier pipe to be ASTM A53, seamless, carbon steel, Schedule 40
- Polyurethane, closed cell insulation
- PVC jacket per ASTM D1784

- Valves – Buried
  - Chilled Water
    - Resilient seated gate valves for pipe up to 12".
    - Butterfly valve for pipe over 12" conforming to AWWA C504 and Tucson Water Specification No. 1411
  - Heating Water
    - Butterfly valve conforming to AWWA C504 and Tucson Water Specification No. 1411
- Joint Restraint Devices
  - Ductile iron mechanical joints – Megalug joint restraint
  - Ductile iron flange connection –Megaflange joint restraint flange adapter
  - Integral ductile iron joint – TR Flex restrained joint
  - Concrete cylinder pipe - welded
- Valve Boxes – cast iron box and cover
- Air Relief Valve Vaults – cast in place concrete with 30" diameter cover
- Air Relief Valves – APCO Series 140C, cast iron body, SS float, SS lever, Buna –N seat

Part 3 - Execution

- Chilled water piping
  - Ductile iron pipe to be installed per AWWA C600 and Tucson Water Standard Specification No. 1401.
  - Concrete cylinder pipe to be installed per AWWA M9 and manufacturer's recommendations.
- Hot water piping
  - Installed per pre-insulated piping system manufacturer's instructions
- Testing: Hydrostatic, no leakage permitted@100 psig, witnessed by UA Inspector before joints are concealed.

End of Section 02610

DIVISION 2 – SITEWORK

Section 02620 – Site Potable Water and Reclaimed Water Utilities

Introduction

Piping of site utilities

POTABLE WATER, RECLAIMED WATER

Part 1 - General

- Refer to Section 15050 common piping materials and methods.
- Refer to Section 15980 for meter requirements.

Part 2 - Products

- Pipe Schedule:

Service	Size	Pipe	Fittings	Joints
Potable and Reclaimed Water	Up to 3"	PVC-Sch. 40	PVC	Glued
	4" to 12"	PVC- C900 or Ductile iron	PVC Ductile iron	Push-on, mechanical jt
	Over 12"	Ductile iron	Ductile iron	Push-on, mechanical jt

- Pipe
  - Ductile iron pipe and fittings to be cement mortor lined (interior) and coated with bituminous material (exterior) per AWWA. Mortor lining for reclaimed systems shall be double thickness.
  - PVC pipe, AWWA C900.
  - Reclaimed Water- PVC pipe shall be purple (Panatone 522C). Ductile iron pipe shall be encased in purple polyethylene.
- Valves - Buried
  - Potable- For pipe over 12" Butterfly valve conforming to AWWA C504.
  - Reclaimed Water- For pipe over 12" Butterfly valve conforming to AWWA C504.
  - Resilient- Seat gate valves for pipe up to 12".
- Joint Restraint Devices
  - Ductile iron mechanical joints –Megalug joint restraint.
  - Ductile iron flange connection –Megaflange joint restraint flange adapter.
  - Integral ductile iron joint – TR Flex restrained joint.
  - PVC pipe – EBBA Iron Sales Series 1700.

- Valve Boxes – cast iron box and cover.
- Air Relief Valve Vaults – cast in place concrete with 30" diameter cover.
- Air Relief Valves – APCO Series 140C, cast iron body, SS float, SS lever, Buna –N seat.

Part 3 - Execution

- Potable water
  - Installation shall be per Tucson Water Standards.
- Reclaimed water
  - Installation shall be per Tucson Water Standards.
- Testing- Hydrostatic, no leakage permitted@100 psig for 4 hours, witnessed by UA Inspector before joints are concealed.

End of Section 02620

DIVISION 2 – SITEWORK

Section 02640 - Site Natural Gas Utility

Introduction

Piping of site utilities

NATURAL GAS

Part 1 - General

- Southwest Gas Corporation standards are applicable.

Part 2 - Products

- Piping and meters
    - Materials provided by Southwest Gas Corporation per its standards.

Part 3 - Execution

- Installation by Southwest Gas Corporation per its standards.
- Contractor to coordinate activities with Southwest Gas Corporation and provide adequate access to the site.

End of Section 02640

DIVISION 2 – SITEWORK

Section 02710 – Site Sanitary Drainage

Introduction

Piping of site utilities

SANITARY DRAINAGE

Part 1 - General

- Pima County (PC) Standard Specifications and Details are applicable.

Part 2 - Products

- Pipe Schedule

Service	Size	Pipe	Fittings	Joints
Sanitary	Up to 15"	PVC SDR-35	PVC	Bell & Spigot

- PVC pipe per ASTM D3034, SDR 35
    - PVC Fittings per ASTM D3034
    - Joints per ASTM D3212 with gaskets per ASTM F477

Part 3 - Execution

- Installation to conform with PC/COT Standards and Details
- Testing per PC/COT Standards and witnessed by UA Inspector

End of Section 02710

DIVISION 2 – SITEWORK

Section 02720 – Site Storm Drainage

Introduction

Piping of site utilities

STORM DRAINAGE

Part 1 - General

- Pima County/City of Tucson (PC/COT) Standard Specifications and Details are applicable.

Part 2 - Products

- Pipe Schedule:

Service	Size	Pipe	Fittings	Joints
Sanitary	Up to 18"	PVC SDR-35	PVC	Bell & Spigot
	larger than 18”	Reinforced Concrete	Concrete manhole	Gasket & mortar

- PVC pipe per ASTM D3034, SDR 35
  - PVC Fittings per ASTM D3034
  - Joints per ASTM D3212 with gaskets per ASTM F477
- Reinforced concrete pipe to conform with AASHTO M242
  - Concrete manhole materials shall comply with PC/COT Standards and Details
  - Joint materials shall comply with PC/COT Standards and Details

Part 3 - Execution

- Installation to conform with PC/COT Standards and Details
- Testing per PC/COT Standards and witnessed by UA Inspector

End of Section 02720

DIVISION 2 - SITEWORK

Section 02810 – Irrigation

Introduction

As with layout plans and details, specifications shall be coordinated with those of the other design team members. Electric power shall be supplied for controllers and water for the system.

As with layout plans and details, specifications shall be coordinated with those of the other design team members. Electric power and a phone line shall be supplied for the controllers and water for the system.

Part 1 - General

- Damage to existing systems or utilities shall be repaired and made good by the contractor.
- Existing irrigation systems serving plants that remain on site and beyond shall stay fully functional and be protected from damage during construction.
- Any irrigation equipment removed shall be salvaged to the University.
- Materials and installation shall be guaranteed for 2 years.
- Landscaped areas used as Contractor's storage yard and areas impacted by construction shall be restored to pre-existing condition at completion of project.

Part 2 - Products

- The following are preferred by the University:
    - Backflow Preventer - Febco, reduced pressure type (for domestic water supply connections).
    - Filter - Agrifim
    - Remote Control Valve (RCV) – Rainbird Pesb for potable systems. Rainbird Pesb with non-Potable handle for reclaim water systems.
    - Ball Valves - Brass body ball valves
    - Quick Coupling Valves (QCV) – Rainbird 33 DRC for potable system. Rainbird 33 DLRC for reclaim water systems. Also furnish 2 valve keys fitted with ¾" swivel hose ells.
    - Pressure Reducer - Senninger
    - Valve Box – Ametek with locking lid. Sizes for RCV; 10"X14"X15" deep. For sizes QCV's and gate valves; 9" dia. X 10" deep. On reclaim water systems all boxes shall be purple in color. On potable systems boxes shall be green in turf areas and brown/tan in planting areas.
    - Spray Head – Hunter series rotors. Rotors shall have purple tops when used in reclaimed water systems. Pop up heads shall be Toro 570z series with check valves.
    - Bubbler Head - Toro #FB-200 ADJ PC/89-0946 Screen
    - Drip Emitter – Rainbird zeribug emitters. XB-10 and XB-20 only.
    - Controller – "Calsense" controller only with radio remote and phone modem.
    - Polyethylene pipe - Distribution tubing size; .220". Drip system lateral size; .580" (nominal1/2")
    - Polyethylene fittings –AG Products compression type #710cc. Male barbed-typed fittings are not permitted.
    - End Caps - AG Products #710cctc
    - Polyvinylchloride (PVC) pipe - Schedule 40 for pressurized lines, Class 200 for non-pressurized lines, Class 315 for non-pressurized, 1/2" dia. drip lines. Schedule 40 for all sleeves (I.D. of sleeves shall be a minimum of 1" larger than the O.D. of the pipe or wire bundle it will carry. Purple pipe shall be used on all main lines in reclaimed water systems.
    - PVC fittings - Schedule 40 by Spears
    - Threaded PVC nipples - Schedule 80

- Control and common wire - type THWN Neoprene insulated, single conductor; minimum wire sizes shall be as follows: common wire - 12 gauge, control wire - 14 gauge (12 gauge for runs over 1000').
- Splicing materials: Spears ds-400 prefilled connectors and Spears ds-300 sealer: line splices are allowed only on runs of more than 500'.
- Teflon tape - for threaded connections.
- Unions – Two schedule 80 unions shall be installed on all valve assemblies including master valve.
- Master Valve – All systems shall have a master valve wired to the controller after the P.O.C.
- Flow Meter – All systems shall have a “Calsense” flow meter installed down stream of the master valve. Flow meter shall be wired to the controller and compatible with central control system.
- Multi-port emitters – If multi-port emitters are to be used on the project they shall be Rainbird XBD-80’S. They shall also be enclosed in an “ECONO” emitter box, purple in color on reclaimed systems.

Part 3 - Execution

- Formal Inspections with University present:

  - Layout (prior to trenching) of all piping, heads and other equipment.
  - Mainline trenches, mainline, water source point-of-connection and control wire valves, quick couplers, controllers, other equipment and electrical power connection.
  - Lateral piping and distribution tubing, spray heads, bubbler heads and drip emitters.
  - Final inspection upon completion of all work.

- Formal testing with University present:

  - Main line: tested for not less than four continuous hours at a static line pressure of not less than 100 PSI, with all isolation valves open, and all pipe uncovered.
  - Flush after installation of laterals and risers and test for watertightness and proper operation of lateral piping, filters, control valves, pressure regulators, end or run flush outlets and other equipment with all pipe uncovered.
  - Flush after installation and test for watertightness and proper operation of drip emitters and distribution tubing, spray heads, bubblers heads.
  - Final operational testing to demonstrate full coverage and proper function of automatic controls.

- Pipe and wiring shall be carried in separate Schedule 40 PVC sleeves under sidewalks and pavement with min. burial depths as follows:

  - Pipe and wires under pavement - 24"
  - Pressurized lines - 18"
  - Non-pressurized lines - 12"
  - Non-pressurized drip laterals - 8"
  - Wire - 12"

- Sleeves shall extend 12" beyond edge of sidewalk and/or pavement.

- Minimum clearances between irrigation lines adjacent to or crossing other irrigation lines or those of other trades shall be as follows:

  - 1" diameter and smaller: 6" horizontally, 3" vertically
  - Larger than 1" dia.: 12" horizontally, 6" vertically

- Excavations shall allow for 2" (min) of sand bedding or earth fill when rock or unsuitable bearing material is encountered. Provide and compact backfill as follows:

  - Sand bedding or approved earth fill to a point 6" above the top of pipe (for pipe under paving provide 4" minimum sand bedding on all sides).

  - Approved fill free of lumps 1" in dia. and larger to 6" from the top of the trench.
  - Approved topsoil, as specified elsewhere to the top of the trench.

- Snake pipe in trench to allow 1 additional foot per 100" of pipe.

- Holes bored beneath pavement shall maintain an alignment tolerance of no more than 1" in 10', both vertically and horizontally.

- Pipe shall be cut only with an approved pipe cutter. Cuts with a hacksaw or knife are not permitted. Holes for emitters shall be made only with manufacturers approved punch tool.

- Polyethylene pipe shall be inserted into fittings 1/2" min. Minimum radius of Poly. pipe bends shall be 18".

- Backflow preventers shall be insulated with aluminum tape.

- Install filter immediately downstream of backflow preventer and upstream of control valves.

- Provide thrust blocks for pipe 1-1/2" in dia. and larger.

- All main lines shall have a continuous trace wire laid with the pipe.

- Provide QCV's at 150' (max) spacing along the mainline or around the perimeter of the project, as necessary; install QCV's in valve boxes and on swing joint assemblies perpendicular to adjacent finished grade unless otherwise noted.

- Install RCV's perpendicular to adjacent finished grade unless otherwise noted; provide a minimum of 30" slack in control wires at control valves to allow servicing. Allow 2" clearance between control valves and gravel sump beneath.

- Install end caps in "econo" type valve boxes.

- Install RCV assemblies (RCV, Filter, pressure reducer, QCV, sensor) in valve boxes.

- Tie control and common wires in bundles at 10' intervals.

- Wire splices shall be made in valve boxes.

- Group valve boxes, install no closer than 6" to adjacent walls and not further than 12" from walks, curbs, etc. Install all valve boxes flush with finish grade. Support valve boxes on bricks (min. four) below grade. Provide gravel sumps 6" in depth (min).

- Equipment within valve boxes shall be 4" to 8" below lid and quick couplers no more than 3".

- Install spray heads on triple swing joints 6" from adjacent walks, curbs, mowing strips, etc. and with the top of the head flush with adjacent grade.

- Install bubblier heads on double swing joints and with the distance from the bottom of the head to adjacent finished grade set at 2".

- Distribution tubing leading from the drip emitter to the surface shall not exceed 5 feet in length, shall extend 2" above adjacent finish grade and shall be secured in the soil with an anchor created by wrapping the tubing twice around a 3" length of 1/2" PVC pipe and buried 8" below grade.

- Affix a non-fading, weather resistant copy of Irrigation Diagram and controller name label to inside of controller cabinet door. The Irrigation Diagram shall show all valves operated by the controller, valve sizes and type of planting irrigated.

- For future expansion add a minimum of 2 extra control wires to the furthest valve manifold in each direction.

End of Section 02810

DIVISION 2 - SITEWORK

Section 02830 - Fences and Gates

Introduction

The items listed below are unique to the University of Arizona requirements and shall be incorporated in to the specifications and drawings prepared by the Consultant.

Part 1 - General

- Refer to the Chair Link Fence Manufacturers Institute Voluntary Standards for Chain Link Fence Installation.

Part 2 - Products

- Fabric shall be 9 gauge, 2" weave w/ Class 2 hot dipped galvanized finish, w/ not less than 1.2 oz. of Zinc per square foot, applied before weaving, and with top and bottom selvages knuckled.

- Framing members (including post, rails, braces, gate frames) shall be Type 1 pipe, Schedule 40, hot dipped galvanized w/ not less than 1.8 oz. of Zinc per square foot of surface: posts and rails shall have caps to exclude moisture; rails shall be attached to posts w/ malleable rail end caps w/ 7/8" beveled steel brace band.

- Posts and rails shall be standard gauge steel pipe sized as follows:

    - Corner posts up to 6 feet tall: 2.375" O.D.; over 6 feet tall: 4.00" O.D.
    - Line posts up to 6 feet tall: 2.00" O.D.; over 6 feet tall: 2.375" O.D.
    - Gate posts for leaves up to 6 feet wide: 2.875" O.D.; for leaves from 6 to 13 feet wide: 4.00" O.D.
    - Gate frames: 2.00" O.D. structural grade pipe
    - Rails: 1.625" O.D. w/ 7" long (min.) mid-span expansion couplings
    - Tension wires: .177" O.D. marcelled steel tension wire w/ Class 2, galvanized coating

Part 3 - Execution

- Foundations shall be concrete with a 28 day compressive strength of 2500 PSI, constructed w/ top of footing 2" above adjacent finished grade and sized as follows:

    - Terminal posts: 16" dia. w/ 39" depth of post embedment
    - Line posts: 12" dia. w/ 39" depth of post embedment

- Terminal posts shall be braced with 1.625" O.D. rail installed between the midpoints of the post and the first line rail (in each direction at corners). Attach braces as rails; secure w/ .375" dia/ truss rods from line post to terminal post.

- Bottom of fabric shall be 2" above adjacent finished grade.

- Attach fabric to posts, rails, braces and tension wires at 15" o.c. (max); attach fabric to posts w/ tension bars and clips; stretch fabric between terminal posts or every 100'. whichever is less.

- Gate hardware for swing gates shall include three hinges per leaf, provisions for pad-locking with cast metal fork latch, drop bolt and drop bolt retainer; hardware for rolling gates shall include heavy duty track, ball bearing hangar sheaves, overhead framing and supports, guides stays, bracing and locking devices as desired.

- Gates shall be braced with midpoint bracing as for terminal posts and with a bottom rail.

End of Section 02830

DIVISION 2 - SITEWORK

Section 02850 - Trash Compactor Embed Plan

Introduction

The placement of a trash compactor on any project is a decision to be made by the University. (Either Facilities Management or Residence Life).

Trash compactors are strategically located throughout campus based on need and it's ability to serve several buildings.

Part 1 - General

- The trash compactor and associated container are provided by the City of Tucson, Sanitation Division.
- A concrete slab with embed plates and electrical power is to be provided per the attached drawing for all trash compactor installations.

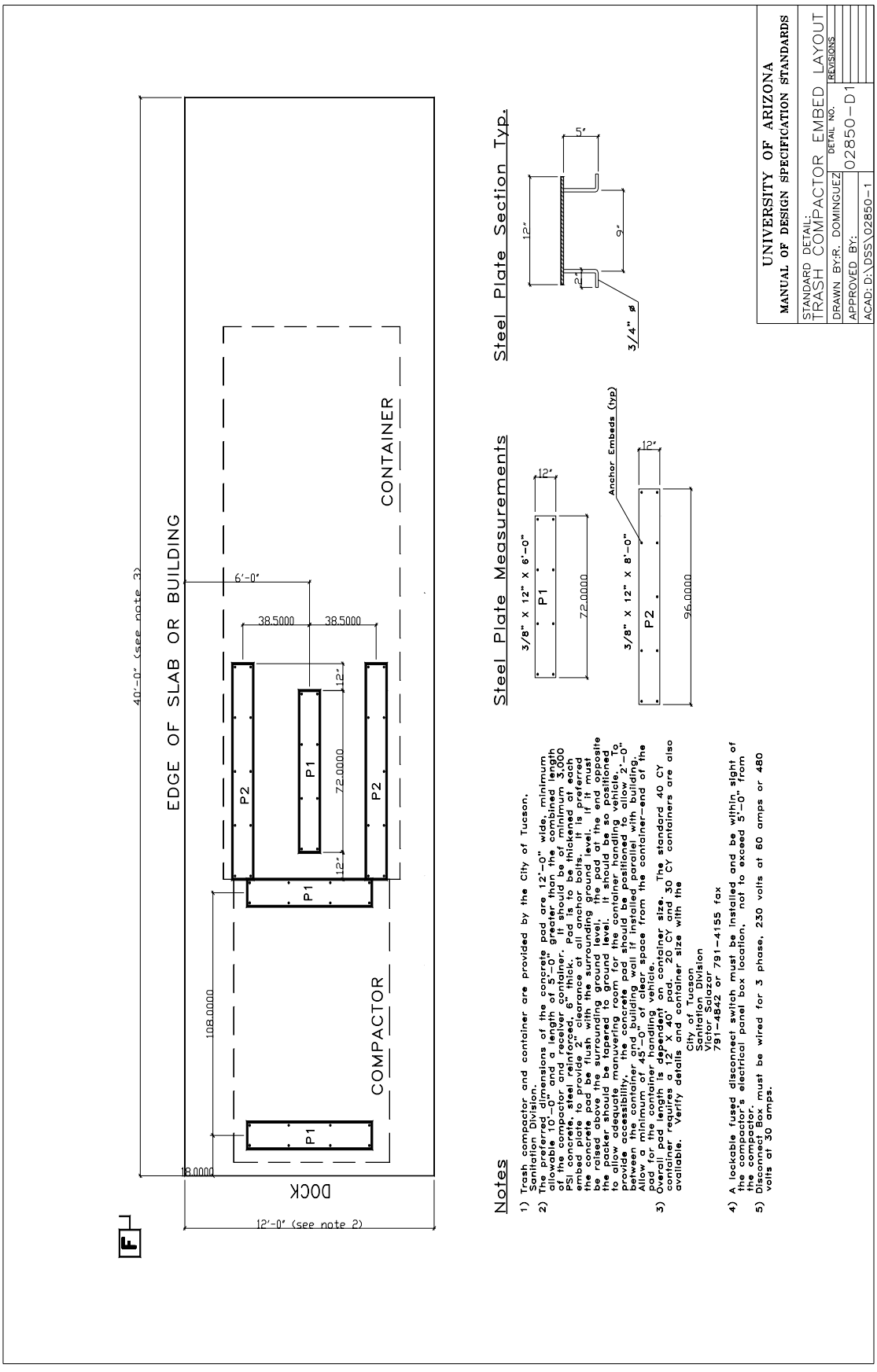
Part 2 - Products

- No discussion.

Part 3 - Execution

- No discussion.

End of Section 02850


EDGE OF SLAB OR BUILDING
40'-0" (see note 3)
CONTAINER
COMPACTOR
DOCK
12'-0" (see note 2)
6'-0"
38.5000
38.5000
12"
72.0000
12"
108.0000
18.0000
P1
P2
P1
P2
P1
Steel Plate Measurements
3/8" X 12" X 6'-0"
3/8" X 12" X 8'-0"
Anchor Embeds (typ)
72.0000
96.0000
Steel Plate Section Typ.
12"
5"
2"
9"
3/4" ø
Notes
1) Trash compactor and container are provided by the City of Tucson, Sanitation Division.
2) The recommended dimensions of the concrete pad are 12'-0" wide, minimum allowable 10'-0" and a length of 5'-0" greater than the combined length of the compactor and receiver container. It should be of minimum 3,000 PSI concrete, steel reinforced, 6" thick. Pad is to be thickened at each embed plate to provide 2" clearance at all anchor bolts. It is preferred that the pad be flush with the surrounding ground level. If it must be raised above the surrounding ground level, the end opposite the packer should be tapered to ground level. It should be so positioned to allow adequate manuvering room for the container handling vehicle. To provide accessibility, the concrete pad should be positioned to allow 2'-0" between the container and building wall if installed parallel with building. Allow a minimum of 45'-0" clear space from the container-end of the pad for the container handling vehicle.
3) Overall pad length is dependent on container size. The standard 40 CY container requires a 12' X 40' pad. 20 CY and 30 CY containers are also available. Verify details and container size with the
City of Tucson
Sanitation Division
Victor Soto at 791-4842 or 791-4155 fax
4) A lockable fused disconnect switch must be installed and be within sight of the compactor's electrical panel box location, not to exceed 5'-0" from the compactor.
5) Disconnect Box must be wired for 3 phase, 230 volts at 60 amps or 480 volts at 30 amps.
UNIVERSITY OF ARIZONA
MANUAL OF DESIGN SPECIFICATION STANDARDS
STANDARD DETAIL:
TRASH COMPACTOR EMBED LAYOUT
DRAWN BY:R. DOMINGUEZ
APPROVED BY:
ACAD: D:\DSS\02850-1
DETAIL NO.
02850-D1
REVISIONS

DIVISION 2- SITEWORK

Section 02870 - Site and Street Furnishings

Introduction

Benches, tables, bollards, bicycle racks receptacles, if appropriate to the facility, shall be included in the project. Generally these items shall be anchored in concrete so as not to be removed by vandals. Specify items which can be readily replaced if damaged.

Part 1 - General

- There are no unique University requirements in this section.

Part 2 - Products

- Benches - Dura Art Stone and Gametime "Ultrim" UF-3000. Concrete and perforated metals are preferred to wood and fiberglass
- Trash Receptacles - Form Products, 7-WCF-ATL. Do not locate on or above paved surfaces.
- Bicycle parking racks - ACI (Arizona Correctional Industries) Model MP 4113. Install below grade.
- Kiosks, bulletin boards. Must be all weather.
- Tree Grates - Neenah, Urban Accessories, Canterbury International. To be installed with frames.
- Drinking Fountains - Haws. Must be handicapped accessible
- Public and Emergency (blue light) telephones. Must be handicapped (ADA) accessible. Emergency telephone shall be hands free operation by Talk-A-Phone, Model 400 - cfr Mushroom. Blue light fixture shall be combination type for both blue light and strobe operation.
- Building ID Signs. By University.
- Lighting. There are four basic types of exterior lighting found on the University campus: street light, area lighting, path lighting and lighting for special purposed (e.g. field lighting and sign lighting). University electrical engineers have reached an agreement with astronomers to the effect that, with rare exception, all exterior lighting shall use High Pressure Sodium (HPS) lamps. Exceptions, such as sports fields and very deep overhangs, will be considered on a case by case basis. Equipment intended for permanent installation shall be heavy duty with a life expectancy of at least 50 years. Street and large area lighting may be most efficient and cost effective when using poles 30 feet tall. The following listing reflects the preferred choices for exterior lighting:
    - Street and area lights use fully shielded fixtures with HPS lamps.
    - Path lighting use 100% down lighting with small HPS lamps.
    - Special purpose lighting such as recessed wall mount step lights and surface mounted path lights shall use small HPS lamps with down louvers.

Part 3 - Execution

- There are no unique University requirements in this Section.

End of Section 02870

DIVISION 2 - SITEWORK

Section 02900 - Landscaping

Introduction

Designers are encouraged to use plant material in energy conserving, climate ameliorating ways. Combinations of deciduous and evergreen shade trees can do much to mediate weather and climatic extremes.

Designers shall refer to site paving drawings and coordinate size of plant pits so as to not undermine hardscape.

The addition of new lawns is restricted due to University agreements with the Arizona Department of Water Resources.

Part 1 - General

- Plant materials shall be selected from the most current revision of the Low Water Use/Drought Tolerant Plant List published by the Arizona Department of Water Resources, Tucson Active Management Area.
- Water harvesting measures should be considered where available.

Part 2 - Products

- Imported topsoil shall be Mesa Red natural, friable loam. Submit written evidence of tests for pH and total dissolved salts (TDS) prior to delivery. pH shall be between 6.5 and 8.0, TDS shall not exceed 1000 parts/million.
- Mulch shall be "Forest Magic" brand or other approved nitrogen stabilized (nitrolized) fine ground fir bark.
- Fertilizer shall be commercial Ammonium Phosphate w/an NPK ration of 16-20-0; use Agriform 20-10-5 formula, 21 gram tablets for salvaged and replanted plants.
- Soil sulphur shall be agricultural grade, pilled or granulated, containing 99.5% active and 0.5% inert ingredients.
- Manure shall be composted, well rotted, free of refuse and containing not more than 25% straw or other bedding material.
- Soil mix for backfilling shall be three parts topsoil to one part mulch with one pound Ammonium Phosphate and two pounds soil sulphur added per cubic yard.
- Tree stakes shall be three (3) inch diameter by eight (8) feet long, pressure-treated Lodgepole Pine, free of any weakening knots or other defect. Stake trees up to 15 gallon size with two (2) stakes. Larger sizes shall be staked or guyed.
- Guy wire shall be new, 12 gauge, annealed, galvanized.
- Chafing guards shall be new, 3/4" dia. reinforced rubber or vinyl hose, 12" long (min) or as necessary to protect tree from guy wires.
- Decorative rock “Desert Gold” or “Wildcat Red” in color, from a local source and shall consist primarily of particles 1/2” to 3/4” in diameter.
- Boulders shall be native Santa Catalina Mountain rock.
- Pre-emergent herbicide shall be “Surflan” or approved equal.

- Palm tying twine shall be natural fiber.

Part 3 - Execution

- New and existing utilities shall not conflict with planting.

- Where plant material will be placed in soil beneath existing pavement, especially asphalt pavement, or other condition where soil sterilant or other treatment potentially harmful to plant material may have been applied shall be tested for the presence of any such chemicals or condition. Affected soils shall be treated and/or excavated and disposed of in accordance with local codes.

- Minimum planting pit sizes shall be as follows:

    - One (1) gallon size container: 18" in dia.
    - Five (5) gallon size container: 36" in dia.
    - Fifteen (15) gallon size container: 60" in dia.
    - Twenty four (24") inch box. 60" square.
    - Thirty six (36") inch box and larger. 18" clear on all sides.
    - Depth of all pits no deeper than the rootball to prevent settling.

- Plant pits shall not undermine hardscape nor shall hardscape elements be placed over plant pits.

- Areas to receive ground cover plants shall be excavated in their entirety to 18" below finish grade and backfilled with backfill mix described above.

- Planting pit percolation rates to be determined prior to planting in the presence of U of A representative.

- After water settling backfill, set plants lower than finish grade to create irrigation basins such that the crown of the root ball shall be 4" lower than surrounding finish grade. Basins shall be as wide as the plant pit. Top of rootball shall be flush with finish grade of the basin.

- 2" of mulch shall be incorporated into the top 3" of soil in irrigation basin areas.

- Root balls of existing palm trees to be transplanted shall have a minimum diameter of 4 feet plus the diameter of the trunk measure 12" above the ground. Vitamin B-1 shall be used per manufacturer's recommendations with the first watering.

- Salvage of existing trees from the project shall be performed by a firm approved by the University and with at least four years experience with this type of work. The work shall be guaranteed and conduced in a manner consistent with local practice. The University shall designate a holding area and source of irrigation for boxed or other wise temporarily stored trees.

- Restoration of turf operations shall include: loosening compacted soil to a minimum depth of 9", removing all rock and debris 1” and larger and adding approved topsoil to match original grade and compaction. 3" of composted, screened, weed free manure plus 2 pounds of Ammonium Phosphate (16-20-0) and 5 pounds of soil sulphur shall be added per 100 square feet and roto-tilled into existing soil to a depth of 6". Between the dates of May 15 and August 15, sow Cynadon dactylon (common Bermuda grass) seed at a rate of 3 pounds per 1000 square feet. Seed shall be 98% pure and have a germination rate of 75%. Between August 15 and May 15, contractor shall provide to the University, but not sow, the appropriate quantity of seed. Roll seeded areas with a 50 pound per linear foot roller then mulch with one-half inch of screened manure.

- The landscape contractor shall maintain all planting until accepted. Maintenance operations shall include: watering, mulching, tightening or adjusting of tree ties, resetting plants to proper grade, restoration of irrigation basins, fertilization and weeding. Replacement materials shall meet all specifications of original materials.

- Where existing lawns have been damaged by construction and are to be repaired by the contractor, follow these instructions:

    - Loosen compacted soil to a depth of 9" min.
    - Remove debris and rock larger than 1" and all contaminated soil.
    - Add topsoil to the level of original grade and allow for settlement.
    - Rototill into the top 6" a 3" layer of manure, 2 pounds Ammonium Phosphate (16-20-0) and 5 pounds of soil sulphur per 100 sf.
    - Broadcast Bermuda grass seed (98% pure, 75% germination) at the rate of three pounds per 1000 sf and cover with a thin layer of manure.

- Sod shall be cut, delivered and installed within a 24 hour period. Cultivate subgrade to a depth of 6" prior to placing topsoil and remove all stones and debris 1" and greater in dia. Place topsoil to a depth of 9" over cultivated subgrade. Topsoil shall consist of equal parts topsoil, sand and manure with 18 pounds soil sulphur, 50 pounds gypsum and 7 pounds Ammonium Phosphate fertilizer (16-20-0) added per 1000 sf.

- Maintenance for new or reestablished turf areas shall be as follows:
    - Maintenance period shall be for 90 days or a minimum of four mowings, whichever is longer, Turf shall be mowed to a height of 1/2" when a height of 1" is reached.
    - Spray heads shall be set 1" above finished grade, initially and reset once turf is established by the contractor at no additional cost. Irrigation shall not result in wilting, puddles or runoff.
    - After 3 weeks and again at the end of the maintenance period, fertilize with a fertilizer that provides one pound available Nitrogen per 1000 sf.
    - Final acceptance will occur with a satisfactory stand of grass (solid, healthy growth, without bare spots) at the end of the maintenance period.

- Palm ties, not broken naturally, shall be cut by contractor after 4 months.

- Berms and swales shall be formed as continuous, smooth landforms with no obvious top or bottom to slopes or grade change from berm to swale.

- Install decomposed granite (DG) 1-3/4" to 2" deep, rake smooth and tamp with a roller of 100 pounds per linear foot weight, minimum. Finish grade shall be 2" below top of adjacent walks, curbs or other pavement. Apply per emergent herbicide, per mfg, instruction, before and after placing the D.G.

- Provide positive drainage away from buildings and structures. Direct runoff water to planting areas.

- All plant materials shall be guaranteed for 1 full year following substantial completion or replacement.

End of Section 02900

DIVISION 2 – SITEWORK

Section 02910 – Temporary Tree and Plant Protection

Introduction

- This section contains standards for protection of in-place and trimming of existing trees that interfere with, or are affected by, execution of the work, whether temporary or permanent construction.

Part 1 - General

- Tree Protection Zone: The area surrounding individual trees or groups of trees that are to remain during construction, defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

Part 2 - Products

- Chain-link fence panels for temporary fencing.

- Coarse bark mulch to cover area under protected trees.

- Plant material used to replace damaged plant materials shall be new plant material.

Part 3 - Execution

- Preparation:
  - Locate and flag with surveyor's tape trees and vegetation that are to remain or to be removed.
  - Engage Owner's Certified Arborist to direct pruning of trees to remain on site.
  - Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Locate fencing as shown on plans. Maintain temporary fence and remove when construction is complete.
  - Mulch tree protection areas with organic matter to a depth of 3 inches.
  - Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
  - Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems. Locate portable restrooms outside tree protection zones.
  - Maintain tree protection zones free of weeds and trash.
  - Arrange with Owner for regular irrigation of protected trees.

- Excavation:
  - Install shoring or other protective support systems outside the tree protection zone to minimize sloping or benching of excavations onto the tree root zone.
  - Outside the Tree Protection Zone:
    - Shovel is to be pulled away from the edge of tree protection zone. If roots larger than 1 inch in diameter are encountered outside the tree protection zone, the Owner's Certified Arborist shall be consulted prior to pruning these roots.
    - Roots encountered during excavation will be redirected into the backfill areas where possible. If large, main lateral roots are encountered, the excavation limits will be extended as necessary to expose roots to a length as required to bend and redirect them into the backfill without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots cleanly 3 inches back from new construction.
    - If tree roots larger than 1 inch in diameter require pruning due to construction activities, the Owner's Certified Arborist shall be consulted prior to pruning.
    - Roots exposed during excavation will be protected to prevent drying until permanent backfill is placed.

Exposed roots will be covered with temporary earth cover or packed with peat moss, and wrapped with burlap and regularly watered to, maintain in a moist condition.
    - Exposed roots will be temporarily supported and protected from compaction and damage until they are permanently relocated and covered with soil.
- Within the Tree Protection Zone:
    - Where excavation for new construction is required within tree protection zones, do not proceed without the Owner's written approval. Hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
    - If tree roots larger than 1 inch in diameter require pruning due to construction activities, the Owner's Certified Arborist shall be consulted prior to pruning.
- Utility Trenches: Where utility trenches are required within tree protection zones, do not proceed without the Owner's written approval. Tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand. Use existing utility locations where possible.
    - Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop. Do not apply any material to cut faces of roots.
    - If tree roots larger than 1 inch in diameter require pruning due to construction activities, the Owner's Certified Arborist shall be consulted prior to pruning.

- Regrading
    - Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single un-compacted layer and hand grade to required finish elevations. Do not grade so that tree trunk is in low spot after finish grading.
    - Change of grade beyond 6 inches: Where existing grade at tree protection zone differs by more than 6 inches from finish grade, construct retaining walls to keep original grade under tree.

- Hardscape around trees
    - In parking lots, allocate 8 foot x 8 foot uncovered space for trees preserved on site. Asphalt cover: Irrigate tree protection zone well the night before. Slope asphalt slightly into planting pit. Flood irrigate again after asphalt installation.
    - Concrete and impermeable paving: Flood irrigate tree protection zone the night before pouring. Protect tree zone from traffic, trash, or backwash during concrete pour. Irrigate tree again the following day.
    - Structural Soil, Structural Cells, and alternative media: Flood irrigate tree zone well the night before. Protect tree zone from backwash or trash during installation of aggregate. Irrigate again the next day.

- Tree repair and replacement
    - Notify the Owner immediately if trees and shrubs to remain in place are damaged during construction. Do not repair damage except with the Owner's Arborist written direction.
    - Promptly repair trees damaged by construction operations within 24 hours of damage. Treat damaged trunks, limbs, and roots according to Owner's Arborist's written instructions.
    - Trees indicated to remain on the site which die or are damaged during construction that Owner's Staff Arborist has determined are incapable of restoring to normal growth pattern will be removed and replaced during construction operations.
        - Provide new trees of same size and species as those being replaced; plant and maintain these trees.
        - Any and all costs of repair or replacement will be assessed to the contractor.

End of Section 02910

DIVISION 2 – SITEWORK

Section 02920 –Tree Salvage

Introduction

This section contains standards for the identification, removal, storage and replanting of existing trees on site.

Part 1 - General

- Create a Reference Sheet for identification of trees to be salvaged.

- Provide backflow prevention devices for the temporary irrigation system

    - Holding Yard: The holding yard for this project will be on or adjacent to the project site with an available water source. Water shall be provided by the Contractor.

- Identification of salvage material
    - The Contractor, Architect and Owner's representatives will determine the final selection of salvage specimens based on specimens already identified, current health, accessibility, viability and appearance.
    - These trees shall be final-tagged with colored tape in conspicuous locations and fenced with temporary construction fence and irrigated to avoid construction damage until they are removed.
    - Contractor is not to remove or work on any salvage material until after the Owner, or designated agent, has determined the limits of the salvage and work area, and has given the Contractor written consent to proceed.

- Removal of salvage material
    - Description of Work: The Contractor shall provide all labor, tools and materials necessary to remove salvage plants from the ground, box them (when required) and transport them to the holding yard.
    - If it is determined that any of the trees to be transplanted can be immediately installed in their new location within the project, the Contractor may do so, but must water, maintain and protect the trees during construction.
    - If any trees are to be transplanted directly onto UA property, the final site will need to be Blue Staked. Allow time for approval.
    - Access: Access shall be entirely within the Owner's property. Damage to surrounding areas not within the property, including but not limited to buildings, curbs, paving, vegetation and utilities, shall be the Contractor's responsibility.
    - The Architect will also identify areas within the property that are not to be disturbed. Any damage within these areas will also be the Contractor's responsibility. If designation of these areas makes access impossible, Contractor shall notify the Architect.

- Protection
    - Contractor shall provide barrier protection to warn pedestrians about the plant excavations, and reasonably prevent someone from falling into one. Protection shall be selected by the Contractor and suitable for the purpose intended and approved by the Architect and Owner.
    - Protection shall be provided during sidebox operations and following removal of the boxed tree, and shall remain in place until the excavation is filled under grading operations.

- Warranty
    - The Contractor shall warranty plants from damage caused by his own operations including boxing, holding and replanting. This warranty includes breakage of major limbs (after trimming), destruction of major root systems, excessive scarring to the trunk, and death from stress or severe insect damage.
    - The Value of the trees to be salvaged shall be determined by a qualified Arborist, and shall be based in whole or in part on the following factors: 1) suitability of the species for the site 2) tree health and vigor prior to start of construction 3) replacement cost for a comparable tree at a local supplier 4) increase in

value of the UA tree based on increase in size beyond that of saleable size 5) rarity within the UA campus tree collection 6) dollar contribution of tree as modeled in USFS i-Tree Suite of software programs
- Should replacement material be required under this warranty, Contractor is responsible for the procurement and transportation of the replacement material.
- Plant materials shall be guaranteed for one year following final acceptance of planting operations under this section.

Part 2 - Products

- Box Materials
  - Boxes shall be of wood strong enough to allow transport of trees both to and from the storage facility.
  - Boxes shall be of wood, resistant to rot and fungus, and capable of lasting at least three years.
  - Should the box require replacement, or damage occur to the tree as a result of poor box material, the tree shall be replaced as a warranty item at no additional cost to the Owner.

- Nutrients
  - Contractor shall apply chemical nutrients to the tree, as needed, to maintain tree in good health. Balanced fertilizer at ½ strength and Vitamin B-1 shall be used per manufacturer's recommendations with the first watering.
  - Loss of tree from lack of nutrients or over-fertilizing shall be considered a warranty item and the tree shall be replaced at no additional cost to the Owner.
  - Contractor should use an anti-transpiration agent such as Vapor Guard, or approved equal, as needed to prevent excessive wilting and wind damage.

Part 3 - Execution

- Trimming and Pruning
  - The Contractor shall prune off all dead limbs from the salvage material.
  - Contractor consult with the Owner's Certified Arborist before removing canopy branching from the tree only, as needed, to reduce stress on tree during the moving operation.
  - Pruning cuts shall be clean and outside the branch collar. Techniques shall follow current ANSI 300 Standards for Pruning. Pruning shall be done in such a manner as to retain the original character and structure of the trees.
  - Any tree which is found to be diseased at this stage may be removed from the salvage list with the approval of the Architect.
  - Contractor is responsible for protection of cuts after pruning. No pruning paint shall be applied to wounds.
  - Architect and Owner's Arborist shall inspect tree pruning prior to sideboxing. Trees which, in their opinions, are of unacceptable shape, size or canopy may be removed from the salvage list at this time.

- Boxing
  - Contractor shall identify the size (caliper) of the tree and the corresponding box size. The chart below gives the approximate relationship between box size and caliper size. Contractor may, at his discretion, increase the box size, but should not decrease the box sizes from those listed below. Caliper sizes indicated on the tree inventory plan may vary some from actual conditions. Contractor is responsible for determining actual caliper size for each tree identified for salvage.

Trunk Diameter in inches	Box Size in Inches
Under 4"	42
7-1/2"	45
8-1/2"	48
10"	51
13"	54
14"	57
Over 14"	60 - 120"

  - The Contractor shall sidebox the trees a minimum of 35 days prior to removing the trees.
  - During the sideboxed holding period, the Contractor shall provide water, nutrients and herbicides to the

salvaged material, as needed. Failure to provide proper care during this stage, which results in the loss of the material, shall be treated as a warranty item.
  - Removal: As the tree is removed from the ground, the Contractor shall provide reasonable care during this operation to avoid breaking of limbs and scarring of the trunk.
  - Transportation:
    - The Contractor shall transport the trees from their location in the field to the designated holding yard.
    - This transportation includes the loading and unloading of the trees from the truck or other transporting vehicle.

- Maintenance of plants during holding period
  - The Contractor shall provide all labor, tools and materials necessary for the maintenance of the salvage materials in the holding yard during a holding period as previously specified.
  - The Contractor shall be responsible for the replacement of salvage material which dies or is seriously damaged during the holding period. See the warranty section for complete specifics of this warranty.
  - Holding Yard:
    - The Contractor shall store or make arrangements for the storage of all salvaged material in the secure yard during construction. This yard shall be located as designated by the Architect and Owner's Representative.
    - The holding yard shall be open for prearranged inspections on a regular basis by the Architect and Owner's Representative.
    - All salvage material shall be clearly labeled and stored in one specific location if other plant material is stored onsite.
  - Time Limitation: The Contractor shall be responsible for maintenance of the material as previously after delivery of the material to the holding yard.
  - Water: The Contractor shall be responsible for provision of a temporary drip irrigation system sufficient to provide water to the salvage material. Contractor shall be responsible for making new connection and removing temporary lines at end of holding period.
  - Fertilizer: The Contractor shall be responsible for provision of nutrients needed to maintain the material in a healthy condition.
  - Other: The Contractor shall be responsible for the provision of any other materials necessary for the maintenance of the salvage material in a healthy condition and secure location.
  - The Contractor shall provide qualified manpower on a regular basis to inspect the trees for health and vigor.
  - The Contractor shall participate with the Architect and Owner's Representative on a monthly basis for inspection.

- Monthly operations
  - The planting of the salvaged material will be done in the same general area as the salvage operations. Exact location will be per the landscape plans.
  - Plant hole sizes and planting mixtures will be as shown on the plans.
  - Contractor shall coordinate planting and new irrigation with the general landscape contractor. The general landscape contractor will install the permanent irrigation system. The irrigation system must be functional within a week of tree installation.

- Cleanup
  - Contractor shall maintain the area of his work free from debris and extraneous material throughout the course of this work.

End of Section 02920

DIVISION 2 – SITEWORK

Section 02930 – Palm Tree Salvage and Planting

Introduction

This section contains standards for the identification, removal, storage and replanting of existing palm trees on site.

Part 1 - General

- Create a reference sheet for identification of trees to be salvaged.

- Provide backflow prevention devices for the temporary irrigation system if required by governing codes.

    - Holding Yard: The holding yard for this project will be on the project site, as indicated on the drawings. Water shall be provided by the Contractor.

- Identification of salvage material
    - The contractor, Architect and Owner's representatives will determine the final selection of salvage specimens based on specimens already identified, current health, accessibility, viability and appearance.
    - These trees shall be final-tagged with colored tape in conspicuous locations, irrigated, and fenced with temporary construction fence to avoid construction damage until they are removed.
    - Contractor is not to remove or work on any salvage material until after the Owner, or designated agent, has determined the limits of the salvage and work area, and has given the Contractor written consent to proceed.

- Removal of salvage material
    - Description of Work: The Contractor shall provide all labor, tools and materials necessary to remove salvage plants from the ground, frond- and rootball-protect them (when required) and transport them to the holding yard.
    - If it is determined that any of the trees to be transplanted can be immediately located to their new location, the Contractor may do so, but must water, maintain and protect the trees during construction.
    - If any trees are to be installed directly onto another site on UA property, the final site will need to be Bleu staked. Allow time for approval.
    - Access: Access shall be entirely within the Owner's property. Damage to surrounding areas not within the property, including but not limited to buildings, curbs, paving, vegetation and utilities, shall be the Contractor's responsibility.
    - The Architect will also identify areas within the property that are not to be disturbed. Any damage within these areas will also be the Contractor's responsibility. If designation of these areas makes access impossible, Contractor shall notify the Architect.

- Protection
    - Contractor shall provide barrier protection to warn pedestrians about the plant excavations, and reasonably prevent someone from falling into one.
        - Palms should be planted immediately or stored for no more than 48 hours in a shaded area where the total tree shall be misted frequently.
        - Do not store palm trees on an asphalt surface.
        - Covering material must allow air movement so that heat does not build up under the covering.
        - Do not use plastic or rubberized tarpaulins.
        - Do not stack palms, but lay them in a single layer on a flat surface.
        - If the trees are stored for more than a day, the rootballs must be covered with a burlap tarp and kept moist.
        - Planting delays may result in rejection of the palm.
    - Tagging and preparation:

    - Exercise extreme caution while pruning palms, to prevent spread of vascular diseases. Dip pruning tools in a sterilizing agent before beginning pruning and before moving from one palm to another.
    - After tagging of the palms, remove all thatch or dead leaves and cut back all resulting leaf bases to within 2 inches of the base of the trunk. Do not use chain type saws for pruning. Do not cut into trunk.
    - The crown of the palm shall be reduced to leave at least 1/3 of the green fronds during shipping.
    - Use soft rope (organic twine) to tie remaining fronds to protect crown bud.
    - Do not permit fronds to become damaged by means of restraint.
  - Loading and unloading:
    - A lattice type crane, a telescoping type crane or a specially designed tree crane is acceptable for lifting and off-loading palm trees.
    - For transporting, the trailer used shall be long enough to avoid damage to the heart of the palm.
    - Loading and unloading of palms must be accomplished with the aid of nylon or fabric sling/straps with a minimum width of 4 inches.
    - Palms should be carefully lifted off the truck setting the choker to the outside so to turn the palm to the inside as it is lifted.
    - Extreme caution must be used to ensure that the heads are not caught, pulled on banged into or shaken; any of these can damage the bud.
    - Excessive scarring or trunk damage will not be permitted and will be cause for rejection of the palms at the project site.

- Coordination
  - Remove all debris, trash and excess materials found on site or generated by the Contractor's operations.
  - Prior to digging and transplanting of palm trees the Contractor shall notify the Owner's Representative at least two (2) working days before starting any work.
  - Contractor is to provide all water and coordinate between temporary and permanent irrigation systems.

- Warranty
  - The Contractor shall warranty plants from damage caused by his own operations including boxing, holding and replanting. This warranty includes breakage of major limbs (after trimming), destruction of major root systems, excessive scarring to the trunk, and death from stress or severe insect damage.
  - Should replacement material be required under this warranty, Contractor is responsible for the procurement and transportation of the replacement material.
  - Plant materials shall be guaranteed for one year following final acceptance of planting operations under this section.
  - Guarantee nursery-grown palms against the bud rot Thielaviopsis paradoxa, the fungus Fusarium oxysporum, and the root disease Phytophthora palmivora and similar vascular infections for a period of six months from the start of the beginning of the maintenance period.
  - Replace without additional cost to the Owner all dead palms and all palms not in a vigorous condition as determined by the Owner's Representative. Replacement shall be when directed by the Owner's Representative.
  - Apply "Subdue" per manufacturers recommendation by flooding the planting basin as often as label permits during maintenance period.
  - Coordinate irrigation requirements of new palms with irrigation plans. The Contractor shall maintain the existing landscaping and irrigation systems.
  - Perform tensiometer testing and visual inspection of observation vents regularly during the maintenance period to verify the correct soil moisture at the surface and at the bottom of the rootball, report levels to the Owner's Representative in writing monthly.
  - Fertilize and apply soil and foliar drench.
  - Do not trim any green or partially green fronds during the maintenance period.

Part 2 - Products

- Palm trees
  - All palms shall have been grown in accordance with good horticultural practices under climatic conditions similar to those for the project for at least two (2) years prior to shipment to the site.
  - All palms shall be specimen quality, well-grown, symmetrical, without curvature or leaning trunk from the

perpendicular and so trained or favored in development and appearance as to be superior in form, compactness and symmetry of crown. All palms shall be within one foot above or below the height specified, measured from the bottom of the crown bud to finish grade after installation.
  - All palms shall be sound, healthy and vigorous, well foliated prior to pruning and showing no signs of disease. They shall be free of disease, insect pests, eggs or larvae. They shall also have well developed root systems. All palms shall be free from physical damage or adverse conditions which would prevent thriving growth.
  - Verify that all field dug palms contain an adequate root ball to guarantee transplantation. Do not wrap root ball in plastic. Do not install palms that have damaged root balls.
  - Minimum box size, minimum trunk caliper, and initial height are identified under each tree species.
  - For palm trees only, the height shall be measured from the ground line to the base of the growing bud.

- Accessories
  - Clean washed concrete sand.
  - Frond Tie: Minimum 1/2 inch diameter soft sisal rope capable of maintaining frond in tied condition for 4 months.
  - PVC Pipe: Schedule 40, 4 inch diameter perforated pipe.
  - Filter fabric for covering PVC perforated pipe.

- Fungicides:
  - Where a product trade name or company is listed, "or equal" substitutions may be offered.
  - Soil Drench: "Subdue" by CIBA-GIEGY.
  - Foliar Drench:
    - "Kocide" Copper T.S. fungicide.
    - "Manzate", dithane flowable fungicide.
    - "Benelate" fungicide.

- Fertilizers and amendments
  - Where a product trade name or company is listed, "or equal" substitutions may be offered.
  - "Wood-Ace" Palm Special fertilizer (11-4-6) as manufactured by Vigoro Industries.
  - "Soluble Stem" micronutrient fertilizer as manufactured by Peters Fertilizer Products of W.R. Grace and Company, Fogelsville, PA 18051.
  - "Minor-Gro" fertilizer as manufactured by W.R. Grace and Company, Fogelsville, PA 18051.
  - Hydrated urea.
  - "Basic H" as manufactured by Shaklee Corporation.

- Water
  - Clean, fresh, and free of substances or matter which could inhibit vigorous growth of plants.
  - Water shall not contain elements toxic to plant life.

Part 3 - Execution

- Existing palm tree removal/salvage
  - Existing palms designated for removal shall be excavated, prepared for salvage, and tree- and rootball-protected.
  - Rootballs of existing palm trees to be transplanted shall have a minimum diameter of the trunk diameter plus 4 feet, and shall be at least 16 inches in depth.
  - Contractor shall protect existing plant material, walls, pavements, and other site amenities from damage.

- Excavation
  - A trenching machine, a backhoe with a narrow bucket or a properly sized tree spade is acceptable as the excavation equipment. The exact equipment used must be approved by the Owner's Representative.

- Execution of planting new palm trees
  - Layout palms at locations shown on the plans. Use 3 foot lath, color coded for each palm. The Owner's

Representative will check location of palms in the field to exact position before planting begins.

- Where palms are to be preplanted to permit site improvements to be installed around them, be responsible for the accurate layout of those palms, measured to their centerlines.
- Provide protection of those palms while work is taking place. Provide bracing per drawings.
- Provide regular irrigation as necessary until final acceptance. Vitamin B-1 shall be used per manufacturer's recommendations with the first watering.
- Excavation
  - "Hand dig" planting pits and protect existing utilities, where utilities may be encountered.
  - The palm tree excavation shall be a minimum of 5 feet wide by 5 feet long By depth of rootball plus 12 inches.
  - It is acceptable for the final site grade around the palm to be 6 to 12 inches higher than the original soil line of the root ball.
  - The depth of the pit shall be approved by the Owner's Representative prior to planting the tree.
- Water-test tree pits:
  - Water test each tree pit for drainage by filling the holes twice in succession with water.
  - If when filled with water the second time the pit fails to drain within 24 hours, then additional excavation is necessary to break through the impermeable layer or to provide a thick under layer of clean washed concrete sand below the root ball.
- Clean moist washed concrete sand should be added to the bottom of the hole and tamped or water jetted, prior to insertion of the tree.
- Install drainage and viewing vent pipe(s) in each tree pit to assure wetting of the whole root ball and to enable monitoring and viewing of the tree pit chamber.
- The vents shall be 4 inch diameter perforated PVC, with sufficient length to extend to the bottom of the tree pit. Provide filter cloth to cover perforated PVC pipe.
- Do not backfill drainage or viewing pipes.
- Backfill shall be clean site soil. Palms shall be placed in the pit and watered in as they are backfilled. Watering shall be done with a pipe sticker, six foot length topped with a 90 degree elbow and placed on the end of at least a 3/4 inch hose with adequate volume. Work the sticker up and down, washing the soil down around the rootball as the backfilling is accomplished. The backfill soil shall be thoroughly saturated, all around the periphery of the root ball, before going on to the next palm. It is of the utmost importance that this procedure occur as each palm is being planted, not later in the day, or the next day.
- Apply fertilizer amendments during planting by mixing one ounce of "Basic H" and two tablespoons of "Stem" in a 5 gallon container of water. Drench area around each palm when backfilling is almost complete. Water in thoroughly.
- A 6 inch deep swale shall be made around each palm tree to provide water holding capability.
- After planting, the crown buds of all the palms shall be within 1 foot of the designated palm height above finish grade.

- Fungicide
  - After planting, drench the soil with the fungicide, "SUBDUE" per manufacturers recommendations by flooding the planting basin. Reapply as often as label permits throughout the maintenance period.

- Irrigation
  - It is essential that irrigation be deep enough to assure wetting of the whole root ball. Vitamin B1 shall be used per manufacturer’s recommendations with the first watering.
    - Maintain the irrigation system to the existing trees and supplement additional water to newly planted trees as necessary for establishment.
    - Check for water penetration as well as drainage throughout the root zone at least once a week and monthly thereafter for duration of warranty. These findings shall be entered into a log with the dates and initials of person verifying the drainage. Monitoring shall be done the day prior to applying supplemental water. After the initial watering-in, water the palms with a good soaking, 40-50 gallons per palm every day. Watering amounts and schedule are estimates and are subject to change by Owner's Representative after reviewing the log and observing in the field.

- Fertilizing
  - After four to six weeks, apply four pounds per palm tree and at six month intervals apply 5 to 6 pounds per

palm tree of "Woodace Palm Special" fertilizer in a one inch band around the base of each palm.

- After 14 days then monthly, spray the fronds (foliar drench) with the following mixture. No compounds shall exceed manufacturers recommended rate. The following rates are for a 100 gallon tank mix.
  - "Kocide" 101 w.p. at 3/4 pound; or "Manzate" at one quart.
  - W.R. Grace, "Minor-Gro" at 1/2 cup.
  - Hydrated urea and five cups or 2-1/2 pounds.
  - Spread sticker at 8 ounces "Basic H", by Shaklee Corp., Hayward California.
  - "Benlate" at one pound.

End of Section 02930