



**Pima County Natural Resources, Parks and Recreation Department  
Pima County Project Management Office**

# **2016 Standard Specifications and Details for Park Development**

**Prepared by McGann & Associates Inc., Landscape Architects and Planners  
for Pima County Natural Resources, Parks and Recreation Department  
and Pima County Project Management Office**



**Pima County Natural Resources, Parks and Recreation Department  
Pima County Project Management Office**

# **Pre-Design Investigations**

**Prepared by McGann & Associates Inc., Landscape Architects and Planners  
for Pima County Natural Resources, Parks and Recreation Department  
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**Index – Pre-Design Investigations**

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PRE-DESIGN INVESTIGATIONS – SITE SURVEYS ..... 2

PRE-DESIGN INVESTIGATIONS – GEOTECHNICAL REPORT ..... 4

PRE-DESIGN INVESTIGATIONS – UTILITY INVESTIGATIONS ..... 6

## **PRE-DESIGN INVESTIGATIONS - SITE SURVEYS**

### **Introduction:**

A complete and accurate survey of each project site is essential for the design and engineering of park improvements. This survey information is also an important part of the permanent set of records maintained by the Pima County Natural Resource, Parks, and Recreation Department (and/or the Pima County Project Management Office). A land survey shall be performed for each new or expanded park project and shall be as described below.

### **Information to be provided by Pima County:**

The Pima County Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office) will provide the design consultant and/or surveyor with the following:

- A written legal description of the project site
- Authorization to enter the site for the purpose of performing a land survey
- A title report for the subject parcel(s)

### **Scope of Survey Work:**

The scope of the survey work to be performed for each new or expanded park development project shall include:

- Field work as required to make tie-ins to existing benchmarks for horizontal and vertical controls
- Written documentation of benchmarks used for the subject survey
- The setting of field panels as required for aerial photography and survey work
- Aerial photography of the project site
- Field work as required to locate all boundary corners and as required to confirm the property line distances and bearings included in the legal description
- The installation of new or replacement corner pins as may be required
- Mapping of all recorded easements associated with the subject parcel
- Mapping of existing improvements on the project site, including, but not limited to: buildings, roads, pavements, fences, gates, overhead utilities, at-grade utility structures and appurtenances, and underground utility lines
- Topographic mapping using a one-foot contour interval supplemented with spot elevations at high points, low points, and other appropriate locations
- Spot elevations for fixed improvements including, but not limited to: finished floors, slabs, roadway and parking lot pavements, curbs, headers, courts, slabs, sidewalks, utility structures, manhole rims, storm drain inlets, storm drain inverts, and sanitary sewer inverts
- Mapping of the location and elevation of other site features that may be relevant to the proposed project including, but not limited to, rock outcrops, specimen trees, and saguaro cacti

## **PRE-DESIGN INVESTIGATIONS - SITE SURVEYS**

### **Deliverables:**

Work products to be delivered to the Design Consultant and the Pima County Natural Resources, Parks, and Recreation Departments shall include:

- A hardcopy plot of the rectified aerial photograph plotted at a scale of 1" = 40' or larger
- A hardcopy plot of the boundary, easement, culture, and topographic survey map, sealed and signed by the Registered Land Surveyor of record. (The map shall be dated and shall include a written summary of all vertical and horizontal benchmarks and controls used in conjunction with the survey).
- Digital files for the aerial photograph in a file format acceptable to the Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office). Files shall be provided on compact disk or thumb drive.
- Digital files for the survey map in AutoCad format. (The most recent release of AutoCad shall be utilized except as may be approved by the Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office). Files shall be provided on compact disk or thumb drive.
- Legal descriptions and drawings of all new easements required for new project utilities. The legal descriptions and drawings shall be in the format needed for recordation.

## **PRE-DESIGN INVESTIGATIONS - GEOTECHNICAL REPORT**

### **Introduction:**

Information related to surface and subsurface soil conditions on the project site is essential to the design and engineering of park structures, buildings and pavements. It is also important to have adequate information related to the character of the soil profile after completion of proposed grading. Geotechnical investigations shall be performed in conjunction with each design project and shall be as described below.

### **Information to be provided by Pima County:**

The Pima County Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office) will provide the design consultant and/or the geotechnical engineer with the following:

- Results of environmental assessments as may have been performed by others to detect the presence of hazardous materials on the project site
- Authorization to enter the site for the purpose of performing geotechnical investigations

### **Scope of Geotechnical Investigation Work:**

The scope of the geotechnical investigation work shall include:

- Soil borings in the vicinity of each proposed building or structure and the analysis of collected soil samples as required to identify and describe subsurface soil conditions and as required to establish soil bearing capacities
- Soil borings in the vicinity of each proposed parking lot and/or park road and the analysis of collected soil samples as required to develop recommendations for pavement section(s)
- Soil borings or test pits in all areas where trenching will be required for underground utility installation. (The borings and test pits shall be as required to determine the presence of bedrock, caliche, or other soil conditions unfavorable to the trenching work.)
- Soil borings or test pits in all areas where surface grades will be lowered by grading. (The scope of the boring and test pit work shall be sufficient to determine the presence of bedrock, caliche, or other conditions detrimental to the planting and maintenance of turf grass and/or other landscape plantings.)
- Infiltration tests in the vicinity of proposed leach fields as required for the design, engineering, and permitting of septic tank and leach field disposal systems, as applicable
- The collection of soil samples from project locations proposed for landscape developments and the analysis of the samples for horticultural properties. (The analysis to include measurement of soil; texture, pH, salinity, exchangeable cations, and nutrients.)

## **PRE-DESIGN INVESTIGATIONS - GEOTECHNICAL REPORT**

### **Deliverables:**

The work product to be delivered to the Pima County Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office) shall be a Geotechnical Report that includes:

- Copies of all soil boring and test pit logs
- The results of laboratory analyses related to soil type, soil texture, plasticity index, and other relevant physical properties of the soil
- The results of laboratory analyses related to soil nutrients, soil fertility, and other horticultural properties of the soil
- A narrative summary, with accompanying maps, showing the approximate limits and depth of areas on the site with shallow bedrock, caliche, and/or other unfavorable soil conditions
- Recommendations for building foundation design
- Recommendations for post-tension slab design, as applicable
- Recommendations for flexible and rigid pavement design, as applicable
- Recommendations for the safe implementation of trenching work associated with underground utilities
- Recommendations for the grading and treatment of cut and fill slopes
- Recommendations for soil amendments and conditioners to be incorporated into the soil in areas to be planted with turf grass
- Recommendations for soil amendments and conditioners to be incorporated into the soil areas to be planted with trees and shrubs

## **PRE-DESIGN INVESTIGATIONS - UTILITY INVESTIGATIONS**

### **Introduction:**

The presence of existing utility systems in the vicinity of a project and the capacity of these utilities to support the proposed park development can have significant impact on the feasibility of the project and on the cost of construction. During the preliminary design phase of each project, the presence, condition, and capacity of utilities required for the proposed project shall be checked and documented.

### **Information to be provided by Pima County:**

The Pima County Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office) will provide the design consultant with the following:

- The best available as-built drawings related to private (Pima County owned) utilities as may be present on the project site

### **Scope of Utility Investigation Work:**

The scope of the utility investigation work to be performed by the design consultant shall include contacting the appropriate utility companies to identify or confirm the following:

- The size and location of potable water mains in the vicinity of the site. (The investigation shall include confirmation that the potable water main(s) can be tapped for new potable water services.)
- The static pressure in the potable water main at the proposed point-of-connection
- The size and location of reclaimed water mains in the vicinity of the site. (The investigation shall include confirmation that the reclaimed water main(s) can be tapped for new potable water services.)
- The static water pressure in the reclaimed water main at the proposed point-of-connection
- The size, location, and depth of existing sanitary sewers in the vicinity of the project. (The investigation shall include confirmation that the sewer can be extended to serve new facilities on the project site.)
- The location and type (voltage, etc.) of electric power lines in the vicinity of the project site. (The investigation shall include confirmation that the local electric power distribution system has the capacity to provide the service(s) required for the proposed park development.)
- The location of telephone lines in the vicinity of the project site. (The investigation shall include confirmation that the local telephone system has the capacity to provide the service(s) required for the proposed park development.)

## **PRE-DESIGN INVESTIGATIONS - UTILITY INVESTIGATIONS**

### **Deliverables:**

The work product to be provided to the Pima County Natural Resources, Parks, and Recreation Department (and/or the Pima County Project Management Office) shall include the items listed below. These items shall be included with the Schematic Design (or 30% Design) submittal.

The utility information shall be noted on the Schematic Design (or 30% Design) drawings or included in a supplemental report to be submitted with these drawings.

- Name of the potable water provider, the location of existing main to be tapped for the new service, the approximate location and size of new service, and the static water pressure at the proposed point of connection
- Name of the reclaimed water provider, location of existing main to be tapped for the new service, the approximate location and size of new service, and the static water pressure at the proposed point of connection
- Name of the sanitary sewer system operator, the location and size of the sewer line or manhole where the new connection will be made, the approximately routing of the new sewer, and the size of the sanitary sewer line(s) proposed for the project
- Name of the electric utility company serving the project site, the location of the existing power lines in the vicinity of the site, the approximate demand or load associated with the project, and the approximate location of new transformers and metered services
- Name of the telephone company serving the project site, the location of the existing telephone lines in the vicinity of the site, the quantity of phone lines required for the project, and the approximate location of new telephone pedestals and panels



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# **Design and Construction Checklists**

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**Index – Design and Construction Checklists**

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PRE-ENGINEERED SHADE CANOPIES AND TENSIONED FABRIC SHADE STRUCTURES..... 2

PRE-ENGINEERED RAMADAS ..... 5

PRE-ENGINEERED RESTROOM BUILDINGS ..... 8

PLAYGROUND EQUIPMENT AND SURFACING ..... 11

FENCING, GATES, AND POST-AND-CABLE BARRIERS ..... 15

IRRIGATION SYSTEM ..... 18

LANDSCAPE WORK ..... 22

NATIVE PLANT SALVAGE WORK..... 26

## **PRE-ENGINEERED SHADE CANOPY AND TENSIONED FABRIC SHADE STRUCTURE CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving pre-engineered shade canopies and/or tensioned-fabric shade structures.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 13-31-23 (Pre-Engineered Shade Canopies and Tensioned Fabric Shade Structures)
3. Standard Details P-2300 through P-2302, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Detail for the proposed shade canopy is shown or referenced on the project plans. (See Standard Detail P-2300, P-2301, or P-2302).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 13-31-23 (Pre-Engineered Shade Canopies and Tensioned Fabric Shade Structures) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that information is included on the project plans showing the proposed location and orientation of pre-engineered shade canopy.
2. Confirm that information is included on project plans showing relationship of shade canopy to playground equipment covered, including the manufacturer's designated fall zones for playground equipment.
3. Confirm that the project plans show an ADA accessible route to playground equipment transfer stations and demonstrate that shade canopy columns are not in conflict with the accessible routes.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.

## **PRE-ENGINEERED SHADE CANOPY AND TENSIONED FABRIC SHADE STRUCTURE CHECKLIST**

2. Confirm that project plans include note(s) indicating that sealed shop drawings for the pre-engineered shade canopy and/or tensioned fabric shade structure will be made by the Contractor as part of a "Deferred Submittal."
3. Confirm that the powder coat color for shade canopy frame is noted on the project plans. (Alternatively, confirm that a note is included requiring Contractor to submit chips / samples to the Owner for powder coat color selection).
4. Confirm that the color for shade canopy and/or tensioned fabric shade structure fabric is noted on the project plans. (Alternatively, confirm that a note is included requiring Contractor to submit chips / samples to the Owner for fabric color selection).

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit Shop Drawings for shade canopy and/or tensioned fabric shade structure, sealed by an Arizona registered Structural Engineer. The Shop Drawings to include information related to; the foundation(s), structural framing, and structural connections. (See Specification Section 13-31-23, Paragraph 1.10-B).
2. Contractor to submit color chips / samples for powder coat colors and roof fabric if colors are not specifically noted on the project plans. (See Specification Section 13-31-23, Paragraphs 2.2-C.1 and 2.5-D).

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Perform standard inspection(s) of materials and installation of structure and fabric associated with the pre-engineered shade canopy.

### **Construction Phase Checklist - Inspections and Testing to be performed by an Independent Testing Laboratory:**

1. Sample and test concrete from column foundations. (if required by the approved Shop Drawings).

### **Construction Phase Checklist - Inspections to be made by Certified Playground Safety Inspector**

1. Verify that the top of footings are below required depth of resilient surfacing. (See Specification Section 32-18-16, Paragraph 3.9-A).
2. Verify that the location of shade canopy columns are outside the fall zones associated with play equipment covered. (See Specification Section 32-18-16, Paragraph 3.9-A).

## **PRE-ENGINEERED SHADE CANOPY AND TENSIONED FABRIC SHADE STRUCTURE CHECKLIST**

### **Checklist - Turn-Over Equipment:**

1. Manufacturer's Maintenance Instructions for Pre-Engineered Shade Canopy and/or Tensioned Fabric Shade Structure.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for structural frame, frame finishes, and shade fabric. (See Specification Section 13-31-23, Paragraph 3.6-A.

## **PRE-ENGINEERED RAMADA CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving pre-engineered ramada structures.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 13-34-18 (Pre-Engineered Ramadas)
3. Standard Details P-2200 through P-2202, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Detail for the proposed ramada structure is shown or referenced on the project plans. (See Standard Details P-2200 through P-2202).
2. Confirm that the appropriate Standard Detail for precast concrete picnic tables to be installed at the ramada is referenced on the project plans, as applicable. (See Standard Details P-1003 and P-1004).
3. Confirm that the appropriate Standard Details for barbeque grills and associated pavement to be installed or constructed at the ramada are referenced on the project plans, as applicable. (See Standard Details P-1005 through P-1007).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 13-34-18 (Pre-Engineered Ramadas) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the finished floor elevation for the ramada is noted on the project plans.
2. Confirm that information is included on project plans showing the proposed location and orientation of the ramada structure.
3. Confirm that the electrical service to the ramada lighting and convenience outlets (if applicable) is shown on the project plans.
4. Confirm that the project electrical plans show or note quantity and location of electrical outlets to be installed at the ramada structure.
5. Confirm that the project plans show an ADA accessible route to the proposed ramada.

## **PRE-ENGINEERED RAMADA CHECKLIST**

6. Confirm that the quantity and location of picnic tables to be installed at the ramada are shown or noted on the project plans, as applicable.
7. Confirm that the location of the barbeque grill and associated accessible paving are shown or noted on the project plans, as applicable.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that project plans include a note(s) indicating that sealed Shop Drawings and Structural Calculations for the pre-engineered ramada structure will be made by the Contractor as part of a "Deferred Submittal." Notes should indicate that it is the Contractor's responsibility to obtain the Shop Drawings from the building manufacturer, that it is the Contractor's responsibility to submit and process the Shop Drawings through the Building Safety Department, and that it is the Contractor's responsibility to obtain all required permits.
3. Confirm that the powder coat color(s) for the ramada frame are noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for powder coat color selection).
4. Confirm that the color for the ramada roof is noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for roof color selection).

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit Shop Drawings for the ramada structure. The Shop Drawings are to be sealed by an Arizona registered Structural Engineer. Shop drawings must include information related to: foundation, ramada framing, architectural components, and finishes. (See Standard Specification Section 13-34-18, Paragraph 1.9-B).
2. Contractor to submit color chips / samples for powder coat colors and roof panels colors if not specifically noted on the project plans. (See Specification Section 13-34-18, Paragraph 1.9-C).

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that electrical conduits have been installed below the ramada slab and to column locations, as applicable. Inspection(s) to be made prior to pouring the ramada floor slab.

## **PRE-ENGINEERED RAMADA CHECKLIST**

2. Perform standard inspection(s) of finishes, fixtures, and equipment associated with the ramada structure.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. Inspect work and test compaction of subgrade below footings and slab as required by the approved shop drawings.
2. Sample and test concrete for floor slab and footings as required by the approved shop drawings.
3. Perform special inspection of structural welding work as required by the approved shop drawings.

### **Checklist - Turn-Over Equipment:**

1. N/A

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for the ramada structure. See Specification Section 13-34-18, Paragraph 3.9-A.

## **PRE-ENGINEERED RESTROOM BUILDING CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving pre-engineered restroom buildings.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 13-34-23 (Pre-Engineered Restroom Buildings)
3. Standard Details P-2100 through P-2106, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Detail for the proposed restroom building is shown or referenced on the project plans. (See Standard Details P-2000 through P-2006).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 13-34-23 (Pre-Engineered Restroom Buildings) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the finished floor elevation for restroom is noted on the project plans.
2. Confirm that information is included on project plans showing the proposed location and orientation of the restroom building.
3. Confirm that the potable water service to restroom is shown on the project plans.
4. Confirm that the sanitary sewer connection to restroom is shown on the project plans.
5. Confirm that the electrical service to restroom (and site lighting electrical panels to be installed in the restroom) are shown on the project plans.
6. Confirm that the project electrical plans show or note quantity and location of electrical outlets to be installed in the restroom building (and work room /snack-bar space(s), as applicable).
7. Confirm that a telephone service(s) for the irrigation controller (if applicable) and a telephone service for the work space / snack bar phone (if applicable) are shown on the project plans.

## **PRE-ENGINEERED RESTROOM BUILDING CHECKLIST**

8. Confirm that the project plans show an ADA accessible route to all restroom entries, concession entries, and concession service windows, as applicable.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that project plans include a note(s) indicating that sealed Shop Drawings for the pre-engineered restroom building will be made by the Contractor as part of a "Deferred Submittal."
3. Confirm that the paint colors for building exterior walls, building interior walls, doors, and trim are noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for paint color selection).
4. Confirm that the color for restroom metal roof is noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for roof color selection).

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit Shop Drawings for the restroom building. The Shop Drawings are to be sealed by an Arizona registered Structural Engineer. Shop drawings must include information related to: foundation, building structure, architectural components and finishes, building electrical system, building plumbing system. (See Standard Specification Section 13-34-23, Paragraph 1.10-B).
2. Contractor to submit color chips / samples for paint colors and roof panels if colors are not specifically noted on the project plans. (See Specification Section 13-34-23, Paragraphs 2.2-B, 2.2-C, 2.2-D, 2.4-A, and 2.5-A).

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that plumbing stub-outs below restroom building have been installed and tested. Inspection(s) to be made prior to placement of pre-engineered restroom building.
2. Verify that electrical, telephone, irrigation conduits have been installed below restroom building. Inspection(s) to be made prior to placement of pre-engineered restroom building.

### **PRE-ENGINEERED RESTROOM BUILDING CHECKLIST**

3. Perform standard inspection(s) of finishes, fixtures, and equipment associated with restroom building and associated equipment.

#### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. Inspect work and test compaction of subgrade below building foundation.
2. Inspect work and test compaction of aggregate base course foundation.
3. Sample and test concrete. (If Shop Drawings indicate concrete is to be used in conjunction with restroom foundation construction).

#### **Checklist - Turn-Over Equipment:**

1. Operations and Maintenance Manual for Pre-Engineered Restroom Building.

#### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for building (walls, floors, roof decks, etc). See Specification Section 13-34-23, Paragraph 3.7-A.
2. Letter of Guarantee for restroom building furnishings, fixtures, and equipment. See Specification Section 13-34-23, Paragraph 3.7-B.

## **PLAYGROUND EQUIPMENT AND SURFACING CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving playground equipment, fitness / exercise equipment, and associated resilient surfacing.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 32-18-16 (Playground Equipment and Surfacing)
3. Standard Details P-900 through P-902, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Details for the proposed playground equipment and surfacing are shown or referenced on the project plans. (See Standard Details P-900 through P-902).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 32-18-16 (Playground Equipment and Surfacing) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the project plans show separate play structures / areas for age groups 2-5 years and 5-12 years as recommended by CPSC Publication 325 (Public Playground Safety Handbook)
2. Confirm that the project plans show the location, layout, and grading of the curb and/or walkways to be installed at the perimeter of the proposed playground.
3. Confirm that the project plans show the location and layout of all play structures and associated signs with the limits of the use zones depicted.
4. Confirm that the project plans show the location and layout of all fitness equipment and associated signs with the limits of the use zones depicted.
5. Confirm that the project plans show rubberized resilient surfacing from an accessible perimeter walkway to all designated transfer stations associated with the play structure.
6. Confirm that the project plans indicate rubberized resilient surfacing and/or engineered wood fiber surfacing within all use zones associated with the play structure and/or fitness equipment.

## **PLAYGROUND EQUIPMENT AND SURFACING CHECKLIST**

7. Confirm that the project plans show or note the requirements for signs that designate the play structure as appropriate for certain age groups. (2-5 years and 5-12 years, typical).
8. Confirm that the project plans show the relationship between the play structure (and its associated use zones) and the columns associated with pre-engineered shade canopies and/or tensioned fabric shade structures to be installed in the vicinity of the play structure, as applicable.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that the colors for the playground equipment and fitness equipment are noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for color selection).
3. Confirm that the colors for the rubberized resilient surfacing are noted on the project plans. (Alternatively, confirm that a note is included requiring the Contractor to submit color chips to the Owner for surfacing color selection).

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit a letter that the playground and fitness equipment is certified by the International Play Equipment Manufacturers Association (IPEMA). See Specification Section 32-18-16, Paragraph 1.9-A.
2. Contractor to submit a letter that the rubberized resilient surfacing is certified by the International Play Equipment Manufacturers Association (IPEMA). See Specification Section 32-18-16, Paragraph 1.9-B.
3. Contractor to submit a letter that the engineered wood fiber surfacing is certified by the International Play Equipment Manufacturers Association (IPEMA). See Specification Section 32-18-16, Paragraph 1.9-C.
4. Contractor to submit an Equipment Installation / Use Zone Diagram for each play structure as provided by the playground equipment and/or fitness equipment manufacturer. See Specification Section 32-18-16, Paragraph 1.9-D.
5. Contractor to submit color chips for the paint / powder coat and plastic components to be used for the play equipment and/or fitness equipment. See Specification Section 32-18-16, Paragraph 1.9-E.

## **PLAYGROUND EQUIPMENT AND SURFACING CHECKLIST**

6. Contractor to submit Manufacturer's Inspection, Maintenance, and Repair Instructions and the manufacturer's Installation Instructions for the playground equipment, fitness equipment, and resilient surfacing materials. See Specification Section 32-18-16, Paragraph 1.9-F.
7. Contractor to submit a sample of pea gravel if used as surfacing below or adjacent to fitness equipment. See Specification Section 32-18-16, Paragraph 1.9-G.
8. Contractor to submit a copy of the Post-Installation Inspection and Certification Report as prepared by an independent, National Playground Safety Institute (NPSI) Certified Playground Safety Inspector. See Specification Section 32-18-16, Paragraph 3.9-A. The inspection report shall include the results of the Critical Fall Height Test with resulting g-max and HIC scores provided.

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that the forms for the perimeter curb are of a depth and alignment that is consistent with the project plans and the standard details.
2. Verify that the playground area has been excavated and graded to allow for the installation of drainage aggregate and resilient surfacing in accordance with the standard details.
3. Verify that the drainage aggregate and filter fabric have been installed in accordance with the standard details and specifications.
4. Verify that temporary fencing is in place prior to the start of play structure erection. Fencing to be installed to prevent public use of the structure prior to final assembly, surfacing installation, and safety inspection / certification. See Specification Section 32-18-16, Paragraph 3.5-A.
5. Verify that the play structure and fitness equipment are being installed by qualified personnel. See Specification Section 32-18-16, Paragraphs 1.6-A and 1.6-B.
6. Verify that all play structure components and associated signs have been installed per the project plans and schedules.
7. Verify that the various types of resilient surfacing have been installed per the project plans and schedules.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. Play structure, fitness equipment, surfacing, and related playground improvements to be inspected and certified by an independent, NPSI Certified, Playground Safety Inspector. See Specification Section 32-18-16, Paragraph 3.9-A.

## **PLAYGROUND EQUIPMENT AND SURFACING CHECKLIST**

### **Checklist - Turn-Over Equipment:**

1. Contractor to provide the Owner with one copy of the play equipment installation manual for each play structure and unit of fitness equipment installed on the project. See Specification Section 32-18-16, Paragraph 1.10-A-1.
2. Contractor to provide the Owner with one set of specialized tools as required for the installation and maintenance of the play structures and fitness equipment installed. See Specification Section 32-18-16, Paragraph 1.10-A-2.
3. Contractor to provide the Owner with one quart of touch-up paint of each color used to finish the metallic portions of the play structure(s) and fitness equipment. See Specification Section 32-18-16, Paragraph 1.10-A-3.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for the play structure and fitness equipment installed. See Specification Section 32-18-16, Paragraph 3.11-A.
2. Letter of Guarantee for resilient surfacing materials installed. See Specification Section 32-18-16, Paragraph 3.11-B.

## **FENCING, GATES, AND POST-AND-CABLE BARRIER CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving chain-link fencing, backstops, dugouts, post-and-cable barriers, and park entry gates.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 32-31-30 (Fencing, Gates, and Post-and-Cable Barriers)
3. Standard Details P-400 through P-810-D, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Details for the proposed fencing and gates are shown or referenced on the project plans. (See Standard Details P-400 through P-810-D).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 32-31-30 (Fencing, Gates, and Post-and-Cable Barriers) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the project plans indicate the length, alignment, and height of all chain link fences to be installed on the project and that appropriate Standard Details for the chain link fence are referenced.
2. Confirm that the project plans show the location and type of all chain-link gates to be installed on the project and that appropriate Standard Details for the gates are referenced.
3. Confirm that the project plans indicate the length and alignment of all post-and cable barriers to be installed on the project site and that appropriate Standard Details are referenced.
4. Confirm that the project plans show the location of all openings and gates in the post-and-cable barrier and that appropriate standard details are referenced.
5. Confirm that the project plans show the location and width of all park entry gates and that appropriate standard details are referenced.
6. Confirm that the project plans show the location and alignment of all backstops to be installed on project and that appropriate standard details are referenced.

## **FENCING, GATES, AND POST-AND-CABLE BARRIER CHECKLIST**

7. Confirm that the project plans show the location of all dugouts to be installed on the project and that appropriate standard details are referenced.
8. Confirm that the project plans show the location of all batting cages to be installed on the project and that appropriate standard details are referenced.
9. Confirm that the project plans include boundary survey information that can be referenced by the Contractor when surveying and staking fence lines to be installed along project boundaries. See Specification Section 32-31-30, Paragraph 1.8-A.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that the project plans include notes identifying paint colors to be used on the park entry gates and the post-and-cable barrier posts. See Specification Section 32-31-30, Paragraphs 2.9-A and 2.9-B.

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit product specification sheets for fencing materials and hardware. See Specification Section 32-31-30, Paragraph 1.7-A.
2. Contractor to submit shop drawings for park entry gates, fabricated chain link gates wider than 5'-0", and fabricated hinges, latches, and hardware. See Specification Section 32-31-30, Paragraph 1.7-B.

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that the staked alignment of project fences is consistent with the project plans. See Specification Section 32-31-30, Paragraph 3.2-A.
2. Verify that the excavations for post footings are of the depth and dimensions required by the standard details.
3. Verify that all post / rail and other welded connections are complete and have been ground smooth and touched-up with zinc-based paint. See Specification Section 32-31-30, Paragraph 3.4-B.
4. Verify that all chain-link fabric is of the gauge required by the standard specifications and that it has been attached to the fence framing members with clips of the appropriate gauge and at the required spacing.

## **FENCING, GATES, AND POST-AND-CABLE BARRIER CHECKLIST**

5. Verify that expansion couplings have been installed in long, straight runs of chain-link fence as noted on the project plans or as required by the standard specifications. See Specification Section 32-31-30, Paragraph 3.4-F.
6. Verify that post-and-cable barrier footings have been sloped to drain away from the post per the standard details.
7. Verify that clamps have been installed at post-and-cable barrier terminations and that there are no intermediate splices in the cable.
8. Verify that all gates and gate hardware operate correctly and have been installed per the appropriate standard details.
9. Verify that all non-galvanized ferrous metal fencing components have been primed, painted, and touched-up in accordance with Standard Specification 32-31-30, Paragraph 3.9-A through Paragraph 3.9-D-1.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Turn-Over Equipment:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for the fencing, gates, and post-and-cable barriers installed. See Specification Section 32-31-30, Paragraph 3.11-A.

## **IRRIGATION SYSTEM CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving the installation of landscape irrigation systems.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 32-80-00 (Irrigation System)
3. Standard Details P-300 through P-329, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Details for the proposed irrigation equipment are shown or referenced on the project plans. (See Standard Details P-300 through P-329).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 32-80-00 (Irrigation System) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the location(s) and size of the water meter(s) to be installed to serve the project irrigation system are shown on the project plans.
2. For irrigation systems using potable water, confirm that the location and size of all backflow preventer(s) are shown on the project plans.
3. For irrigation control systems to be connected to the Pima County NRP&R Department's central control system, confirm that a master valve and flow sensor of appropriate size are shown on the project plans. Confirm that a telephone service has been provided to allow for communication between the NRP&R Department's off-site work station and the on-site control equipment.
4. Confirm that the irrigation mainline is shown and sized on the project plans and that isolation valves are provided at appropriate locations along the mainline to facilitate system maintenance and repair.
5. Confirm that all remote control valve (RCV) assemblies are shown and sized on the project plans and that all RCV's are assigned to a specific controller station.
6. Confirm that all lateral lines, for drip zone and turf zones, are shown and sized on the project plans.
7. Confirm that sleeves are shown and sized for all segments of mainline pipe and lateral line pipe to be installed under pavement.

## **IRRIGATION SYSTEM CHECKLIST**

8. Confirm that the type, number of stations, and proposed location for the controller(s) are shown on the project plans. Confirm that there will be spare stations on the controller for future system expansion, as appropriate.
9. Confirm that the manufacturer, model number, nozzle size, and other features of each sprinkler type used on the project are noted on the project plans. For projects utilizing reclaimed water, confirm that the equipment noted / specified includes purple (reclaimed water) color coding.
9. Confirm that the manufacturer, model number, flow rate, and other features of each drip emitter type used on the project are noted on the project plans.
10. Confirm that the manufacturer, model number, size, and other features of all quick coupling valves (and/or other specialty valves) used on the project are noted on the project plans.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that the project plans include a detailed Irrigation Equipment Schedule. The Standard Specifications and Details are non-proprietary and may not be sufficient, without the Irrigation Equipment Schedule, to ensure that all of the system components provided are fully compatible. The Irrigation Equipment Schedule should indicate the manufacturer, model number, and features / options associated with each irrigation system component utilized on the project.
3. Confirm that the project plans identify the duration of the initial Irrigation Maintenance period if other than the 60 days required by the Standard Specifications. See Specification Section 32-80-00, Paragraph 3.21-C.

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit marked-up manufacturer product specification sheets for all irrigation pipes, valves, applicators, and other system equipment and appurtenances required for the project. See Standard Specification Section 32-80-00, Paragraph 1.9-A. Submittals to be received prior to the delivery of materials and equipment to the project site and prior to the start of irrigation system installation.
2. Contractor to submit As-Built Drawings of the irrigation system installed. The as-built drawings to include GPS coordinates for all system valves. See Specification Section 32-80-00, Paragraph 1.9-B. As-built drawings to be received prior to Substantial Completion of the project.

## **IRRIGATION SYSTEM CHECKLIST**

3. Contractor to provide a copy of the Backflow Preventer Test Certificate for each backflow preventer installed on the project. See Specification Section 32-80-00, Paragraph 3.4-A.

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that the layout of the backflow preventers, mainlines, master valves, flow sensors, isolation valves, and remote control valves is consistent with the project plans. See Specification Section 32-80-00, Paragraph 3.2-A.
2. Verify that the backflow preventer and associated security enclosure have been installed per the Standard Details and Specifications. See Specification Section 32-80-00, Paragraphs 3.4-A and 3.4-B.
3. Verify that the layout and spacing of the irrigation sprinkler heads is uniform and consistent with the project plans. See Specification Section 32-80-00, Paragraph 3.2-A.
4. Verify that the trenches for the irrigation mainline and lateral lines are consistent with the trench depth(s) and width(s) noted or shown on the Standard Details and Specifications. See Specification Section 32-80-00, Paragraph 3.5-A.
5. Verify that sleeves have been installed in all locations where irrigation lines will be installed below pavements. Confirm that the locating wires have been installed at all sleeve ends in accordance with the Standard Details. See Specification Section 32-80-00, Paragraph 3.6-A.
6. Observe the pressure testing of all mainline pipe verify that pressure testing has been successfully completed. See Specification Section 32-80-00, Paragraph 3.8.
7. Verify that bedding material is placed below, on the sides of, and above all mainline and lateral line pipe per the Standard Details and Specifications. See Specification Section 32-80-00, Paragraph 3.6-B.
8. Verify that the appropriate primer and solvent weld cement products are being used to construct all solvent weld PVC joints. See Specification Section 32-80-00, Paragraphs 2.1-E and 3.7.
9. Verify that the low-voltage control wire, two-wire cable, and/or other communication cables are installed per the Standard Details and Specifications. See Specification Section 32-80-00, Paragraph 3.9.
10. Verify that all mainline and lateral line trenches are backfilled in lifts and compacted in accordance with the Standard Details and Specifications. See Specification Section 32-80-00, Paragraph 3.11-A, 3.11-B, and 3.11-C.
11. Verify that all irrigation system valves and associated valve access boxes have been installed per the Standard Details and Specification. See Specification Section 32-80-00, Paragraph 3.12-A and 3.12-B.
12. Verify that the controller(s) and associated security enclosures have been installed in accordance with the Standard Details and Specifications. See Specification Section 32-80-00, Paragraphs 3.13.
13. Verify that the controller(s) have been properly programmed and that on-site controllers are

## **IRRIGATION SYSTEM CHECKLIST**

communicating with one another and with the NRP&R Department's off-site work station. See Specification Section 32-80-00, Paragraph 3.13.B.1.

14. Verify that all sprinkler heads are properly adjusted as to height, radius of spray, and arc of spray. See Specification Section 32-80-00, Paragraphs 3.15-A and 3.15-B.
15. Verify that emitters and distribution tubing have been installed per the Standard Details and Specifications. See Specification Section 32-80-00, paragraph 3.16.A.
16. Verify that a complete operational test of the irrigation system has been satisfactorily performed in accordance with the Standard Specifications. See Specification Section 32-80-00, Paragraph 3.18-A.
17. Verify that all applicable irrigation system maintenance activities are being performed during the initial maintenance period. Periodic inspections will be required. See Specification Section 32-80-00, Paragraph 3.21-C.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Turn-Over Equipment:**

1. Contractor to provide the Owner with spare / replacement sprinkler heads, nozzles, remote control valves, and emitter access boxes. See Specification Section 32-80-00, Paragraph 1.13-A.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for the irrigation system installed. See Specification Section 32-80-00, Paragraph 3.24-A.

## **LANDSCAPE WORK CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving landscape improvements.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 32-90-00 (Landscape Work)
3. Standard Details P-100 through P-209 and P-1300 through P-1309, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Details for the proposed plant types and landscape improvements are shown or referenced on the project plans. (See Standard Details P-100 through P-209).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 32-90-00 (Landscape Work) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that the limits of all natural or landscaped areas to be preserved are shown on the project plans.
2. Confirm that the species, size, and proposed location for all salvaged specimen plants to be replanted on the project site are shown on the project plans.
3. Confirm that the species, size, and proposed location for all nursery grown plants to be installed on the project site are shown on the project plans.
4. Confirm that the project plans include a comprehensive list or schedule of plants with species, sizes, and quantities noted.
5. Confirm that the limits of all areas to be planted with turf grass are shown on the project plans.
6. Confirm that the project plans identify the species and variety of turf grass to be planted, if other than as called for in the Standard Specifications. The Standard Specifications call for Hybrid Bermuda Grass seed, "Midiron" Hybrid Bermuda Grass sprigs, and/or sod. See Specification Section 32-90-00, Paragraphs 2.9-A, 2.9-B, and 2.9-C.

## **LANDSCAPE WORK CHECKLIST**

7. Confirm that the project plans include a note indicating the method / materials to be used for planting turf grass. The standard specifications include the options of seeding, sprigging, or sodding. See Specification Section 32-90-00, Paragraph 2.9-A.
8. Confirm that the limits of all areas to be seeded with native plants are shown on the project plans. If multiple seed mixes are to be used, confirm that the limits of areas to receive each seed mix are shown on the plans.
9. Confirm that the species and sowing rates for species to be included in the native plant seed mix (or mixes) are included on the project plans. The Standard Specifications refer to the project plans for this information. See Specification Section 32-90-00, Paragraph 2.11-B.
10. Confirm that the type and limits of all proposed inorganic surfacing materials (such as decomposed granite) are shown on the project plans and that the color and gradation of the material is noted. See Specification Section 32-90-00, Paragraph 2.12.
11. Confirm that the limits and types of various pavements and hardscape elements are shown on the project plans.

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific materials, products, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.
2. Confirm that the project plans include a note clarifying the required planting soil mix for trees and shrubs. The Standard Specifications include the options "Prepared Soil" and "Prepared Topsoil." See Specification Section 32-90-00, Paragraphs 2.4-A, 2.4-B, and 2.4-C.
3. Confirm that the project plans include a note indicating requirements for special soil amendments for the tree and shrub planting soil mix if recommended by the Soils Report. If no special requirements are noted, a default mixture of amendments will be required. See Specification Section 32-90-00, Paragraphs 2.4-A and 2.4-B.
4. Confirm that the project plans identify the duration of the initial Landscape Maintenance Period if other than the 60 days required by the Standard Specifications. See Specification Section 32-90-00, Paragraph 3.22-C.

## **LANDSCAPE WORK CHECKLIST**

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. Contractor to submit Certificates of Compliance for seed, sprigs, sod, and soil amendments. See Specification Section 32-90-00, Paragraph 1.8-B.
2. Contractor to submit samples of decomposed granite, crushed rock, and/or rip-rap. See Specification Section 32-90-00, Paragraph 1.8-C.

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that the Contractor has marked and barricaded areas and individual plants to be preserved in place. Inspection should be made prior to the start of site clearing and grading work. See Specification Section 32-90-00, Paragraph 3.2.
2. Verify that the plants delivered to the site are healthy, undamaged, without infestations of pests, and of the species and size(s) required. Inspection to be made as soon after the plants are delivered to the project site as possible. See Specification Section 32-90-00, Paragraph 3.8-A.
3. Verify that the plant pits have been excavated to the dimensions detailed. Inspection to be made prior to the installation of prepared backfill and the installation of trees and shrubs. See Specification Section 32-90-00, Paragraph 3.8-B.
4. If hard soils and poor drainage are of concern, verify that the Contractor has tested selected plant pits for drainage. If plant pit drainage does not meet specifications, verify that the Contractor has implemented the specified remedial actions. See Specification Section 32-90-00, Paragraph 3.10-C.
5. Verify that the various steps associated with the preparation of soils in areas to be planted with turf grass have been implemented prior to the planting of seed, sprigs, or sod. Multiple inspections will be required. See Specification Section 32-90-00, Paragraph 3.13-A through 3.13-H-1.
6. Verify that the various steps associated with the preparation of soils in areas to be planted with native plant seed have been implemented prior to the commencement of seeding operations. Multiple inspections may be required. See Specification Section 32-90-00, Paragraph 3.18-A.
7. Verify that the subgrade below areas to receive decomposed granite or other inorganic surfacing materials have been treated with pre-emergent herbicide. Inspection to be made prior to the placement of the surfacing material.
8. Verify that watering gel has been installed at all tall-pot plants (and other plants not receiving supplemental irrigation) in the quantities noted on the plans and as specified in Section 32-90-00, Paragraph 3.11.

## **LANDSCAPE WORK CHECKLIST**

9. Verify that all applicable landscape maintenance activities are being performed during the Landscape Maintenance Period. Periodic inspections will be required. See Specification Section 32-90-00, Paragraph 3.22-C.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Turn-Over Equipment:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for the plant materials installed. See Specification Section 32-90-00, Paragraph 3.24-A.

## **NATIVE PLANT SALVAGE WORK CHECKLIST**

### **Purpose:**

This checklist is intended for use by the design professional, the design reviewer, and the construction administrator on projects involving native plant salvage and replanting work.

### **Documents to be Coordinated:**

1. The Project Plans
2. Standard Specification Section 32-96-00 (Native Plant Salvage Work)
3. Standard Details P-100 through P-107, as applicable.

### **Design Phase Checklist - Standard Details:**

1. Confirm that the appropriate Standard Details for the proposed native plant salvage and replanting work are shown or referenced on the project plans. (See Standard Details P-100 through P-107).

### **Design Phase Checklist - Standard Specifications:**

1. Confirm that Standard Specification Section 32-96-00 (Native Plant Salvage Work) is referenced on the project plans.

### **Design Phase Checklist - General Requirements for Project Plans:**

1. Confirm that all plant specimens shown on the Pima County Development Services approved Native Plant Preservation Plan are accounted for and shown on the project plans.
2. Confirm that the location of all plants to be salvaged are shown superimposed over an aerial photo of the site or otherwise clearly shown on the project plans.
3. Confirm that the native plant salvage work is fully integrated with the new planting work as shown on the project plans.
4. Confirm that a native plant salvage schedule is included on the project plans showing the species, height, caliper, and form of each plant to be salvaged as part of the project.
5. Confirm that the limits of all natural areas to be preserved are clearly shown on the project plans.
6. Confirm that the location of all specimen plants to be preserved-in-place, that are within the limits of grading, are clearly shown and that notes are provided to indicate that these specimens are to be protected.

## **NATIVE PLANT SALVAGE WORK CHECKLIST**

### **Design Phase Checklist - Notes to be Included on the Project Plans:**

1. Confirm that project plans include a note stating that the Project Plans and Details are to be used in conjunction with the Standard Details and Specifications, and that specific products, models, dimensions, and features identified on the Project Plans take precedence over the general requirements of the Standard Details and Specifications.

### **Construction Phase Checklist - Submittals to be made by Construction Contractor:**

1. None unless specific submittal requirements are identified on the project plans.

### **Construction Phase Checklist - Inspections to be made by the Owner's Representative:**

1. Verify that all plants to be salvaged and/or preserved-in-place are marked and tagged in the field. See Specification Section 32-96-10, Paragraph 1.9-A.
2. Verify that natural areas or existing landscaped areas to be preserved are marked, fenced, or otherwise protected during the implementation of the project work.
3. Verify by date when specimen trees and shrubs are initially boxed in the field. Verify that trees and shrubs are retained in the field and irrigated for not less than 28 days in accordance with the Standard Specifications. See Specification Section 32-96-00, Paragraph 3.6-A-4.
4. Verify that the salvaged plants are being maintained in the holding nursery in accordance with the Standard Specifications. See Specification Section 32-96-00, Paragraphs 3.9-A and 3.9-B.
5. Verify that the salvaged plants are replanted as shown on the project plans and in accordance with the Standard Details.

### **Construction Phase Checklist - Inspections and Testing Work to be performed by an Independent Testing Laboratory:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Turn-Over Equipment:**

1. None unless specific requirements are identified on the project plans.

### **Checklist - Letters of Guarantee:**

1. Letter of Guarantee for salvaged and replanted native plant specimens. See Specification Section 32-96-00, Paragraph 3.10-A.



**Pima County Natural Resources, Parks and Recreation Department  
Pima County Project Management Office**

# **Standard Specifications**

**Prepared by McGann & Associates Inc., Landscape Architects and Planners  
for Pima County Natural Resources, Parks and Recreation Department  
and Pima County Project Management Office**

Pima County Natural Resources, Parks, and Recreation Department  
**Index - Standard Specifications for Park Development**

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Section 13-31-23

PRE-ENGINEERED SHADE CANOPIES AND TENSIONED FABRIC SHADE STRUCTURES

Section 13-34-18

PRE-ENGINEERED RAMADAS

Section 13-34-23

PRE-ENGINEERED RESTROOM BUILDINGS

Section 32-18-16

PLAYGROUND EQUIPMENT AND SURFACING

Section 32-31-30

FENCING, GATES, AND POST-AND-CABLE BARRIERS

Section 32-80-00

IRRIGATION SYSTEM

Section 32-90-00

LANDSCAPE WORK

Section 32-96-00

NATIVE PLANT SALVAGE WORK

## **SECTION 13-31-23 - PRE-ENGINEERED SHADE CANOPIES AND TENSIONED FABRIC SHADE STRUCTURES**

### **PART ONE - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to the work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this section includes, but is not limited to, the:
  - 1. Preparation and submittal of shop drawings for the pre-engineered shade canopies with steel frame roof support.
  - 2. Preparation and submittal of shop drawings for tensioned fabric shade structures.
  - 3. Acquisitions of permits as required for shade canopy / structure construction
  - 4. Construction of concrete foundations.
  - 5. Supply and installation of the pre-engineered shade canopies with steel frame roof support.
  - 6. Supply and installation of pre-engineered tensioned fabric shade structures.
- B. The extent of the work is shown on the drawings and details.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to, the:
  - 1. Supply and installation of playground structures and resilient surfacing
  - 2. Construction of landscape, hardscape, and irrigation improvements

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate his work with the Owner's Representative. Work that is completed or in-progress shall be protected during the installation of pre-engineered shade canopies and/or tensioned fabric shade structures. The Contractor shall notify the Owner's Representative of field conditions which prevent the installation of the shade canopies as shown.

## 1.5 REQUIRED LICENSURE

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

## 1.6 COMPLIANCE WITH APPLICABLE REGULATIONS

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall obtain and pay for all required inspections, permits, and fees and shall provide notices required by governmental authorities.

## 1.7 APPLICABILITY OF STANDARD DRAWINGS AND DETAILS

- A. Applicability of Standard Drawings and Details: Standard drawings and details as adopted and published by the Pima County Natural Resources, Parks, and Recreation Department may be included with, or referenced on, the project plans. These standard drawings and details are intended to show the overall size, configuration, and general features associated with the proposed shade canopy or tensioned fabric shade structure. These standard drawings and details are intended to be used as the basis for the preparation of sealed shop drawings. The approved shop drawings shall govern the fabrication, construction, and installation of the pre-engineered shade canopy or tensioned fabric shade structure.

## 1.8 REFERENCE SPECIFICATIONS

- A. Reference Specifications: The following specifications are, by reference, made a part of these specifications. To the extent applicable, all project work shall be implemented in accordance with the specifications listed below.
- B. American Institute of Steel Construction (AISC)
  - 1. AISC Standard Specifications
- C. American Iron and Steel Institute (AISI)
  - 1. AISI Specifications for Cold Formed Members
- D. American Welding Society (AWS)
  - 1. AWS Specifications for Structural Welding
- E. American Concrete Institute (ACI):
  - 1. ACI-315-92      Details and Detailing of Concrete Reinforcement

F. Steel Structures Painting Council

1. SSPC-SP10 Specification for Near-White Blast Cleaning

G. American Society for Testing and Materials

1. ASTM-A-36-14 Standard Specification for Structural Steel
2. ASTM A-53M-12 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
3. ASTM-A307-14 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rods.
4. ASTM-A-500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
5. ASTM-A-570 Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled
6. ASTM-F-1487-11 Standard Consumer Product Safety Performance Specification for Playground Equipment for Public Use
7. ASTM-E-84-15 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM-193-M-15 Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications

H. National Fire Protection Association (NFPA)

1. NFPA-701-2015 Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

I. Pima Association of Governments

1. Pima Association of Governments (PAG) - Standard Specifications for Public Improvements (2014 or most recent edition)
2. Pima Association of Governments - Standard Details for Public Improvements (2014 or most recent edition).

1.9 APPLICABLE CODES:

- A. Applicable Codes: Except as modified by the project drawings, or other project specific documents, the pre-engineered shade canopies and tensioned fabric shade-structures shall be designed and constructed to comply with:

1. International Building Code, 2012 or most recent edition adopted by Pima County including all amendments adopted by Pima County.

#### 1.10 SUBMITTAL REQUIREMENTS:

- B. General: The Contractor shall make the submittals identified below. Submittals shall be made and approved prior to the delivery of materials to the site and its incorporation into the work.
  
- C. Shop Drawings: The Contractor shall obtain from the pre-engineered shade canopy manufacturer and/or from the tensioned fabric shade structure fabricator complete shop drawings for the proposed structure. The shop drawings shall be sealed by an Arizona Registered Professional Structural Engineer and shall be submitted to the Owner for review and approval. The information to be included on the Shop Drawings shall include, but may not be limited to, the items listed below:
  - 1. Structural Notes: The shop drawings shall include general notes related to the shade canopy frame(as applicable), or the posts for anchoring the tensioned fabrics (as applicable)the concrete footings, and other structural features.
  - 2. Foundation Plans and Details: The shop drawings shall include complete details for shade canopy and/or tensioned fabric structure footings.
  - 3. Shade Canopy and/or Tensioned Fabric Shade Structure Elevations: The shop drawings include scaled, dimensioned elevations of the proposed shade canopy.
  - 4. Framing Plan: The shop drawings shall include plans and details showing the configuration and size of all columns and other structural members. The plans shall indicate hardware to be used for frame member connections.
  - 5. Shade Fabric Information: The shop drawings shall include information related to the shade fabric and its connection to the shade canopy frame and/or posts.
  - 6. Structural Calculations: The shop drawings shall be provided with structural calculations for the shade canopy and/or tensioned fabric shade structure.
  
- C. Color Samples: The Contractor shall submit color samples for the shade canopy frame and/or tensioned fabric shade structure post color and the shade fabric. Where the colors have been noted on the project plans, the samples shall be for the Owner's verification. Where colors have not been noted on the project plans, a complete set of standard color options shall be submitted for the Owner's review and selection.

#### 1.11 BUILDING PERMITS:

- A. Permits for Shade Canopies: The Contractor shall be responsible for submitting shop drawings, structural calculations, and other information as required to obtain the permits necessary for the installation of the shade canopies.

1. Inspections: The Contractor shall be responsible for scheduling and coordinating all required inspections. Inspections, approvals, and documentation shall be as required by the subject building permit.

## **PART TWO - MATERIALS**

### **2.1 SHADE CANOPIES - GENERAL REQUIREMENTS**

- A. Shade Canopy Manufacturer and Model Number: The shade canopy manufacturer and model number shall be as noted on the project plans.
- B. Shade Canopy Size: The length, width, column spacing, eave height, overall roof height, and roof pitch shall be as noted on the project plans.
- C. Shade Roof Configuration: The shade canopy roof type and configuration shall be as noted on the project plans.

### **2.2 SHADE CANOPIES - STRUCTURAL FRAMING**

- A. Steel Columns: Steel columns shall be constructed of structural steel tube in accordance with ASTM-A-53, Grade B.
- B. Other Structural Members: Structural members other than columns shall be structural steel in accordance with ASTM-A-36.
  1. Framing Member Shapes and End Conditions: All shade canopy framing members shall be tubes or similar shapes without exposed flanges that could attract nesting birds or insects. All tube ends shall be closed with a welded plate to prevent access by birds or insects.
- C. Factory Finish on Frame Members: All frame members shall be powder coated. The steel frame shall be shot blasted in accordance with SSPC-SP-10 to near white conditions. The powder coating shall then be applied using an electrostatic spray process and then baked to 450 degrees F. to fuse it to the metal.
  1. Frame Color: The color of all powder coated frame members shall be as noted on the project plans or as selected by the Owner.
- D. Fasteners: Fasteners shall be structural bolts in compliance with ASTM-A-307-14.

### **2.3 TENSIONED FABRIC SHADE STRUCTURES - GENERAL REQUIREMENTS**

- A. Tensioned Fabric Shade Structure Supplier / Fabricator and Model Number: The tensioned fabric shade structure shall be as supplied / fabricated by the manufacturer noted on the project plans. The model number, if applicable, shall be as noted on the project plans.

- B. Tensioned Fabric Shade Structure Size: The overall length, width, post spacing, height, and post locations shall be as noted on the project plans.
- C. Shade Sail Configuration: The tensioned fabric shade sail(s) configuration attachment to the supporting posts shall be as noted on the project plans.

2.4 TENSIONED-FABRIC SHADE STRUCTURE - STRUCTURAL POSTS / COLUMNS

- A. Steel Posts / Columns: Steel columns shall be constructed of structural steel tube in accordance with ASTM-A-500.
  - 1. Structural Post / Column Shape(s) and End Conditions: Tensioned fabric shade structure posts / columns shall be square or rectangular steel tube as noted on the project plans. All exposed tube ends shall be closed with a welded plate to prevent access by birds or insects.
  - 2. Factory Finish on Posts / Columns: All posts / columns shall be powder coated. The steel frame shall be shot blasted in accordance with SSPC-SP-10 to near white conditions. The powder coating shall then be applied using an electrostatic spray process and then baked to 450 degrees F. to fuse it to the metal.
  - 3. Post / Column Color: The color of all powder coated posts / columns shall be as noted on the project plans or as selected by the Owner.

2.5 SHADE FABRIC

- A. Shade Fabric: The shade fabric shall be constructed from 100% high density polyethylene (HDPE) monofilament and tape yarns and shall have a lock-stitch construction that is fray and tear resistant. The fabric shall be flame retardant, ultraviolet (UV) stabilized, and heat set to provide dimensional stability and to minimize shrinkage. The fabric shall meet the following standards:
  - 1. Break Strength: Warp = 173 lbs                      Weft = 414 lbs
  - 2. Tear Resistance: Warp = 39 lbs                      Weft = 35 lbs
  - 3. Burst Force: Face = 432 lbs
  - 4. Bursting Pressure: 432 lbs
  - 5. Fire Compliance: ASTM E-84-15 and NFPA 701-2015
  - 6. Construction: Knitted
- B. Shade Fabric Edges: Shade fabric edges shall be strengthened with a non-tear vinyl material.
- C. Fabric Sleeves and Pockets and Corners: All fabric sleeves and pockets shall be reinforced with protective webbing.

- D. Shade Fabric Color: The shade fabric color shall be as noted on the project plans or as selected by the Owner's Representative.

2.6 WIRE ROPE CABLE AND HARDWARE:

- A. Wire Rope Cable and Hardware: Wire rope cable shall be stainless steel with a 1/4" (minimum) nominal diameter. The wire rope shall have a minimum tensile strength of 9,000 lbs. Wire rope fittings and cable hardware shall be in accordance with the approved shop drawings.

Turn Buckles	Type 316 Stainless Steel
Toggle Ends	Type 316 Stainless Steel
Chain	Type 316 Stainless Steel Chain
Shackles and D-Rings	Type 316 Stainless Steel
Eyebolts	Type 316 Stainless Steel

2.7 FOUNDATIONS

- A. Reinforced Concrete Foundations: The reinforced concrete foundations shall be in accordance with the approved shop drawings.
- B. Anchor Bolts: Anchor bolts shall be in accordance with the approved shop drawings.

**PART 3 - EXECUTION**

3.1 FABRICATION

- A. General: All base plates, and plates for bolted connections shall be factory welded into place and holes for bolted connections shall be factory cut in accordance with the approved shop drawings.
- B. Welds: All welded connections shall be made by certified welders in accordance with AWS Specifications and under the supervision of an AWS certified welding inspector. Welds shall be in accordance with the approved shop drawings.
- C. Other Components: All other components shall be fabricated in accordance with the approved shop drawings.

3.2 BLUE STAKING:

- A. Blue Staking: The Contractor shall request that the project site be Blue Staked prior to the start of pre-engineered shade canopy and/or tensioned fabric shade structure construction. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as directed by the Owner or appropriate utility company, at the Contractor's expense.

### 3.3 LAYOUT:

- A. Layout: The Contractor shall lay out the location of the pre-engineered shade canopy and/or tensioned fabric shade structure for the Owner's review and approval. The Contractor shall confirm that all columns are outside the designated fall zone of the playground equipment being covered. The Contractor shall also confirm that the height of the canopy above the play structure(s) is in accordance with ASTM-F-1487-11.

### 3.4 FOUNDATION CONSTRUCTION:

- A. Foundation Construction: The reinforced concrete foundations shall be constructed in accordance with the approved shop drawings. Manufacturer provided templates shall be used to locate and secure anchor bolts, as applicable.
- D. Foundations in Areas with Resilient Surfacing: The top of all foundations located within playground areas with resilient surfacing shall be at an elevation that is below the required, specified, or detailed depth of the resilient surfacing.

### 3.5 ON-SITE ASSEMBLY AND ERECTION OF SHADE CANOPY AND/OR TENSIONED FABRIC SHADE STRUCTURE

- A. Installer Qualifications: The installation work shall be supervised and performed by qualified individuals with experience on similar projects.
- B. Installation of the Shade Canopy and/or Tensioned Fabric Shade Structure: The shade canopy and/or tensioned fabric shade structure shall be installed in accordance with the approved shop drawings and in accordance with the manufacturer's recommendations. Care shall be taken to protect existing site improvements during the installation process.
- C. Protection of Fabric: The shade fabric shall be protected during installation. Shade fabric that is damaged or torn during transport, storage, or installation shall be removed and replaced.
- D. Touch-up and Repair of Framing: Shade canopy and/or tensioned fabric shade structure frame components that are damaged during shipment and/or erection shall be touched-up using manufacturer approved paints and finishes. Components damaged in a manner that precludes touch-up work, as determined by the Owner's Representative, shall be replaced with new components.

3.6 GUARANTEE:

- A. Guarantee: The shade canopy shall be guaranteed to be free from defects in materials and workmanship for guarantee periods listed below

Guarantee for Structural Frame:	10 Years
Guarantee Period for Powder Coating on Frame:	10 Years
Guarantee for Fabric:	10 Years

The guarantee for the fabric shall cover significant fading, tearing, ripping, and/or discoloration. A written letter of guarantee shall be submitted to the Owner's Representative prior to Final Acceptance of the Work.

The letter shall include the name, mailing address, phone number, and email address of the representative to be contacted regarding guarantee issues. The letter shall specifically state that the manufacturer / fabricators will make all necessary repairs during the guarantee period at no cost to the Owner. The Contractor shall be responsible for obtaining the manufacturer's Letter of Guarantee and for submitting this information to the Owner.

- B. Notification of Deficiencies: The Owner will provide written notification to the manufacturer / fabricator of deficiencies that occur during the guarantee period.
- C. Manufacturer's Response to Written Notification: The manufacturer / fabricator shall perform repair or replacement work or provide the Owner with an acceptable schedule for completion of the repair work within ten (10) calendar days of receipt of written notice. If the manufacturer / fabricator fails to respond and perform the required repair work within the specified period, The Owner shall have the right to have the work performed by others and to invoice the manufacturer / fabricator for the cost of the work. The manufacturer / fabricator agrees to pay all such charges.

END OF SECTION – 13-31-23

## **SECTION 13-34-18 - PRE-ENGINEERED RAMADAS**

### **PART ONE - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to the work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this section includes, but is not limited to, the:
  - 1. Preparation and submittal of shop drawings for the pre-engineered ramada structure and associated foundations
  - 2. Acquisition of permits as required for ramada construction
  - 3. Construction of concrete foundations and floor slabs
  - 4. Supply and installation of the pre-engineered ramada structure
- B. The extent of the work is shown on the drawings and details.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to, the:
  - 1. Construction of paving and other hardscape improvements
  - 2. Construction of landscape improvements
  - 3. Installation of a new irrigation system

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate his work with the Owner's Representative. Work that is completed or in-progress shall be protected during the installation of pre-engineered ramada structure(s). The Contractor shall notify the Owner's Representative of field conditions that prevent the installation of the ramada as shown.

#### **1.5 REQUIRED LICENSURE**

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

1.6 COMPLIANCE WITH APPLICABLE REGULATIONS

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall obtain and pay for all required inspections, permits, and fees and shall provide notices required by governmental authorities.

1.7 APPLICABILITY OF STANDARD DRAWINGS AND DETAILS

- A. Applicability of Standard Drawings and Details: Standard drawings and details as adopted and published by the Pima County Natural Resources, Parks, and Recreation Department may be included with, or referenced on, the project plans. These standard drawings and details are intended to show the overall size, configuration, and general features associated with the proposed ramada structure. These standard drawings and details are intended to be used as the basis for the preparation of sealed shop drawings. The approved shop drawings shall govern the fabrication, construction, and installation of the pre-engineered ramada.

1.8 REFERENCE STANDARDS

- A. Reference Specifications: The following specifications are, by reference, made a part of these specifications. To the extent applicable, all project work shall be implemented in accordance with the specifications listed below.
- B. American Institute of Steel Construction (AISC)
  - 1. AISC Standard Specifications
- C. American Iron and Steel Institute (AISI)
  - 1. AISI Specifications for Cold Formed Members
- D. American Welding Society (AWS)
  - 1. AWS Specifications for Structural Welding
- E. American Concrete Institute (ACI):
  - 1. ACI-315-92          Details and Detailing of Concrete Reinforcement
- F. Steel Structures Painting Council
  - 1. SSPC-SP10          Specification for Near-White Blast Cleaning

G. American Society for Testing and Materials

1. ASTM-A307-14 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rods
2. ASTM-A-325 Standard Specification for Structural Bolts, Steel, Heat Treated
3. ASTM-A-500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
4. ASTM-A-570 Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled

H. Pima Association of Governments (PAG)

1. PAG - Standard Specifications for Public Improvements (2014 or most recent edition)
2. PAG - Standard Details for Public Improvements (2014 or most recent edition)

1.9 SUBMITTAL REQUIREMENTS:

- A. General: The Contractor shall make the submittals identified below. Submittals shall be made and approved prior to the delivery of materials to the site and its incorporation into the work.
- B. Shop Drawings: The Contractor shall obtain from the pre-engineered ramada structure manufacturer complete shop drawings for the proposed ramada. The shop drawings shall be sealed by an Arizona Registered Professional Structural Engineer and shall be submitted to the Owner for review and approval. The information to be included on the Shop Drawings shall include, but may not be limited to, the items listed below:
1. Code Analysis Data: The shop drawings shall list the name and date of all applicable codes used in the design of the building.
  2. Design Load Data: The shop drawings shall identify design loads for roof dead load, roof live load, wind load, and seismic load.
  3. Structural Notes and Calculations: The shop drawings shall include general notes related to the ramada frame, the concrete foundation, reinforcing steel, welding, and other structural features.
  4. Foundation Plans and Details: The shop drawings shall include complete details for ramada foundations and footings.
  5. Ramada Elevations: The shop drawings include scaled, dimensioned elevations of the proposed ramada.
  6. Framing Plans: The shop drawings shall include plans and details showing the configuration and size of all columns, beams, and other structural members. The plans shall indicate materials to be used as fasteners.

7. Roofing Plans: The shop drawings shall include details for the installation of the metal roof deck and all other roofing system components.
  8. Electrical Plans: Where applicable, the shop drawings shall include plans, details, diagrams, and calculations for the ramada electrical and lighting systems.
- C. Color Samples: The Contractor shall submit color samples for the ramada frame color and the ramada metal roofing. Where the colors have been noted on the project plans, the samples shall be for the Owner's verification. Where colors have not been noted on the project plans, a complete set of standard color options shall be submitted for the Owner's review and selection.

#### 1.10 APPLICABLE CODES AND STANDARDS:

- A. Applicable Codes: Except as modified by the project drawings, or other project specific documents, the pre-engineered ramada shall be designed and constructed to comply with the:
1. International Building Code (IBC): 2012 or most recent edition adopted by Pima County including all amendments as adopted by Pima County
  2. National Electric Code (NEC): 2011 or most recent edition adopted by Pima County including all amendments as adopted by Pima County

#### 1.11 BUILDING PERMITS:

- A. Permits for Pre-Engineered Ramadas with Prior State of Arizona Approval: The Contractor shall be responsible for the processing of shop drawings for buildings with prior approval by the State of Arizona Office of Manufactured Housing. Processing shall be as required to obtain permits from local government authorities for utility connections and other features not covered by State of Arizona prior approval(s).
1. Inspections: The Contractor shall be responsible for scheduling and coordinating all State of Arizona required inspections. Reports, signed by the State of Arizona's authorized inspector, demonstrating compliance with applicable State requirements shall be submitted to the Owner, prior to Substantial Completion of the Work.
- B. Permits for Pre-Engineered Ramadas without Prior State of Arizona Approval: The Contractor shall be responsible for submitting shop drawings and obtaining permits for pre-engineered ramadas that do not have prior State of Arizona approval. The shop drawings and associated reports and calculations shall be complete and shall include all information required by Pima County (or other local jurisdiction) for drawing approval and issuance of required permits.

1. Inspections: The Contractor shall be responsible for scheduling and coordinating all required inspections. Inspections, approvals, and documentation shall be as required by the subject building permit.

## **PART TWO - MATERIALS**

### **2.1 RAMADA - GENERAL REQUIREMENTS**

- A. Ramada Manufacturer and Model Number: The pre-engineered ramada manufacturer and model number shall be as noted on the project plans.
- B. Ramada Size: The length, width, column spacing, eave height, overall roof height, and roof pitch shall be as noted on the project plans.
- C. Ramada Roof Configuration: The ramada roof type and configuration shall be as noted on the project plans.

### **2.2 STRUCTURAL FRAMING**

- A. Structural Framing: Framing members shall be constructed of structural steel tube in compliance with ASTM A500, Grade B or cold-rolled box sections in compliance with ASTM A570, Grade 55.
  1. Framing Member Shapes and End Conditions: All ramada framing members shall be tubes or similar shapes without exposed flanges that could attract nesting birds or insects. All tube ends shall be closed with a welded plate to prevent access by birds or insects.
  2. Factory Finish on Frame Members: All frame members shall be powder coated. The steel frame shall be shot blasted in accordance with SSPC-SP-10 to near white conditions. The powder coating shall then be applied using an electrostatic spray process and then baked to 450 degrees F. to fuse it to the metal.
  3. Frame Color: The color of all powder coated frame members shall be as noted on the project plans or as selected by the Owner.

### **2.3 FASTENERS**

- A. Fasteners: Fasteners shall be structural bolts in compliance with ASTM A325, or anchor bolts, self-tapping screws, or rivets in accordance with ASTM A307.

## 2.4 ROOFING SYSTEM

- A. Metal Roofing Panels: The ramada roof system shall be as noted on the project. Plans. If not noted on the project plans it shall consist of a ribbed metal roofing system with raised ribs at 12" on-center. The rib height shall be approximately 1-3/16" high. Roof panels shall be constructed of 22 gauge sheet steel. The metal panels shall be factory primed with a Galvalume or other approved primer. The top surface of the panel shall be finished with a Kynar paint system. Color shall be as noted on the project plans or as selected by the Owner.
- B. Roof Trim: The roof shall be furnished with all required ridge caps, eave trim, and other accessories. The metal trim shall be of the same gauge and finish as the roofing panels.
- C. Fasteners and Sealants: Fasteners and sealants shall be as recommended by the ramada / roofing system manufacturer and in accordance with the approved shop drawings.

## 2.5 FOUNDATIONS

- A. Reinforced Concrete Foundations: The reinforced concrete foundations shall be in accordance with the approved shop drawings.
- B. Anchor Bolts: Anchor bolts shall be in accordance with the approved shop drawings.

## 2.6 RAMADA LIGHTING AND ELECTRICAL SYSTEMS

- A. Compliance with Applicable Codes: All electrical and lighting system components shall comply with applicable codes.
- B. Electrical Service to Ramada Structure: The electrical service to the ramada structure shall be as noted and shown on the project plans.
- C. Ramada Light Fixtures: The ramada light fixture shall be a ceiling mounted light fixture. The light fixtures shall be housed in a vandal resistant housing with a UV stabilized, injection molded, and high strength polycarbonate lens. Fasteners shall be vandal resistant. The fixture manufacturer, model number, and lamp type shall be as noted on the project plans.
- D. Electrical Outlets: Electrical outlets shall be provided as noted and detailed on the project plans. The outlets shall be of the GFI type, shall be enclosed in weatherproof boxes, and shall meet all current code requirements.
- E. Conduit: Conduit for power distribution to the ramada light fixture and outlets shall be rigid steel conduit. All exposed conduit shall be securely anchored to the ramada frame in accordance with the approved shop drawings.

- F. Lighting Controls: Controls for the ramada lighting shall be as noted on the project plans. Controls shall include a photocell for automatic turn-on when at dusk and a timer for shut-off at the designated park closing time.

### **PART 3 - EXECUTION**

#### **3.1 FABRICATION**

- A. General: All base plates, stiffener plates, U-Clips, and end plates shall be factory welded into place. Holes for bolted connections shall be factory cut.
- B. Welds: All welded connections shall be made by certified welders in accordance with AWS Specifications and under the supervision of an AWS certified welding inspector.

#### **3.2 BLUE STAKING:**

- A. Blue Staking: The Contractor shall request that the project site be Blue Staked prior to the start of pre-engineered ramada structure construction. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as directed by the Owner or appropriate utility company, at the Contractor's expense.

#### **3.3 LAYOUT:**

- A. Layout: The Contractor shall lay out the location of the pre-engineered ramada structure indicating the location and elevation of the proposed ramada floor. The Contractor shall notify the Owner's Representative who will inspect and approve (or adjust) the location of the structure.

#### **3.4 FOUNDATION CONSTRUCTION:**

- A. Foundation Construction: The reinforced concrete foundations shall be constructed in accordance with the approved shop drawings. Manufacturer provided templates shall be used to locate and secure anchor bolts, as applicable.

#### **3.5 ON-SITE ASSEMBLY AND ERECTION OF RAMADA STRUCTURE**

- A. Installation of the Pre-Engineered Structures: The installation work shall be supervised and performed by qualified individuals with experience on similar projects.
- B. Touch-up and Repair: Ramada components that are damaged during shipment and/or erection shall be touched-up using manufacturer approved paints and finishes. Components damaged in a manner that precludes touch-up work, as determined by the Owner's Representative, shall be replaced with new components.

3.6 FLOOR SLAB CONSTRUCTION AND FINISHING

- A. Subgrade Preparation: Prior to the construction of the ramada floor slab, the subgrade shall be fine graded, prepared, and compacted as noted on the project plans. The subgrade work shall be inspected and tested prior to the construction of the floor slab.
- B. Floor Slab Construction and Finishing: The ramada floor slab shall be constructed, finished and cured as noted and detailed on the project plans.

3.7 ELECTRICAL SERVICE TO RAMADA LIGHTING AND OUTLETS

- A. Electrical Service to Ramada Lighting and Outlets: The electrical service to the ramada lighting and electrical outlets shall be as shown or noted on the project plans and as required by applicable code requirements.

3.8 WORKMANSHIP AND PROTECTION OF EXISTING IMPROVEMENTS:

- A. Protection of Existing Improvements: Prior to the start of the pre-engineered ramada structure installation, the location of all subsurface improvements shall be verified. Surface and subsurface improvements shall be protected during construction. Repairs to damaged improvements shall be performed by the Contractor, as directed by the Owner, at the Contractor's expense.

3.9 GUARANTEE:

- A. Guarantee: The pre-engineered ramada structure shall be guaranteed to be free from defects in materials and workmanship for a period of ten (10) years. Items that fail during the warranty period, for reasons other than vandalism, neglect, misuse, or Acts-of-God, as determined by the Owner's Representative, shall be repaired or replaced by the ramada manufacturer at no cost to Pima County. A written letter of guarantee shall be submitted to the Owner's Representative prior to Final Acceptance of the Work.

END OF SECTION – 13-34-18

## **SECTION 13-34-23 - PRE-ENGINEERED RESTROOM BUILDINGS**

### **PART I - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to the work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this Section includes, but is not limited to, the:
  - 1. Preparation and submittal of shop drawings for pre-engineered restroom buildings
  - 2. Acquisition of permits as required for restroom construction
  - 3. Supply and installation of pre-engineered restroom building(s)
  - 4. Supply and installation of fixtures, furnishings, and equipment associated with the pre-engineered restroom building(s)
- B. The proposed location, size, configuration, and architectural finishes associated with the pre-engineered restroom building(s) shall be shown or noted on the project drawings.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to:
  - 1. Site grading, earthwork, and subgrade compaction
  - 2. Extension of a potable water service to the pre-engineered restroom building
  - 3. Extension of an electrical service to the pre-engineered restroom building
  - 4. Connection of the restroom to the sanitary sewage system (where applicable)
  - 5. Connection of the restroom building to an on-site septic tank / leach field disposal system (where applicable).
  - 6. Construction of walkways for public access to the pre-engineered restroom building

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate all pre-engineered restroom building work with the Owner's Representative. Work that is completed or in-progress shall be protected during the installation of the restroom. The Contractor shall notify the Owner's Representative of field conditions that prevent the installation of restroom buildings as shown.

#### **1.5 REQUIRED LICENSURE**

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate

for the work to be performed.

#### 1.6 COMPLIANCE WITH APPLICABLE REGULATIONS

- A. General Requirements: The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits, and pay for all associated fees.

#### 1.7 COMPLIANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA)

- A. Compliance with the Americans with Disabilities Act: Access to the restroom building (including access to storage and work areas where applicable), circulation within the building, access to plumbing fixtures, and all other aspects of the building shall be in full compliance with the Americans with Disabilities Act and related design guidelines.

#### 1.8 APPLICABILITY OF STANDARD DRAWINGS AND DETAILS

- A. Applicability of Standard Drawings and Details: Standard drawings and details as adopted and published by the Pima County Natural Resources, Parks, and Recreation Department may be included with, or referenced on, the project plans. These standard drawings and details are intended to show the overall size, floor plan configuration, and general features associated with the proposed restroom building. These standard drawings and details are intended to be used as the basis for the preparation of sealed shop drawings. The approved shop drawings shall govern the fabrication, construction, and installation of the pre-engineered restroom building.

#### 1.9 REFERENCE STANDARDS

- A. Reference Specifications: The following specifications are, by reference, made a part of these specifications. To the extent applicable, all project work shall be implemented in accordance with the specifications listed below.
- B. American Concrete Institute (ACI):
  - 1. ACI-301-10            Specifications for Structural Concrete for Buildings
  - 2. ACI-315             Details and Detailing of Concrete Reinforcement
  - 3. SP-66(04)            ACI Detailing Manual
- C. American Society for Testing and Materials (ASTM)
  - 1. ASTM-A-36-14        Standard Specification for Structural Steel
  - 2. ASTM-A-615M-15     Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement
  - 3. ASTM-A-82M-05     Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
  - 4. ASTM-C-150M-15     Standard Specifications for Portland Cement

5. ASTM-C-33N-13 Standard Specifications for Concrete Aggregates
  6. ASTM-C-920-14 Specification for Elastomeric Joint Sealants
- D. American Welding Society (AWS)
1. AWS-D-1.4 Structural Welding Code - Reinforcing Steel
- E. Pima Association of Governments (PAG)
1. Pima Association of Governments (PAG) - Standard Specifications for Public Improvements (2014 or most recent edition)
  2. Pima Association of Governments (PAG) - Standard Details for Public Improvements (2014 or most recent edition)

#### 1.10 SUBMITTAL REQUIREMENTS:

- A. General: The Contractor shall make the submittals identified below. Submittals shall be made and approved prior to the delivery of materials to the site and its incorporation into the work.
- B. Shop Drawings: The Contractor shall obtain from the pre-engineered restroom building manufacturer complete shop drawings for the proposed structure. The shop drawings shall be sealed by an Arizona Registered Professional Structural Engineer and shall be submitted to the Owner for review and approval. The information to be included on the Shop Drawings shall include, but may not be limited to, the items listed below:
1. Code Analysis Data: The shop drawings shall list the name and date of all applicable codes used in the design of the building. Building area, occupancy type, type of construction, and occupancy load shall also be identified.
  2. Design Load Data: The shop drawings shall identify design loads for roof dead load, roof live load, floor live load, wind load, and seismic load.
  3. Structural Notes and Calculations: The shop drawings shall include general notes related to the building foundation, concrete, reinforcing steel, welding, and other structural features.
  4. Foundation Plans and Details: The shop drawings shall include complete details for on-site constructed foundation work and for foundation slabs and structural components to be constructed with the pre-engineered building.
  5. Floor Plans: The shop drawings shall include scaled, dimensioned floor plans. The floor plans shall show wheelchair turning radii and other information as required to demonstrate compliance with accessibility standards.
  6. Building Elevations: The shop drawings include scaled, dimensioned building elevations with all doors, windows, vent panels, and exterior building features shown or noted.

7. Building Sections: The shop drawings shall include building sections as required to show the location and size of interior partition walls and other pertinent building features.
8. Plumbing Plans, Riser Diagrams, and Fixture Schedules: The shop drawings shall include plumbing plans showing the proposed location and mounting of all plumbing fixtures. Riser diagrams and a plumbing fixture schedule shall also be provided.
9. Electrical Plans, Diagrams, Schedules, and Calculations: The shop drawings shall include electrical plans, riser diagrams, lighting fixture schedules, panel schedules, and load calculations.

1.11 APPLICABLE CODES AND STANDARDS:

- A. Applicable Codes: Except as modified by the project drawings, or other project specific documents, the pre-engineered rest-room building shall be designed and constructed to comply with:
  1. International Building Code (IBC): 2012 or most recent edition adopted by Pima County including all amendments as adopted by Pima County
  2. National Electric Code (NEC): 2011 or most recent edition adopted by Pima County including all amendments adopted by Pima County
  3. International Plumbing Code (UPC): 2012 or most recent edition adopted by Pima County including all amendments adopted by Pima County

1.12 BUILDING PERMITS:

- A. Permits for Pre-Engineered Buildings with Prior State of Arizona Approval: The Contractor shall be responsible for the processing of shop drawings for buildings with prior approval by the State of Arizona Office of Manufactured Housing. Processing shall be as required to obtain permits from local government authorities for utility connections and other features not covered by State of Arizona prior approval(s).
  1. Inspections: The Contractor shall be responsible for scheduling and coordinating all State of Arizona required inspections. Reports, signed by the State of Arizona's authorized inspector, demonstrating compliance with applicable State requirements shall be submitted to the Owner, prior to Substantial Completion of the Work.
- B. Permits for Pre-Engineered Buildings without Prior State of Arizona Approval: The Contractor shall be responsible for submitting shop drawings and obtaining permits for pre-engineered buildings that do not have prior State of Arizona approval. The shop drawings and associated reports and calculations shall be complete and shall include all information required by Pima County (or other local jurisdiction) for drawing approval and issuance of required permits.

1. Inspections: The Contractor shall be responsible for scheduling and coordinating all required inspections. Inspections, approvals, and documentation shall be as required by the subject building permit.

## **PART 2 - MATERIALS**

### **2.1 SUBGRADE AND FOUNDATION:**

- A. Subgrade: The subgrade below the building foundation shall be as noted on the project plans and as recommended in the Geotechnical Engineering Report for the project.
- B. On-Site Constructed Foundation: The foundation shall be constructed of aggregate base course material. The material shall comply with Section 303 of the Pima Association of Governments (PAG) Standard Specifications for Public Improvements (most recent edition). Dimensions and compaction shall be as noted on the approved shop drawings and as recommended in the Geotechnical Engineering Report for the project.

### **2.2 BUILDING WALLS, FLOOR SLABS, AND ROOF DECKS:**

- A. Building Walls, Floor Slabs, and Roof Decks: Walls, floors, and roof decks shall be constructed of reinforced concrete. The floor, walls, and roof deck shall be cast as an integral unit or units at the fabricator's off-site plant.
  1. Concrete: All concrete for floors, walls, and roof decks shall have a 28-day compressive strength of not less than 5,000 psi.
  2. Reinforcing Steel: Reinforcing steel shall be Grade 60 deformed rebar complying with ASTM A-615M-15.
  3. Weld Plates and Anchors: Steel for weld plates and anchors shall comply with ASTM A-36-14.
- B. Exterior Building Wall Finishes: All exterior walls shall be textured. Texture shall be as noted on the project plans and in accordance with the approved shop drawings. Texturing shall be accomplished with a formliner, or other approved method. After curing, the exterior walls shall be primed and painted with an industrial grade paint this is specifically manufactured for application over a concrete substrate. Paint color shall be as noted on the drawings or as selected by the Owner.
- C. Interior Building Wall Finishes: All interior walls shall have a smooth finish. After curing, the walls shall be primed and painted with an industrial grade, two part, epoxy paint that is specifically manufactured for application on a concrete substrate. Paint color shall be as noted on the drawings or as selected by the Owner.
- D. Interior Floor Finishes: All interior floors shall have a troweled, smooth finish. After curing, the floors shall be finished with an industrial grade, slip-resistant, two-part epoxy floor paint that is

specifically manufactured for application on a concrete floor substrate. Paint color shall be as noted on the drawings or as selected by the Owner.

- E. Interior Floor Slope: All interior floors shall be sloped to provide positive drainage towards floor drains.

### 2.3 JOINT SEALANTS

- A. Joint Sealants: Joint sealants shall consist of rolled polyurethane foam rope and a non-sag, non-staining, polyurethane caulking compound meeting ASTM-C-920-14.

### 2.4 ROOFING SYSTEM

- A. Roofing Panels: The roof deck shall be covered with a ribbed metal roofing system with raised ribs at 12" on-center. Rib height shall be approximately 1-1/4". Roof panels shall be constructed of 22 gauge steel sheet. The panels shall be factory primed with a Galvalume or other approved primer. The exposed surface of the panel shall be finished with a factory applied silicon modified polyester finish or a flourpolymer resin finish. Color shall be as noted on the project plans or as selected by the Owner.
  - 1. Trim and Fasteners: The roofing system provided shall be furnished with all required ridge caps, eve closures, weatherproof fasteners, sealants, and other hardware. Metal trim shall be of the same gauge and finish as the metal roofing panels. Fasteners and sealants shall be as recommended by the roofing system manufacturer.

### 2.5 BUILDING DOORS

- A. Doors: Doors shall be extra heavy-duty, pre-hung metal doors with matching metal frame. The door frame shall be secured to the building with heavy-duty, concealed, vandal resistant anchoring devices. All doors shall be equipped with stainless steel kick-plates (on the inside of the door only), heavy-duty hinges, and door sweeps. Doors shall be factory finished with rust-inhibiting primer and industrial grade exterior enamel paint. Color shall be as noted on the drawings or as selected by the Owner.

### 2.6 DOOR HARDWARE

- A. Door Handles: Door handles shall be of the heavy-duty, lever operated type constructed from cold-rolled steel that is zinc dichromate plated to protect it against rust and corrosion. The lever shall be a minimum of 5-1/4" in length. The lever handles shall operate independently on the inside and outside of the door.
- B. Deadbolt Locks: All doors shall be equipped with heavy-duty, single-bolt deadbolt locks. Locks shall be as manufactured by Schlage, Model B-800, Heavy-Duty "Primus" Series High Security Lock(s). Due to the Pima County Natural Resources, Parks, and Recreation Department's need to standardize locks and stock replacement units / parts, substitute brands and models will not be approved.

## 2.7 DOOR SIGNS

- A. Door Signs: Molded plastic signs with etched surfaces shall be installed on or adjacent to the Women's and Men's room doors. Signs shall include international symbols and shall have raised Braille letters. All signs shall comply with ADA requirements.

## 2.8 PIPING AND PLUMBING FIXTURES

- A. Piping: All water supply piping shall be copper with copper or compatible metal fittings. All waste and vent piping shall be Schedule 40 PVC with Schedule 40 or Schedule 80 PVC fittings.
  - 1. Pipe Location: Except for supply lines under the floor slab and pipe penetrations through interior building walls, all water supply, waste, and vent lines shall be installed in an exposed condition within the building plumbing chase.
- B. Shut-off Valves: Each lavatory, toilet, and urinal shall be equipped with its own shut-off valve. The valve shall be installed in the plumbing chase.
- C. Toilets: Toilets shall be prison-grade fixtures manufactured from 14 gauge, Type 304, welded, seamless, stainless steel. Toilets shall be wall-mounted toilet fixtures with mounting height as required by ADA. Mounting fasteners shall be accessible for the plumbing chase, only.
  - 1. Flush Valves: Toilets shall be equipped with an institutional grade, wall-mounted, push-button operated flush valve. The flush valve shall be installed in the plumbing chase.
- D. Urinals: Urinals shall be prison-grade fixtures manufactured from 14 gauge, Type 304, welded, seamless, stainless steel. Urinals shall be wall-mounted with mounting height as required by ADA. Mounting fasteners shall be accessible from the plumbing chase, only.
  - 1. Flush Valves: Urinals shall be equipped with an institutional grade, wall-mounted, push-button operated flush valve. The flush valve shall be installed in the plumbing chase, only.
- E. Lavatories: Lavatories shall be prison-grade fixtures manufactured from 14 gauge, Type 304, welded, seamless, stainless steel. Lavatories shall be wall-mounted with mounting height as required by ADA. Mounting fasteners shall be accessible from the plumbing chase, only.
  - 1. Faucet: Lavatories shall be equipped with a single push-button operated metering faucet. Faucet shall be chrome plated.
- F. Eye-Wash and Shower: Where noted or shown on the project plans, an eye-wash / emergency shower shall be installed in the plumbing chase or the work / storage space associated with the restroom building. The Eye-Wash / Emergency Shower shall comply with applicable ADA and Occupational Safety and Health Administration (OSHA) standards.

## 2.9 RESTROOM ACCESSORIES AND EQUIPMENT

- A. Grab Bars: Grab bars shall be provided and installed as required for compliance with ADA. Grab bars shall be prison-grade fabricated from Type 304, 22 gauge stainless steel. Fasteners shall be concealed.
- B. Toilet Paper Dispensers: Toilet paper dispensers shall be provided and installed. Mounting location shall be in compliance with ADA. Dispenser shall consist of a 18 gauge stainless steel frame with a stainless steel tube that can be padlocked to the frame.
- C. Stainless Steel Mirrors: Mirrors shall be constructed of Type 304, 20 gauge, bright annealed stainless steel with returns that conceal the backing material. The backing material shall be 1/4" thick masonite. Mirrors shall be secured to the wall with tamper resistant mounting screws. Mirror dimensions shall be approximately 16" wide by 24" high.
- D. Hand-Dryers: Hand dryers shall be of the surface mounted, push-button operated, heated-air, blower type. The unit shall be wall mounted in accordance with ADA standards using concealed fasteners. The cover shall be fabricated from gray cast-iron with porcelain enamel finish. The nozzle shall be fabricated from die-cast zinc with chrome finish. The nozzle shall be fixed. The motor shall be 1/10 hp, 115 volt, 20 amp, 60 Hz motor. The heating element shall be a 2300 watt element with an integral automatic resetting circuit breaker.

## 2.10 ELECTRICAL SERVICE AND LIGHTING

- A. Compliance with Applicable Codes: All electrical and lighting system components shall comply with applicable codes.
- B. Electrical Service to Building: The electrical service to the rest room building shall be as noted and shown on the project plans.
- C. Interior Lighting: Ceiling mounted light fixtures shall be installed in the women's restroom, the men's restroom and, where applicable, interior storage and work spaces. Light fixtures shall consist of metal backplate and ends with a UV stabilized, injection molded, high strength polycarbonate lens. Fasteners shall be vandal resistant. Lamps shall be fluorescent.
  - 1. Power to Ceiling Lights: Power to all ceiling lights shall be conduit that has been cast in the concrete ceiling and/or wall panels.
  - 2. Lighting Controls: Lighting in public restroom spaces shall be controlled with an electronic 7-day time switch. Lighting in storage and work spaces shall be controlled with wall mounted manual switches.
- D. Exterior Lighting: A wall mounted light fixture (or fixtures) shall be provided at the public entries to the restroom building. The light fixture shall consist of a die-cast aluminum housing with reinforcing ribs on the exposed sidewalls. The lens shall be a one-piece, injection molded ,

high-strength polycarbonate lens. Fasteners shall be vandal resistant. Lamps shall be high-pressure sodium. Fixtures shall comply with the Tucson / Pima County Outdoor Lighting Code.

1. Power to Wall Mounted Exterior Lights: Power to all exterior light fixtures shall be in conduit that has been cast on the concrete wall and/or ceiling panels.
2. Lighting Controls: Exterior lighting shall be controlled with an electronic 7-day time switch. The control of the exterior lights shall be independent of the control for interior lights.

#### 2.11 ELECTRICAL OUTLETS IN WORK / STORAGE SPACES:

- A. Electrical Outlets: Wall mounted GFI outlets shall be provided in all work / storage spaces. The quantity of outlets and the mounting height above the finished floor shall be as per the approved shop drawings.
  1. Power to Electrical Outlets: Power to all electrical outlets shall be conduit that has been cast on the concrete wall and/or ceiling panels.

#### 2.12 VENTS AND WINDOWS:

- A. Vents: All restroom spaces (women's room, men's room, and storage / work spaces) shall have natural ventilation. Ventilation shall consist of openings in the precast concrete structure that are covered with heavy-duty, painted steel, louvered vent panels that are secured to prevent unauthorized removal. Vent size and vent panel materials shall be as per the approved shop drawings.
- B. Windows: Windows shall be provided in all restroom spaces (women's room, men's room, and storage / work spaces) to provide for natural daylighting. Windows shall be non-operable. Window frames shall be heavy-duty steel frames secured in a manner that prevents unauthorized removal. Glazing shall be 1/4" thick frosted Lexan.

### **PART 3 - EXECUTION**

#### 3.1 BLUE STAKING

- A. Blue Staking: The Contractor shall have the work area Blue Staked prior to the start of any excavation or foundation work. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

#### 3.2 SUBGRADE AND FOUNDATION WORK

- A. Subgrade Preparation and Foundation Construction: The subgrade below the building and the building foundation shall be constructed per the approved shop drawings. All subgrade and foundation work shall be inspected, tested, and approved prior to the placement of the pre-

engineered restroom building.

### 3.3 UTILITY STUB-UPS

- A. Utility Stub-Ups: All conduits, pipe, and other utility appurtenances that will be below the building shall be installed, tested, and approved prior to the placement of the pre-engineered restroom building.

### 3.4 PLACEMENT OF PRE-ENGINEERED BUILDING

- A. Placement of the Pre-Engineered Restroom Building: The pre-engineered restroom building shall be delivered to the site, off-loaded, and set on the approved foundation. The work shall be performed using equipment of a type and with a capacity that is suitable for the work. Placement of the building shall be accomplished in a manner that avoids damage to the pre-engineered restroom and/or damage to other site improvements.
  - 1. Tolerances: The pre-engineered structure shall be set so that all floors are level and all walls are plumb. Where multiple building sections are utilized, the adjacent units shall match in elevation and alignment and shall be as required to make the connections shown or noted on the approved shop drawings.
  - 2. On-Site Welding: Welded connections between adjacent units shall be made as shown or noted on the approved shop drawings. Welds shall be ground smooth, cleaned, and painted to match adjacent surfaces.

### 3.5 UTILITY CONNECTIONS

- A. Utility Connections: Water, sewer, electrical, and where applicable, phone connections shall be made in accordance with the approved shop drawings, applicable codes, and the subject utility company standards.

### 3.6 TESTING, ADJUSTMENT, AND TOUCH-UP

- A. Testing: All doors, locks, light fixtures, plumbing fixtures, valves, and other equipment installed in the pre-engineered restroom shall be tested and adjusted as needed to ensure proper operation.
- B. Touch-Up: All building surfaces and installed equipment damaged during the placement of the pre-engineered restroom and/or the installation of equipment shall be touched up. Touch-up painting shall be accomplished with the same paint products and colors as used in conjunction with the initial painting work.
- C. Caulking of Joints: All joints between abutting sections of pre-engineered building shall be caulked or sealed to provide a permanent, weather and insect tight joint.

3.7 GUARANTEE:

- A. Guarantee for Building Components: All building floors, walls, roof decks, roofing systems, doors, and door frames shall be guaranteed to be free from defects in materials and workmanship for a period of ten years. A written letter of guarantee shall be submitted to the Owner's Representative prior to Final Acceptance of the Work.
  
- B. Guarantee for Furnishings, Fixtures, and Equipment: All furnishings, fixtures, and equipment installed in the pre-engineered restroom building shall be guaranteed to be free from defects in materials and workmanship for a period of two years. A written letter of guarantee shall be submitted to the Owner's Representative prior to Final Acceptance of the Work.

END OF SECTION – 13-34-23

## **SECTION 32-18-16 - PLAYGROUND EQUIPMENT AND SURFACING**

### **PART ONE: GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this section includes, but is not limited to, the:
  1. Layout, grading, and subgrade preparation for the playground area(s)
  2. Layout, grading, and subgrade preparation for the fitness equipment area(s)
  3. Installation of concrete curbs and headers
  4. Supply and installation of playground equipment
  5. Supply and installation of fitness equipment
  6. Supply and installation of resilient surfacing materials
  7. Inspection, testing, and certification of the installed equipment and surfacing

The extent of the playground equipment, fitness equipment, and surfacing work is shown on the project drawings and details.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to:
  1. Site grading and drainage work
  2. The construction of landscape, hardscape, and irrigation improvements

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate all playground equipment, fitness equipment, and surfacing work with the Owner's Representative. Work that is completed or in-progress shall be protected during the installation of the equipment and surfacing. The Contractor shall notify the Owner's Representative of field conditions that prevent installation of the equipment and surfacing as shown.

#### **1.5 REQUIRED LICENSURE**

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

1.6 INSTALLER QUALIFICATION AND CERTIFICATION REQUIREMENTS

- A. Installation Contractor Qualifications: The playground/fitness equipment and surfacing shall be installed by a National Playground Contractor’s Association (NPCA) qualified contractor.
- B. Installation Superintendent Qualifications: The installation of the playground / fitness equipment shall be performed under the direct supervision of an individual that is currently certified by the National Playground Safety Institute (NPSI) as a Certified Playground Safety Inspector.

1.7 COMPLIANCE WITH APPLICABLE REGULATIONS

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits, and pay for all associated fees.

1.8 REFERENCE SPECIFICATIONS

- A. Reference Specifications: The following specifications are, by reference, made a part of these project specifications. To the extent applicable, the project work shall be implemented in accordance with these reference specifications
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM F-1487-11 Standard Consumer Safety Performance Specification for Playground Equipment for Public Use
  - 2. ASTM F-1292-13 Standard Specifications for Impact Attenuation for Surfacing Materials within the Use Zone of Playground Equipment
  - 3. ASTM F-1951-14 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment
  - 4. ASTM F-2075-15 Standard Specifications for Wood Fiber for Use as Playground Safety Surface Under and Around Playground Equipment
  - 5. ASTM D-412-06a(2013) Standard Test Methods for Thermoplastic Elastomers – Tension
  - 6. ASTM D-624-00(2012) Standard Test Method for Tear Strength of Vulcanized Rubber and Thermoplastic Materials
- C. Americans with Disabilities Act:
  - 1. Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines, Published in the Federal Register on September 15, 2010, Chapter 10 Recreation Facilities, Section 1008 Play Areas

- D. Consumer Products Safety Commission:
  - 1. Public Playground Safety Handbook, Publication # 325 (Rev. November 2010).

#### 1.9 SUBMITTAL REQUIREMENTS

- A. Playground / Fitness Equipment Manufacturer's Statement of Compliance: The Contractor shall submit a letter, signed by the playground equipment manufacturer, stating that the playground and fitness equipment supplied is certified by the International Play Equipment Manufacturers Association (IPEMA) to be in compliance with ASTM 1487-11. The Statement of Compliance shall be submitted to the Owner's Representative for approval prior to the start of installation work.
- B. Rubberized Resilient Surfacing Material Manufacturer's Statement of Compliance: The Contractor shall submit a letter, signed by the rubberized resilient surfacing material manufacturer, stating that the resilient surfacing material supplied is certified by the International Play Equipment Manufacturers Association (IPEMA) to be in compliance with ASTM F-1292-13. The Statement of Compliance shall be submitted to the Owner's Representative for approval prior to the start of installation work.
- C. Engineered Wood Fiber Resilient Surfacing Statement of Compliance: The Contractor shall submit a letter, signed by the engineered wood fiber resilient surfacing manufacturer, stating that the engineered wood fiber resilient surfacing material supplied is certified by the International Play Equipment Manufacturers Association (IPEMA) to be in compliance with ASTM F-2075-15 and ASTM F-1292-13. The Statement of Compliance shall be submitted to the Owner's Representative for approval prior to the start of installation work.
- D. Equipment Installation / Use Zone Diagram: The Contractor shall submit a diagram, as provided by the playground / fitness equipment manufacturer, illustrating the layout of the specified playground equipment and the limits of the required use zone(s) as specified in ASTM F 1487-11. The Installation / Use Zone Diagram shall be submitted to the Owner's Representative for approval prior to the start of installation work.
- E. Color Chips: The Contractor shall submit to the Owner's Representative, for review and approval, color chips for the powder coated and plastic components of the playground and fitness equipment.
- F. Inspection, Maintenance and Repair Instructions: The Contractor shall submit the following items to the Owner's Representative prior to the issuance of a Certification of Substantial Completion.
  - 1. One (1) copy of the Playground Equipment Manufacturer's Inspection, Maintenance, and Repair Instructions.
  - 2. One (1) copy of the Fitness Equipment Manufacturer's Inspection, Maintenance, and Repair Instructions.

3. One (1) copy of the Rubberized Resilient Surfacing Manufacturer's Inspection, Maintenance, and Repair Instructions.
4. One (1) copy of the Engineered Wood Fiber Resilient Surfacing Material's Inspection and Maintenance Instructions.
5. One (1) copy of the Playground Equipment Installation Instructions.

G. Samples:

1. Sample of Pea Gravel: One cubic foot of the gradation and color proposed for use on the project.

1.10 CONTRACTOR PROVIDED MAINTENANCE TOOLS AND SUPPLIES

A. Maintenance Tools and Supplies: The Contractor shall supply and turn-over to the Owner's Representative, prior to Final Acceptance of the Work, the following items:

1. One (1) copy of the playground equipment installation manual.
2. One (1) set of specialized tools required for the installation and maintenance of the playground equipment.
3. One (1) quart size can of paint for each color used to finish the metal components of the play structure(s) and fitness equipment.

1.11 DELIVERY AND STORAGE OF PLAYGROUND EQUIPMENT AND SURFACING MATERIALS

- A. Notification of Equipment and Material Deliveries: The Contractor shall notify the Owner's Representative within 48 hours of the time the playground equipment and surfacing materials are delivered to the site so that the Owner can inspect the condition of the delivered materials.
- B. Delivery of Playground / Fitness Equipment: Playground / fitness equipment shall be shipped and delivered to the site in protective shipping containers, boxes, or wrappings. All equipment damaged during shipping or delivery, as determined by the Owner's Representative, will be rejected.
- C. Delivery of Rubberized Resilient Surfacing Materials: Rubberized resilient surfacing materials shall be delivered to the site in the manufacturer's original, unopened containers.
- D. Delivery of Engineered Wood Fiber Resilient Surfacing Material: The engineered wood fiber resilient surfacing material shall be delivered to the site in bulk truckload(s) or in other approved packaging.
- E. Storage of Playground / Fitness Equipment: All playground / fitness equipment shall be stored in a secure location and protected from moisture, vandalism, or other damage.

- F. Storage of Rubberized Resilient Surfacing Materials: The rubberized resilient surfacing materials shall be stored under conditions as recommended by the material manufacturer.
- G. Storage of Engineered Wood Fiber Resilient Surfacing Materials: Except as may be approved, in writing, by the Owner's Representative, the engineered wood fiber material shall be moved directly from the delivery truck to the playground area to be surfaced and shall not be stockpiled on site. If temporary stockpiling of the material is approved by the Owner's Representative, it shall be done in a location and in a manner that prevents contamination of the material with soil, rock, or other material.

## **PART TWO: MATERIALS**

### **2.1 CONCRETE FOR FOOTINGS, HEADERS, AND CURBS**

- A. Concrete for Footings, Headers, and Curbs: Concrete shall be Class B concrete per Section 1006 of the Pima Association of Governments (PAG) Standard Specifications for Public Improvements (2014 or most recent Edition).

### **2.2 DRAINAGE AGGREGATE**

- A. Drainage Aggregate: Drainage aggregate shall be clean crushed rock or gravel of uniform gradation. Gradation shall be as 3/4" size, or as noted on the project plans.

### **2.3 FILTER FABRIC:**

- A. Filter Fabric: Filter Fabric for the separation of drainage aggregate and resilient surfacing materials shall be a non-woven, needle-punched, heat bonded polypropylene material designed for use as a soil separator and drainage filter. The filter fabric manufacturer and model number shall be as noted on the project plans.

### **2.4 PEA GRAVEL SURFACING**

- A. Pea Gravel Surfacing: Pea Gravel shall be screened to remove particles over three-eighths inch (3/8"). Except as may be approved by the Owner's Representative, all material used on the project shall be from the same source and shall match the approved sample.

### **2.5 ENGINEERED WOOD FIBER RESILIENT SURFACING**

- A. Engineered Wood Fiber Resilient Surfacing: The engineered wood fiber resilient surfacing shall be comprised of softwoods and/or hardwoods and shall contain minimal amounts of bark, twigs, leaf debris, or other materials. The majority of the material shall not exceed 1-1/2" and shall contain 10% to 20% fines to aid in compaction. The product shall be non-toxic and non-flammable. The material shall be IPMEA Certified and shall conform to ASTM F-1292-13 and ASTM F-2075-15. The engineered wood fiber material manufacturer and product number shall be as noted on the project plans.

## 2.6 RESILIENT WEAR MATS

- A. Resilient Wear Mats: Resilient wear mats for installation at slide exits and other designated locations shall consist of recycled rubber bound with a polyurethane or other binder to form a mat. The mat shall have a weight of 7.5 lbs. per square foot. The mat shall be 4' x 4' in size or of the minimum size noted on the project plans. The resilient wear mat manufacturer and model number shall be as noted on the project plans.

## 2.7 RUBBERIZED RESILIENT SURFACING MATERIALS

- A. General Requirements: The rubberized resilient surfacing shall be of the poured-in-place type. It shall carry the International Play Equipment Manufacturer's Association's (IPEMA's) Seal of Approval. If the surface is part of the accessible route it shall comply with ASTM F-1951-14, Standard Specification for Determination of Accessibility to Surface Systems Under and Around Playground Equipment.
- B. Aggregate Base Course Material: The aggregate base course material used as base course for the rubberized resilient surfacing material shall be aggregate base course (ABC) material as per Section 303 of the Pima Association of Governments (PAG) Standard Specifications for Public Improvements (2014 or most recent Edition).
- C. Rubberized Resilient Surfacing:
  - 1. General Requirements: The surfacing shall be a poured-in-place system with an impact attenuating substrate and a bonded wear surface. The surfacing manufacturer and model number shall be as noted on the project plans.
  - 2. Impact Attenuating Substrate: The substrate (cushion layer) shall consist of shredded styrene butadiene rubber (SBR) adhered with a 100% solids polyurethane binder to form a resilient, porous material. Strands of SBR may vary from 0.5 mm to 2 mm in thickness. Foam or granular rubber shall not be utilized in the substrate. The binder shall be between 10 and 14 percent of the total weight of the rubber and shall provide 100 percent coating of the particles. The substrate shall be compatible with the wearing surface.
    - a. Thickness of Substrate: The substrate shall have a minimum thickness of 2-1/2 inches. The Contractor shall verify that the thickness of the substrate is adequate to meet the standards and specifications referenced herein.
  - 3. Wearing Surface: The wear surface shall consist of ethylene propylene diene monomer (EPDM), Thermal Plastic Vulcanized (TPV), or Treated SBR (Styrene Butadiene Rubber) particles adhered with a polyurethane binder formulated to produce a uniform, even surface. EPDM particles shall meet the requirements of ASTM D-412-06a (2013) for tensile strength and elongation. EPDM shall be peroxide cured with an EPDM content of 26% and shall include a processing aid to prevent hardness. The size of the rubber particles shall be

not less than 2 mm or greater than 4 mm across. Binder shall not be less than 20% of the total weight of the rubber used in the wearing surface and shall provide a 100% coating of the particles. The wearing surface shall be porous.

- a. Thickness of Wearing Surface: The wearing surface shall have a minimum thickness of ½ inch.
  - b. Color of Wearing Surface: The wearing surface color shall be as noted on the plans.
4. Binder: Binder shall be a material specifically designed for use with rubber granule material and outdoor installations. It shall be a single component polyurethane prepolymer formulated using a polymeric form of MDI. No Toluene Diphenyl Isocyanate shall be used.

## 2.8 PLAYGROUND EQUIPMENT

- A. General Requirements: All playground equipment shall carry the Seal of Approval from the International Play Equipment Manufacturer's Association (IPEMA) and shall comply with the standards and specifications referenced herein.
- B. Playground Equipment: The playground equipment shall be of the make, model, and manufacturer as noted on the project plans.
- C. Fitness Equipment: The fitness equipment shall be of the make, model, and manufacturer as noted on the project plans.
- D. Equipment Materials and Finishes:
  1. Colors: The playground equipment and fitness equipment shall be of the color noted on the project plans. If color is not noted, the Contractor shall submit a color schedule to the Owner's Representative for review and color selection. The color schedule shall be submitted to the Owner prior ordering the required equipment.

## 2.9 INCIDENTAL ITEMS

- A. Other Items: Other items required for the installation of the playground equipment shall be as per the manufacturer's written instructions, shall be in accordance with applicable codes, and shall be appropriate for the work to be performed.

## **PART THREE: EXECUTION**

### 3.1 BLUE STAKING

- A. Blue Staking: The Contractor shall request that the project site be Blue Staked prior to the start of any excavation work. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

### 3.2 LAYOUT AND STAKING

- A. Layout of Playground Area and Component Equipment: Prior to the start of playground construction, the Contractor shall layout and stake the limits of the overall play area and the layout of the play equipment. The Contractor shall verify that there are adequate use zones and setbacks between each component piece of the play structure and other pieces of equipment and/or perimeter headers, curbs, pavements, and shade canopy columns. All deficiencies shall be called to the attention of the Owner's Representative. If necessary, the Contractor shall make adjustments to the layout and/or configuration of the play area. Adjustments shall be as approved by the Owner's Representative.

### 3.3 EXCAVATION FOR CONCRETE HEADERS AND RESILIENT SURFACING

- A. Excavation and Grading: The Contractor shall excavate existing soil as required to provide for the construction of perimeter concrete headers and for the installation of the resilient surfacing and associated drainage aggregate. The Contractor shall remove and dispose of all excess soil.

### 3.4 CONSTRUCTION OF CONCRETE HEADERS:

- A. Construction of Perimeter Concrete Headers: Concrete headers shall be constructed as detailed with expansion joints and control joints provided as detailed or noted. Exposed surfaces shall be finished with a light broom finish. All exposed edges shall be tooled to provide a radiused edge. Curing work shall be performed in accordance with the Pima Association of Governments (PAG) Standard Specifications for Public Improvements.
  - 1. Top of Header Finished Grades: The top of the concrete header shall match the adjacent surface with the reveal as noted. Where the finished grade of the adjacent soil is uneven, the header shall be constructed to be level or with a uniform slope as approved by the Owner's Representative. Fine grading work shall be performed at the perimeter of play area to provide the reveal noted or detailed.

### 3.5 PLAYGROUND EQUIPMENT AND FITNESS EQUIPMENT INSTALLATION

- A. Temporary Fencing: Prior to the start of playground and fitness equipment installation, a temporary, 6' high (minimum) chain-link fence, or other Owner approved barrier, shall be installed around the playground to restrict access to the play equipment prior to completion of the playground equipment and surfacing work. The fence shall remain in place until the post installation inspection and certification work have been successfully completed.
- B. Installation of Posts and Concrete Footings: Equipment posts and concrete footings shall be constructed and installed in accordance with the playground equipment manufacturer's written instructions. The base of all posts anchored in concrete shall be marked to denote the appropriate elevation for the top of the concrete footing and the appropriate elevation for the top of the resilient surfacing to be installed later.

1. Resilient Surfacing Finished Grade Markers: All markers indicating the finished grade of the resilient surfacing shall be protected and shall remain affixed to the playground equipment for future reference by the Owner's maintenance staff.
- C. Assembly and Testing of Playground Equipment: All playground equipment components and fasteners shall be assembled, checked, and tested in accordance with the equipment manufacturer's written instructions.
  1. Age Appropriate Warning Labels: All age appropriate warning labels provided by the manufacturer shall remain affixed to the playground equipment for future reference by the Owner's maintenance staff.

### 3.6 PEA GRAVEL SURFACING INSTALLATION

- A. Pea Gravel Surfacing: All areas to be surfaced with pea gravel shall be brought to the lines and grades shown on the drawings with allowances made for the depth of the gravel material. The pea gravel shall be installed over the subgrade to the depth noted on the plans.

### 3.7 RUBBERIZED RESILIENT SURFACING INSTALLATION

- A. Project Site Conditions: The rubberized resilient surfacing shall be installed on a dry sub-surface with no rain forecast during the initial drying /curing period. The ambient temperatures and relative humidity during the installation and curing period shall be within the range recommended by the manufacturer.
- B. Subgrade Preparation and Compaction: The subgrade shall be cleaned of all concrete, excess soil, and other debris and shall be graded to provide a clean and uniform subgrade surface. Areas that have been over-excavated and all fill material shall be compacted to not less than 95% of the maximum laboratory density.
- C. Placement and Compaction of Aggregate Base Course Material: The aggregate base course material shall be placed in lifts not exceeding six inches (6"), moistened, and compacted to a density of not less than 95% of the maximum laboratory density. The aggregate base course shall be graded to provide a uniform surface as required for the rubberized resilient surfacing.
- D. Mixing: All rubberized resilient surfacing material shall be mixed on site in a rotating tumbler in accordance with the manufacturer's written instructions.
- E. Substrate Installation: The substrate material shall be installed as one continuous pour without interruption. Installation techniques shall be as per the manufacturer's written instructions. The depth of the material shall be as detailed and as required to provide the impact attenuation required for the play equipment installed.

- F. Wearing Course Installation: Adhesive, as recommended by the manufacturer, shall be applied to the substrate and the wearing course material installed before the adhesive dries. The wearing course surface shall be troweled to a smooth even finish. The wearing course material shall be installed as a continuous pour without interruption. Installation techniques shall be as per the manufacturer's written instructions. The wearing course shall be installed without depressions or other irregularities that will result in the ponding of water on the surface of the rubberized resilient surfacing.
- G. Curing and Protection: The wearing course shall be allowed to cure for a minimum of 48 hours or as per the manufacturer's written instructions. During the curing period the surfacing material shall be protected from all traffic.

### 3.8 ENGINEERED WOOD FIBER RESILIENT SURFACING INSTALLATION

- A. Subgrade Preparation: The subgrade shall be cleaned of all concrete, excess soil, and other debris and shall be graded to provide a clean and uniform subgrade surface. Areas that have been over-excavated shall be compacted to the density of the adjacent, undisturbed soil.
- B. Placement of Drainage Aggregate: Drainage aggregate shall be placed and graded to provide a uniform course of clean aggregate material as detailed or noted. Drainage aggregate shall be kept clean of foreign material during the course of the work.
- C. Placement of Filter Fabric: After placement of the drainage aggregate, the filter fabric shall be installed and trimmed as detailed and as required to fully cover the drainage aggregate. Adjacent panels of filter fabric shall be overlapped by six inches (6"), minimum.
- D. Installation of Engineered Wood Fiber Resilient Surfacing: The engineered wood fiber resilient surfacing shall be installed as detailed and as required to provide the full depth of material detailed or noted. Allowance shall be made for settlement and compaction. Supplemental surfacing shall be supplied and installed as required.
- E. Installation of Wear Mats: Wear mats shall be installed at slide exits and at other designated locations. Mats shall be installed level and at a depth of six inches (6") below the surface of the engineered wood fiber resilient surfacing.

### 3.9 POST-INSTALLATION INSPECTION AND CERTIFICATION

- A. Post-Installation Inspection and Certification: After completion of the playground equipment and playground surfacing, the Contractor shall have the installation inspected by a third-party independent inspector who has current certification as a National Playground Safety Institute (NPSI) Certified Playground Safety Inspector. The inspection shall include performance of the Critical Fall Height Test per ASTM-F-1292 with resulting g-max and HIC scores provided. If deficiencies are noted, they shall be repaired, replaced, or otherwise remedied and the installation re-inspected. A report, certifying that the installation meets all applicable requirements and signed by the inspector, shall be provided to the Owner prior to Substantial Completion of the Work.

### 3.10 CLEAN-UP

- A. Site Clean-up: The Contractor shall perform cleaning operations during the installation of the playground equipment, fitness equipment, and playground surfacing and upon completion of the project. The Contractor shall remove from the site all excess materials, debris, and equipment and shall legally dispose of all excess and waste materials. The Contractor shall repair all damage resulting from playground equipment, fitness equipment, and playground surfacing installation.

### 3.11 GUARANTEE:

- A. Playground Equipment Guarantee: The playground equipment manufacturer shall guarantee the playground equipment installed to be free from defects in materials and workmanship for a period of two (2) years commencing on the date of Substantial Completion of the Work. A written letter of guarantee, signed by the equipment manufacturer, shall be submitted to the Owner's Representative prior to Final Acceptance of the Work. The letter shall include the name, mailing address, phone number, and e-mail address of the manufacturer's representative to be contacted regarding guarantee issues. The letter shall specifically state that the manufacturer will make all necessary repairs to the equipment during the guarantee period in accordance with these specifications, at no cost to the Owner. The Contractor shall be responsible for obtaining the manufacturer's Letter of Guarantee and for submitting this information to the Owner's Representative.
- B. Rubberized Resilient Surfacing Guarantee: The rubberized resilient surfacing manufacturer shall guarantee the surfacing material installed to be free from defects in materials and workmanship for a period of five (5) years commencing on the date of Substantial Completion of the Work. A written letter of guarantee, signed by the surfacing manufacturer, shall be submitted to the Owner's Representative prior to Final Acceptance of the Work. The letter shall include the name, mailing address, phone number, and e-mail address of the manufacturer's representative to be contacted regarding guarantee issues. The letter shall specifically state that the manufacturer will make all necessary repairs to the surfacing during the guarantee period in accordance with these specifications, at no cost to the Owner. The Contractor shall be responsible for obtaining the manufacturer's Letter of Guarantee and for submitting this information to the Owner's Representative.
- C. Notification of Deficiencies: The Owner will provide written notification to the manufacturer(s) of deficiencies that occur during the guarantee period(s).
- D. Manufacturer's Response to Written Notification: The manufacturer shall perform the required repair or replacement work or provide the Owner with an acceptable schedule for the completion of the repair work within ten (10) calendar days of receipt of written notice. If the manufacturer fails to respond and perform the required repair work within the specified period, the Owner shall have the right to have the work performed by others and invoice the manufacturer for the cost of the work. The manufacturer agrees to pay all such charges.

END OF SECTION 32-18-16

## **SECTION 32-31-13 - FENCING, GATES, AND POST-AND-CABLE BARRIERS**

### **PART 1 - GENERAL:**

#### **1.1 RELATED DOCUMENTS:**

- A. The General Provisions of the Contract including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to the work specified in this section.

#### **1.2 DESCRIPTION OF WORK:**

- A. The work specified in this section includes, but is not limited to, the:
  - 1. Fabrication and installation of chain link fences and backstops
  - 2. Fabrication and installation of chain link gates
  - 3. Fabrication and installation of park entry and equestrian step-over gates
  - 4. Fabrication and installation of post-and-cable barriers
  - 5. Fabrication and installation of dog park fence
  - 6. Fabrication and installation of wire fence (welded mesh, barbed, and smooth wire)
- B. The extent of the work is shown on the drawings and details.

#### **1.3 RELATED WORK:**

- A. Related work includes, but is not limited to, the:
  - 1. Construction of landscape, hardscape, and irrigation improvements
  - 2. Site grading, paving, and miscellaneous construction

#### **1.4 COORDINATION:**

- A. The Contractor shall coordinate all fencing, gate, and post-and-cable barrier work with the Owner's Representative. Work by others that is completed or in progress shall be protected during the installation of the fencing, gates, and post-and-cable barriers. The Contractor shall notify the Owner's Representative of field conditions that prevent the installation of the fencing, gates, and post-and-cable barrier as shown.

#### **1.5 COMPLIANCE WITH APPLICABLE REGULATIONS:**

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits and pay for all associated fees.

## 1.6 REFERENCE SPECIFICATIONS

### A. American Society for Testing and Materials (ASTM)

1. ASTM F-567-14a Standard Practice for Installation of Chain Link Fence
2. ASTM A-53-12 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless
3. ASTM A-392-11a Standard Specification for Zinc Coated Steel Chain Link Fence Fabric

### B. American Welding Society

1. AWS D1.1 Structural Welding Code

## 1.7 SUBMITTAL REQUIREMENTS:

A. Product Specification Sheets: The Contractor shall submit to the Owner's Representative for review and approval, three (3) copies of product specification sheets for all fencing materials and hardware to be utilized on the project. The specification sheets shall be highlighted to indicate the materials / options to be provided. No material shall be delivered to the site or incorporated into the work until the required submittal for that material has been made and approved.

B. Shop Drawings: The Contractor shall submit to the Owner's Representative for review and approval, shop drawings for the following items:

1. Park entry gates
2. All fabricated chain link gates wider than 5'-0"
3. All fabricated hinges, latches, and hardware

The Contractor shall also submit shop drawing for all items where the proposed fabrication is different than as detailed or shown on the project plans or different than as shown or noted on the standard details and specifications. All deviations from the standard drawings and specifications shall be clearly noted for the Owner's review. Modified items shall not be delivered to the site or installed without shop drawings approved by the Owner's Representative.

## 1.8 SURVEY REQUIREMENTS:

A. Contractor Surveying: The Contractor shall be responsible for all survey work required to install boundary fencing and gates as shown on the project plans and described in these specifications.

## **PART TWO: MATERIALS:**

### **2.1 CHAIN LINK FABRIC:**

- A. Chain-Link Fabric for Park Fences: Fabric for fencing and gates (exclusive of backstops below 10'-0" and security fencing) shall be 9 Gauge with two inch (2") weave. Fabric shall be hot dipped galvanized with not less than 1.2 oz. of Zinc per square foot. Galvanizing shall be applied before weaving. Top and bottom selvages shall be knuckled. Fabric material shall be new.
- B. Chain-Link Fabric for Backstops: Fabric for backstops shall be 6 Gauge (for fencing below 10'-0") and 9 Gauge (for fencing above 10'-0"). All fabric shall have a two inch (2") weave. Fabric shall be hot dipped galvanized with not less than 1.2 oz. of Zinc per square foot. Galvanizing shall be applied before weaving. Top and bottom selvages shall be knuckled. Fabric material shall be new.
- C. Chain Link Fabric for Security Fences: Fabric for security fencing shall be 9 Gauge with two inch (2") weave. Fabric shall be hot dipped galvanized with not less than 1.2 oz. of Zinc per square foot. Galvanizing shall be applied before weaving. Top selvage shall be twisted and barbed. Bottom selvage shall be knuckled. Fabric material shall be new.

### **2.2 CHAIN LINK FENCE AND GATE FRAMING MATERIALS:**

- A. Framing Members: Framing members, including all posts, rails, braces, and gate frames, shall be Type I pipe, Schedule 40, hot dipped galvanized with not less than 1.8 oz. of Zinc per square foot of surface. Framing members shall be new and undamaged.
- B. Corner Posts: Corner posts up to six feet (6') tall shall have an O.D. of 2.875". Corner posts over six feet (6') tall shall have an O.D. of 4.00 inches unless otherwise noted on the project plans.
- C. Gate Posts: Gate posts for leaves up to six feet (6') tall shall have an O.D. of 2.875". Gate posts for leaves over six feet (6') shall have an O.D. of 4.00 inches unless otherwise noted on the project plans.
- D. Line Posts: Line posts up to six feet (6') high shall have an O.D. of 2.00". Line posts greater than six feet (6') shall have an O.D. of 2.875" unless otherwise noted on the project plans.
- E. Gate Frames: Gate frames shall be constructed of the specified pipe material and shall have an O.D. of 2.00" unless otherwise noted on the project plans. Gate frames shall be braced with mid-point bracing.
- F. Rails and Post Braces: Top, bottom, and intermediate rails and post braces shall have an O.D. of 1.625" unless otherwise noted on the project plans.

- G. Expansion Couplings: Expansion couplings shall be galvanized steel couplings sized for the rails within which they are to be installed.

### 2.3 CHAIN LINK FENCE FITTINGS AND ACCESSORIES:

- A. Tension Wires: Tension wire shall be .177" O.D. Marcellled steel tension wire with Class 2 galvanized coating.
- B. Post Brace Rod: Post brace rod shall be constructed of 0.375" steel rod with adjustable tightener. Rod and tightener shall be hot-dipped galvanized.
- C. Post Caps: All gate, end, and other posts with exposed tops shall be fitted with a post cap to exclude moisture. Caps shall be constructed of malleable steel with galvanized steel finish. Post caps shall be tack welded to the post or secured in a manner acceptable to the Owner's Representative.
- D. Stretcher Bars: Stretcher bars shall be not less than 3/16" by 3/4" in cross section and shall be not less than 2" shorter than the nominal height of the fabric with which they are used. Stretcher bars shall be constructed of galvanized steel.
- E. Stretcher Bar Bands: Bands for securing stretcher bars and fabric to terminal posts shall be formed from flat or beveled steel and shall have a minimum thickness after galvanizing of 0.078" and a minimum width of 3/4". Attachment bolts shall be 5/16" diameter galvanized carriage bolts with nuts.
- F. Fabric Clips: Clips for securing fabric to posts and rails shall be heavy duty galvanized steel wire clips. Clips for securing 6 gauge fabric shall be 6 gauge. Clips for securing 9 gauge fabric shall be 9 gauge. Clips for securing fabric to tension wire shall be corrosion resistant hog-rings.

### 2.4 CHAIN LINK FENCE GATE FITTINGS AND ACCESSORIES

- A. Gate Fittings for Swing Gates: Swing gates shall be equipped with two or three hinges per leaf as detailed on the project plans and with one cast metal fork latch. The latch shall have provisions for pad-locking. All gate fittings shall be hot-dipped galvanized.

### 2.5 CONCRETE FOR CHAIN LINK FENCE POST FOOTINGS

- A. Concrete for Post Footings: Concrete for chain link fence post footings shall be Class B concrete per the Pima County - City of Tucson Standard Specifications for Public Improvements (2014 or most recent edition). The 28 day compressive strength of the concrete shall be not less than 2500 psi.

## 2.6 WIRE FENCES

### A. Wire Mesh Fence for Dog Parks:

1. Posts and Framing Members: Posts and framing members for dog park fences shall be as specified herein for chain link fences.
2. Fence Fabric: Fence fabric shall be 2" (horizontal) x 4" (vertical) wire mesh fabric. Horizontal and vertical wires shall be 12-1/2 gauge, high tensile, Class 3 (galvanized after weaving) steel wire. Wire connections shall be welded.
3. Wire Clips: Clips for securing fence to posts and rails shall be heavy-duty, galvanized steel wire clips sized as needed to securely fasten the fabric to the fence framing.
4. Concrete for Post Footings: Concrete for dog park fence post footings shall be Class B concrete per the Pima County - City of Tucson Standard Specifications for Public Improvements (2014 or most recent edition). The 28 day compressive strength of the concrete shall be not less than 2500 psi.

### B. Wire Mesh Fence for Installations Other than Dog Parks:

1. Posts: Posts shall be heavy-duty painted or galvanized steel "T" posts with a weight of not less than 1.25 lbs. per linear foot of post. Post shall be equipped with an anchor plate welded to that portion of the post to be installed below grade.
2. Fence Fabric: Fence fabric shall be 2" (horizontal) x 4" (Vertical) wire mesh fabric. Horizontal and vertical wires shall be 14 gauge (galvanized after weaving) steel wire. Wire connections shall be welded.
3. Wire Clips: Clips for securing fence to posts shall be heavy-duty, galvanized steel wire clips sized as needed to securely fasten the fabric to the fence posts.

### C. Wire Boundary Delineation (Game) Fences:

1. Posts: Posts shall be heavy-duty painted or galvanized steel "T" posts with a weight of not less than 1.25 lbs. per linear foot of post. Post shall be equipped with an anchor plate welded to that portion of the post to be installed below grade.
2. Barbed Wire: Barbed wire shall be 12-1/2 gauge, 2 or 4 point, galvanized steel wire.
3. Smooth (Barbless) Wire: Smooth or barbless wire shall be 12-1/2 gauge galvanized steel wire.
4. Wire Fence Stays: Wire fence stays shall be 9-1/2 gauge galvanized steel wire stays.

5. Wire Clips: Clips for securing wire to posts shall be heavy-duty, galvanized steel wire clips sized as needed to securely fasten the wire to the fence posts.
6. Framing for End and Corner Post Assemblies: Framing shall be Schedule 40 galvanized steel pipe as detailed.

## 2.7 PARK ENTRY AND EQUESTRIAN STEP-OVER GATES:

- A. Steel Pipe: Pipe for the construction of post and gate members shall be Schedule 40 black steel pipe. Pipe size shall be as detailed or noted.
- B. Hardware and Accessories: Hardware and accessories shall be as detailed and as per the approved shop drawings.
- C. Finishes: The park entry gates shall be primed and painted as specified herein. Reflective tape shall be installed on gate rails as detailed.
- D. Concrete for Post Footings: Concrete for park entry gate post footings shall be Class B concrete per the Pima County - City of Tucson Standard Specifications for Public Improvements (2014 or most recent edition). The 28 day compressive strength of the concrete shall be not less than 2500 psi.

## 2.8 POST-AND-CABLE BARRIERS:

- A. Posts: Posts shall be constructed of Schedule 40 black steel pipe. Size shall be as detailed or noted.
- B. Corner and End Panels: Corner and end panels shall be constructed of Schedule 40 black steel pipe. Size shall be as detailed or noted.
- C. Post Caps: All posts shall be fitted with a post cap to exclude moisture. Caps shall be constructed of malleable steel with galvanized steel finish. Post caps shall be tack welded to the post or secured in a manner acceptable to the Owner's Representative
- D. Cable: Cable shall be ½" diameter, 6 x 25, galvanized steel cable.
- E. Cable Clamps: Cable clamps shall be galvanized steel "U" clamps with two bolts. Size shall be appropriate for the securing of two stands of ½" cable.
- F. Finishes: Posts and end / corner panels shall be primed and painted as specified herein.
- G. Concrete for Post Footings: Concrete for post-and-cable post footings shall be Class B concrete per the Pima County - City of Tucson Standard Specifications for Public Improvements (2014 or most recent edition). The 28 day compressive strength of the concrete shall be not less than 2500 psi.

## 2.9 PAINT

- A. Primer for Ferrous (Non-Galvanized) Metals: Primer shall be a synthetic alkyd corrosion inhibiting primer manufactured for exterior ferrous metal surfaces. The primer manufacturer and primer type shall be as approved by the Owner's Representative.
- B. Finish Paint for Ferrous (Non-Galvanized) Metals: Paint shall be a 100% acrylic, low sheen enamel paint manufactured for application on exterior, primed ferrous metal surfaces. The paint manufacturer and paint type shall be as approved by the Owner's Representative.
  - 1. Color: Paint color shall be as noted on the drawings or as selected by the Owner's Representative.

## **PART THREE: EXECUTION**

### 3.1 WORKMANSHIP:

- A. Workmanship: All chain link fence installation work shall meet the requirements of ASTM-F-567-14a and shall be as approved by the Owner's Representative.

### 3.2 LAYOUT:

- A. Layout of Fence and Gates: The Contractor shall layout the alignment of all fences and shall stake the location of all corner and gate posts for approval by the Owner's Representative. Approval shall be obtained prior to the commencement of fence installation work. Adjustments in the layout of the fence or in gate locations shall be made as directed by the Owner's Representative.
  - 1. Survey: The Contractor shall be responsible for all survey work required for the layout of the perimeter / boundary fencing. .
  - 2. Adjustments to Avoid Conflicts with Existing Vegetation: After the initial staking by the Contractor, the Owner's Representative may direct the Contractor to make adjustments to the layout of the fence or post-and-cable barrier as required to avoid conflicts with existing vegetation or other improvements. No tree, shrub, or cactus shall be removed for fence or post-and-cable barrier installation except as approved by the Owner's Representative.

### 3.3 POST HOLE EXCAVATION AND FOOTINGS:

- A. Scheduling: Fence installation work shall be scheduled to occur after grades along designated fence lines have been brought to the finished grades shown on the drawings.
- B. Blue-Staking: The Contractor shall have the work area Blue-Staked prior to the start of any excavation work.

- C. Footings: Footing excavation and installation work shall be performed as detailed.
  - 1. Barricades: Barricades shall be provided by the Contractor to prevent public access to areas with open fence post excavations. Excavations shall not be left open overnight or during non-working periods without appropriate barricades or other access control measures.

#### 3.4 CHAIN LINK FENCE INSTALLATION:

- A. Posts: Install corner, line, and gate posts as required to keep all posts plumb and aligned with the approved fence alignment. Allow adequate time for concrete footings to set-up before installing fabric or other fence components.
  - 1. Shaping of Post Tops to Receive Top Rail: All posts to receive a top rail shall be shaped or notched to allow for a continuous butt joint between the post and top rail as detailed.
- B. Rails: Install all top, bottom and (where applicable) intermediate rails by welding rail to the (end, gate, and line) posts. The bottom and intermediate rails shall be shaped or notched to allow for a continuous butt joint between the rail and the post as detailed. Rails shall be welded to posts. Welds shall be continuous and shall be ground smooth and cleaned. All surfaces damaged by the welding operation shall be cleaned and finished with zinc based paint.
- C. Braces: Install braces at corners and at gates, and install post caps as detailed.
- D. Fabric: Cut fabric to form continuous piece between terminal posts. Pull fabric taught and secure to terminal posts with stretcher bar. Install tension wire at base of fabric as detailed (where applicable). Bottom of fabric shall be 1" to 2" above the approved finished grade along the fence line.
- E. Clips: Secure fabric to posts, rails, and braces at intervals not exceeding fifteen inches (15") on-center.
- F. Expansion Couplings: Install expansion couplings at 100' intervals or at the intervals noted on the project plans. Align couplings installed in top and bottom rails.

#### 3.5 CHAIN LINK GATE INSTALLATION:

- A. Gates: Install gates plumb and level and check for proper operation of hinges and closure hardware. Make adjustments as needed to provide for normal gate operation as approved by the Owner's Representative.

#### 3.6 WIRE FENCE INSTALLATION:

- A. Dog Park Fence Installation: Dog park fences shall be installed as specified for chain link fence installation.

B. Wire Fence (Other than Dog Park) Installation:

1. Posts: "T" Posts shall be driven into the ground in the locations shown or noted as needed to provide a uniform alignment and consistent post heights that follow the topography and/or finished graded. Post shall be plumb.
2. Fabric: Fabric shall be attached to the posts as detailed and specified.

C. Boundary Delineation (Game) Fence Installation:

1. Posts: "T" Posts shall be driven into the ground in the locations shown or noted as needed to provide a uniform alignment and consistent post heights that follow the topography and/or finished graded. Post shall be plumb.
2. Wire and Wire Stays: Barbed and smooth (barbless) wire shall be attached to the posts as detailed and specified. The spacing between wires and the height of the wires above finished grade shall be as detailed. Two equally spaced wire stays shall be installed between each set of adjacent posts.

3.7 PARK ENTRY AND EQUESTRIAN STEP-OVER GATE INSTALLATION

- A. Gate Post Installation: Install gate posts and footings as detailed. Allow adequate time for concrete footings to set-up before installing gates.
- B. Gate Installation: Install park entry gates as detailed and in accordance with the approved shop drawings. Adjust as needed or as directed by the Owner's Representative to allow for unobstructed operation of the gate and to ensure that gate panels align when the gate is in the closed position.
- C. Tie-Back Post Installation: Install tie back posts plumb, as detailed, and in the location needed to receive the gate. Adjust as required to allow gate to be locked in the open position as detailed on the project plans.

3.8 POST-AND-CABLE BARRIER INSTALLATION

- A. Post Installation: Install posts as detailed. Allow adequate time for concrete to set before installing cable.
- B. End / Corner Panel Installation: Install end / corner panels as detailed. Notch rails to provide continuous butt joint between rail and post. Weld all joints. Welds to be continuous. Grind smooth all welds. Install caps and tack weld to posts.
- C. Cable: Install cable as detailed and tension to provide a sag of not more than 4" when cable is loaded between posts. Wrap cable around terminal posts and secure with three (3) cable clamps.

1. Splicing Restrictions: Cable shall terminated at end / corner panels only. The splicing of cable between end / corner panels is prohibited.

### 3.9 PAINTING OF POSTS, GATES, AND OTHER (NON-GALVANIZED) FERROUS METAL SURFACES

- A. Materials to be Painted: All ferrous metal materials used in the construction of fences, gates, and post-and-cable barriers that are not galvanized or powder coated shall be painted.
- B. Substrate Preparation: All substrate surfaces to receive paint shall be thoroughly cleaned to remove all rust, scale, and other foreign materials. Other surface preparation shall be performed in accordance with the paint manufacturer's written instructions.
- C. Prime Coat: All materials to be painted shall be receive one-coat of rust inhibiting primer as specified herein and as recommended by the primer manufacturer. If damaged prior to the application of the finish coat, the primer shall be touched-up as-needed.
- D. Finish Coat: All materials to be painted shall receive two coats of finish paint as specified herein and as recommended by the finish paint manufacturer. Whenever possible, at least one finish coat shall be applied in the shop prior to the delivery of the item to the project site. The final coat may be applied in the field.
  1. Touch-Up: After completion of the installation, all painted surfaces shall be checked for damage. All damaged areas shall be prepared and painted.

### 3.10 CLEAN-UP:

- A. Clean-up: The Contractor shall clean-up all debris and excess materials during and upon completion of the work. The Contractor shall legally dispose of all excess and waste materials and shall repair all damage resulting from fence, gate, and post-and-cable barrier installation.

### 3.11 GUARANTEE:

- A. Guarantee: The Contractor shall guarantee all fencing, gates, and post-and-cable barrier to be free from defects in materials and workmanship for a period of two years. A written guarantee shall be submitted to the Owner's Representative prior to Final Acceptance of the Work.

END OF SECTION 32-31-13

## **SECTION 32-80-00 - IRRIGATION SYSTEM**

### **PART ONE: GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this section includes, but is not limited to, the:
  1. Coordination of new water meter installation
  2. Installation and testing of backflow preventers
  3. Installation of backflow preventer security enclosures
  4. Excavation, backfill, and compaction of trenches
  5. Installation and pressure testing of mainline pipe
  6. Installation of lateral line pipe and drip system distribution tubing
  7. Installation of sleeves for pipe and wire under pavements
  8. Installation of mainline isolation valves
  9. Installation of master valve, flow sensor, and remote control valve assemblies
  10. Installation of quick-coupling valves, pressure regulating valves, vacuum / air release valves, and other specialty valves
  11. Installation of automatic controllers
  12. Installation of controller security cabinets
  13. Installation of communication cable, control wiring, and related equipment
  14. Installation of sprinkler heads and swing-joint risers
  15. Installation of drip emitters
  16. Installation of drip zone filters and pressure regulators
  17. Operational testing of the irrigation system
  18. Initial maintenance of the irrigation system

The extent of the irrigation work is shown on the drawings and details.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to, the:
  1. Installation / planting of trees, shrubs, and turf areas
  2. Construction hardscape and other site improvement.

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate all irrigation system work with the Owner's Representative. Work that is completed or in-progress shall be protected during the installation of the irrigation

system. The Contractor shall notify the Owner's Representative of field conditions that prevent installation of the irrigation system as shown.

1.5 REQUIRED LICENSURE

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

1.6 QUALIFICATIONS OF IRRIGATION SYSTEM INSTALLERS

- A. The irrigation system shall be installed by, and under the direct supervision of, individuals who have appropriate experience with the installation of irrigation systems similar to the system being installed. A supervisor, with not less than three-years of irrigation system installation experience, shall be on-site at all times when the project irrigation system is being installed.

1.7 COMPLIANCE WITH APPLICABLE REGULATIONS

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits, and pay for all associated fees.

1.8 REFERENCE SPECIFICATIONS

- A. American Society for Testing and Materials:

- |    |                    |  |
|----|--------------------|--|
| 1. | ASTM-D-1784-11     | Standard Specification for Rigid Poly (Vinyl Chloride) Compounds   |
| 2. | ASTM-D-1785-15     | Standard Specification for Poly (Vinyl Chloride) (PVC) Pipe, Schedules 40, 80, and 120                                     |
| 3. | ASTM-D-2241-15     | Specification for Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR-Series)   |
| 4. | ASTM-D-2564-12     | Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems                          |
| 5. | ASTM-D-2672-14     | Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement  |
| 6. | ASTM-F-656-15      | Standard Specification for Primers for use in Solvent Weld Joints of Poly (Vinyl Chloride) (PVC) plastic Pipe and Fittings |
| 7. | ASTM-A-536         | Standard Specification for Ductile Iron Castings   |
| 8. | ASTM-F-477         | Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe  |
| 9. | ASTM-B-33-10(2014) | Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes                                 |

## 1.9 SUBMITTAL REQUIREMENTS

- A. **Material and Equipment Information:** The Contractor shall submit to the Owner's Representative, three (3) sets of catalog cuts for all irrigation system materials and equipment proposed for use on the project. The information submitted shall clearly indicate the type, model, and size of the equipment proposed and shall be sufficient for the Owner's Representative to determine if the proposed equipment meets the project specifications. As an alternative to the three printed sets of submittals, the Contractor may submit the requested information in digital (.pdf file) format on a CD, on a flash drive, or by email to the Owner's Representative. No materials or equipment shall be ordered or incorporated into the Work until the material or equipment has been approved for use on the project. The submittal shall include information related to the following items, if required for the project.

1. Backflow Preventers
2. Backflow Preventer Security Enclosures
3. Backflow Preventer Freeze Protection Enclosures
4. Mainline Pipe (Reclaimed)
5. Mainline Pipe (Potable)
6. Lateral Line Pipe (Reclaimed)
7. Lateral Line Pipe (Potable)
8. Fittings for Mainline Pipe
9. Fittings for Lateral Line Pipe
10. Solvent Weld Primer for PVC Pipe
11. Solvent Weld Cement for PVC Pipe
12. Polyethylene Irrigation Tubing
13. Fittings for Polyethylene Tubing
14. Fittings (Copper and Galvanized Steel)
15. Isolation Valves (Gate and Ball)
16. Master Valves
17. Flow Sensors
18. Remote Control Valves
19. Quick Coupling Valves
20. Pressure Regulating Valves
21. Air and Vacuum Release Valves
22. Access Boxes for Master Valves
23. Access Boxes for Flow Sensors
24. Access Boxes for Remote Control Valves
25. Access Boxes for Isolation Valves
26. Access Boxes - Quick-Coupling Valves
27. Controllers
28. Hand-Held Remote Control Units
29. Controller Antenna
30. Controller Security Enclosure
31. Two-Wire Communication Cable
32. Conduit for Two-Wire Communication Cable
33. Pull Boxes for Two-Wire Communication Cable
34. Low Voltage Control Wire
35. Waterproof Wire Splices (for Control Wire and Two-Wire Communication Cable)
36. Decoders for Two-Wire Systems
37. Surge Protectors
38. Grounding Equipment
39. Sprinkler Heads (Large Radius)
40. Sprinkler Heads (Medium Radius)
41. Sprinkler Heads (Pop-up Sprays)
42. Swing Joints for Large Radius Sprinklers
43. Swing Joints for Medium Radius Sprinklers
44. Swing Joints for Pop-up Spray Sprinkler Heads
45. Drip Emitters (Multi-outlet, all types)
46. Drip Emitters (Single Outlet)
47. In-Line Screen Filters
48. Emitter Distribution Tubing
49. Access Boxes for Emitters
50. Access Boxes for Flush Caps
51. Mainline Marking Tape

- B. As-Built Record Drawings: The Contractor shall submit to the Owner's Representative prior to Substantial Completion of the work, As-Built Record drawings for the irrigation system installed. The drawings shall indicate the location of all; mainlines, master valves, flow sensors, mainline isolation valves, remote control valves, quick coupling valves, and sleeves and pipelines under roadways or other paved surfaces.
1. Preliminary As-Built Drawings: Preliminary as-built drawings shall be prepared for the irrigation mainline and mainline isolation valves prior to the backfilling of mainline trenches. The preliminary as-built drawings shall be presented to the Owner's Representative when the mainline is pressure tested. Approval of the pressure test and authorization to backfill the mainline trenches will be contingent upon submittal of acceptable Preliminary As-Built Drawings.
  2. Procedures to be Used to Document As-Built Locations: The location of all mainlines shall be identified by two or more dimensions from fixed objects such as curbs or structures. The location of all valves shall be identified by Global Positioning System (GPS) coordinates using the State Plane Coordinate System. The GPS equipment used to locate irrigation system valves shall be accurate to within +/-1 meter and shall be as approved by the Owner's Representative. A table listing all system valves and their corresponding coordinates shall be included on the as-built drawings.
  3. Format for Final As-Built Drawings: The Final As-Built Drawings shall be prepared as .pdf files that include the original drawings (as issued for construction) marked-up to note the location of irrigation system features. The As-Built Drawings shall also include all addenda and supplemental drawings related to the irrigation system installed. The Final As-Built Drawings shall be submitted on a CD, flash drive, or other electronic storage device as approved by the Owner's Representative. The preparation of the As-Built Drawings shall be at the Contractor's expense.

#### 1.10 IRRIGATION SYSTEM DRAWINGS

- A. The irrigation drawings are diagrammatic and are intended to show the approximate location of outlets, equipment and piping. Certain runs of piping may be shown distorted for clarity. Minor adjustment to the layout of the system will be necessary. Significant adjustments to the layout, including all changes that effect the configuration of the system or length of piping runs, shall be approved by the Owner's Representative.

#### 1.11 ACQUISITION AND INSTALLATION OF NEW METER(S) AND WATER SERVICE(S)

- A. Requests for and Installation of New (Reclaimed or Potable) Water Meters: The Contractor shall be responsible for contacting Tucson Water or the appropriate water company and requesting the installation of new water meters as shown on the project plans. If required, the Contractor shall obtain an "address" for each meter from Pima County. The Contractor shall pay for all fees and charges associated with the supply and installation of the new meter(s) and water service(s).

1.12 PAYMENT FOR WATER DURING CONSTRUCTION

- A. Payment for Irrigation Water Prior to Final Acceptance: The Contractor shall be responsible for paying all charges for (reclaimed and/or potable) water used for irrigation or for other purposes during construction, during the initial maintenance period, and up to the date of Final Acceptance of the landscape and irrigation improvements.
- B. Transfer of Water Meters to Pima County: At the time of Final Acceptance of the landscape and irrigation work, the Contractor shall submit a letter to the Owner’s Representative requesting that the party billed for water service at the project site be changed from the Contractor to the Pima County. The request shall note the date of Final Acceptance. Upon receipt of this request, the Owner will initiate a formal request to change the name of the party to be billed for water.

1.13 CONTRACTOR PROVIDED SPARE PARTS

- A. Contractor Provided Spare Parts: Prior to Substantial Completion of the Work, the Contractor shall turn-over the following spare parts to the Owner’s Representative.
  - 1. Sprinkler Heads:..... Three (3) sprinklers of each type installed on the project
  - 2. Sprinkler Nozzles: ..... Three (3) sets for each sprinkler type installed on the project
  - 3. Remote Control Valves: .....One (1) of each size valve installed on the project
  - 4. Emitter Access Boxes: ..... Ten (10) of each type installed on the project

**PART TWO: MATERIALS**

2.1 PIPE AND FITTINGS

- A. Color Coding of Pipe Conveying Reclaimed Water: All mainline and lateral line pipe used to convey reclaimed irrigation water shall be integrally color-coded purple pipe.
- B. PVC Mainline and Lateral Line Pipe: Mainline (pipe subject to constant pressure) and lateral line pipe (pipe not subject to constant pressure) shall be PVC plastic pipe extruded from virgin parent materials. Pipe shall comply with ASTM standards D-1785-15 or D-2241-15 as applicable and shall be free from defects. Pipe type and associated joint type shall be as follows:

Pipe Application	Schedule or Size	Joint Type
Mainline (Greater than 4” Size)	Class 200 PVC or as Noted on the Project Plans	Push-On Gasket Type Joint
Mainline Pipe (2-1/2” – 4” Size)	Schedule 40 PVC Pipe or as Noted on the Project Plans	Push-On Gasket Type Joint
Mainline Pipe (2” and Smaller Size)	Schedule 40 PVC Pipe or as Noted on the Project Plans	Solvent Weld Type Joint
Lateral Line Pipe ((1/2” – 3” Size)	Schedule 40 PVC Pipe or as Noted on the Project Plans	Solvent Weld Type Joint

- C. Sleeves for Pipe and Control Wire: Sleeves for irrigation pipe and control wire or control cable under roadways, parking lots, and walkways shall be Schedule 40 PVC pipe.
- D. PVC Pipe Fittings: PVC fittings shall be made from Type I, Grade I, PVC compounds conforming to ASTM D-1784-11, D-2672-14, and D-2241-15 as applicable. Fitting types for various applications and sizes shall be as follows:

<b>Application</b>	<b>Fitting Size</b>	<b>Fitting Type</b>
Mainline	Greater than 4" Size	Ductile Iron, Deep Bell, Gasket Type Fittings (Exclusive of pipe to pipe bell-and-spigot connections)
Mainline	Equal to or Smaller than 4" Size	Schedule 80 PVC Fittings
Remote Control Valve Assemblies / Risers	All Sizes	Schedule 80 PVC Fittings
Pipe Nipples and Threaded Fittings	All Sizes	Schedule 80 PVC Fittings
Lateral Lines	All Sizes	Schedule 40 PVC Fittings
Swing Joints	¾" and Larger Size	Double-Swing Type with Schedule 80 Components and O-Ring Connections
Swing Joints	½" Size	Double Swing Type. Nipples and Fittings with 80 PSI (Min.) Operating Pressure Rating

- E. PVC Solvent Cement and Primer: Solvent cement and primer for joining PVC pipe and fittings shall be as approved by the pipe and fitting manufacturers and shall comply with ASTM Standards D-2564-12 and F-656-15.
1. Primer: Primer shall be manufactured for use on all Classes and Schedules of rigid PVC pipe and fittings, including Schedule 80. Color shall be purple.
  2. Solvent Weld Cement: Solvent weld cement shall be manufactured for use on all Classes and Schedules of rigid PVC pipe and fittings, including Schedule 80. It shall have a medium fast set-up time. Color shall be grey. Fast-set or "hot-glue" solvent weld cement shall not be utilized without written approval by the Owner's Representative.
- F. Steel Pipe and Fittings: Steel pipe and fittings shall be Schedule 40 galvanized steel pipe. Unless otherwise detailed on the project plans, steel pipe shall be used for backflow preventer risers only.
- G. Copper Pipe and Fittings: Copper pipe shall be Type K rigid pipe. Fittings shall be wrought copper or cast bronze fittings. Unless otherwise detailed on the project plans, copper pipe shall be used for backflow preventer risers only.

- H. Ductile Iron Fittings: Ductile iron fittings shall be deep-bell type manufactured for use with PVC irrigation pipe. Fittings shall be grade 65-45-12 in accordance with ASTM A-536. Fitting gaskets shall meet the requirements of ASTM F-477.
- I. Corrosion Protection Pipe Wrap: Pipe wrap for galvanized steel and copper pipe installed below grade shall be adhesive backed polyethylene tape specifically designed for the protection of buried metallic pipe in below-grade installations.

## 2.2 TUBING AND FITTINGS:

- A. Polyethylene Tubing: Tubing shall be manufactured from UV resistant polyethylene resin materials. Tubing shall have an outside diameter of 0.700", an inside diameter of 0.580" and a wall thickness of 0.06". The tubing manufacturer shall be as noted on the project plans.
- B. Fittings for Polyethylene Tubing: Fittings for polyethylene tubing shall be of the barbed, insert, compression type designed specifically for use with the specified tubing. Fittings shall be constructed of durable, UV resistant, ABS materials. Fitting manufacturer shall be as noted on the project plans.

## 2.3 CONDUIT:

- A. Conduit and Fittings: Conduit shall be Schedule 40 PVC conduit. Fittings shall be Schedule 40 PVC fittings. Color shall be gray. Minimum conduit size shall be ¾".

## 2.4 BACKFLOW PREVENTERS

- A. Backflow Preventers: Backflow preventers shall be of the reduced pressure principle type with bronze body and stainless steel springs. The device shall be equipped with ball valves on the upstream and downstream ends. The backflow preventer manufacturer and model shall be as previously approved by Tucson Water, or the water utility providing irrigation water to the project. Size shall be as noted on the drawings.
- B. Backflow Preventer Security Enclosure: The backflow preventer security enclosure shall be fabricated from bent 1-1/4" diameter Schedule 40 steel pipe, 1" x 1" x 1/8" steel angle, and 13 gauge expanded metal panels. The enclosure shall be equipped with hinges and U-bolt hasp for padlocking. The enclosure shall have a powder coated finish. Color shall be "Desert Tan." The security enclosure manufacturer and model shall be as noted on the project plans.
- C. Backflow Preventer Freeze Protection: The backflow preventer freeze protection enclosure shall consist of an insulated fabric bag that can be seasonally installed over the backflow preventer and secured without impacting the operation of the device. It shall have a 22 oz. vinyl coated, UV resistant, and waterproof outer fabric shell. Insulation shall be R-19 (min.) polyfill insulation. The enclosure shall be equipped with rust-proof grommets that allow for securing / locking the enclosure around the backflow preventer. The freeze protection enclosure shall either be installed on the device or turned over to the Owner as directed by the Owner's Representative.

## 2.5 AUTOMATED CONTROL VALVES

- A. Color Coding of Automated Control Valves for Reclaimed Water Systems: All control valves installed in irrigation systems using reclaimed water shall be equipped with flow control handles that are color coded purple.
  - 1. Reclaimed Water Identification Tags: All master valves and remote control valves shall be equipped with a purple reclaimed water identification tag. The tag shall be secured to the valve stem and shall include the notation "WARNING: RECYCLED / RECLAIMED WATER. DO NOT DRINK." Tags shall be as provided by Tucson Water.
- B. Master Valves (4" Size and Larger): Master valves 4" size and larger shall be of the type, size, configuration, manufacturer, and model as noted on the project plans.
- C. Master Valves (3" Size): Master valves (3" size) shall be of the globe / angle type with brass body and glass filled nylon bonnet. The valve shall be of the normally-closed or normally-open design as noted on the project plans. The valve shall be equipped with a heavy-duty 24 VAC solenoid. The valve shall be designed with a scrubber mechanism to prevent clogging when used with reclaimed water. The 3" size master valve manufacturer and model shall be as noted on the project plans.
- D. Master Valves (2" Size): Master valves (2" size) shall be of the globe type with brass body and bonnet. The valve shall be of the normally-closed design and shall be equipped with a heavy-duty 24 VAC solenoid. The valve shall be designed with a scrubber mechanism to prevent clogging when used with reclaimed water. The 2" size master valve manufacturer and model shall be as noted on the project plans.
- E. Remote Control Valves: Remote control valves shall be of the globe type with heavy duty glass-filled nylon body and bonnet, nylon reinforced rubber diaphragm, stainless steel flow control stem, self-cleaning scrubber, and 24 volt heavy-duty solenoid. The remote control manufacturer, model, and size shall be as noted on the project plans.

## 2.6 MANUAL VALVES

- A. Color Coding of Manual Control Valves for Reclaimed Water Systems: All manual control valves installed in irrigation systems using reclaimed water shall be equipped with handwheels, on-off handles, or other permanent markings that are color coded purple.
- B. Gate Valves: Gate Valves shall be 200 psi rated WOG bronze gate valves with female NPT threaded ends. Valves shall have a clear waterway equal to the full nominal diameter of the valve and shall be equipped with a handwheel and non-rising stem.
- C. Ball Valves: Ball valves shall be 400 p.s.i. rated WOG brass or bronze ball valves with threaded ends. Ball valves shall be equipped with resilient TFE seats and blow-out proof stems. Valve handle shall provide 1/4 turn on / off control.

- D. Quick Coupling Valves: Quick coupling valves shall be constructed of brass with a two piece design. The internal valve spring shall be of stainless steel. Valve shall be equipped with a self-closing thermoplastic rubber cover. The quick-coupling valve manufacturer and model shall be as noted on the project plans.
  - 1. Quick-Coupling Valve Key: Quick coupling valve keys shall be constructed of brass with galvanized steel handle. Key shall be furnished with brass hose swivel ell. Key shall be of the same manufacturer as the quick-coupling valve and shall be of matching size.
  
- E. In-line Pressure Regulating Valves: In-line pressure regulating valves shall be of the permanently assembled type with heavy-duty plastic body and FPT ends. The regulator shall have a pre-set outlet pressure of 30 or 40 psi as noted on the drawings. The pressure regulating valve manufacturer and model shall be as noted on the project plans.
  
- F. System Pressure Regulating Valve: System pressure regulating valves shall be of the balanced piston type and shall be capable of reducing inlet pressures and providing consistent outlet pressures over a wide range of flow rates including a no-flow condition. The valve shall consist of a cast-bronze body and bell housing with separate access cover for the plunger and a bolt to adjust the downstream pressure. The bell housing and access cap shall be threaded to the body. The valve shall have a maximum working pressure of not less than 150 psi and shall be capable of providing outlet pressures in the 25 psi to 75 psi range. The valve shall have a union-end inlet and a FPT outlet.
  
- G. Vacuum / Air Release Valves: Vacuum release, air release, and combination vacuum / air release valves shall be constructed with a cast iron body and cover, stainless steel trim, and with a resilient seat for positive shut-off. The valve exterior shall be finished with an alkyd primer. The manufacturer, model number, and size of the valve shall be as noted on the project plans.

2.7 CONTROL SYSTEM TYPES: Control systems shall be of one of the following types:

- A. Control System – Type 1 (Stand-Alone): Type 1 control systems shall be stand-alone systems that utilize an electronic controller, a low-voltage wiring system with separate conductors between the controller and each remote control valve, a common conductor, and remote control valves that open only when receiving an electronic current from the controller. Master valves and flow sensors are optional components of Type 1 control systems.
  - 1. Modified – Type 1 (Stand-Alone) System: If noted on the project plans, a Type 1 (stand alone) system may be modified to utilize a single-two wire conductor and decoders in-lieu-of separate conductors between the controller and each remote control valve.
  
- B. Control System – Type 2 (Central Control with Conventional Wiring): Type 2 control systems provide for communication between the on-site controller and an off-site central control work station. Type 2 systems shall be comprised of an electronic controller, a low-voltage wiring system with separate conductors between the controller and each remote control valve, a common conductor, and remote control valves that open only when receiving an electric current from the controller.

Master valves and flow sensors are integral components of Type 2 control systems and included unless otherwise indicated on the project plans.

- C. Control System – Type 3 (Central Control with Two-Wire Cable): Type 3 control systems provide for communication between the on-site controller and an off-site central control work station. Type 3 systems shall consist of an electronic controller, a single two-wire conductor that connects the controller with all of the remote control valves in the system, decoders that are installed at the remote control valve locations, and remote control valves that open when a signal is received from the controller via the decoder. Master valves and flow sensors are integral components of Type 2 control systems and included unless otherwise indicated on the project plans.

## 2.8 CONTROLLERS:

- A. Controllers for Type 1 and Type 2 Control Systems: Controllers for Type 1 and Type 2 control systems shall be of the microprocessor based electronic type and shall operate on 120 VAC, 60 Hz input. Controller output shall be 24 VAC, 2.5 A. The controller shall be capable of operating two or more 24 VAC, 7 VA remote control valves per station. It shall be capable of operating four independent programs with eight or more start times per program per day. The controller shall also be capable of manual operation and operation by a remote, hand-held device. The controller shall retain all program information during power outages. The quantity of stations shall be as indicated on the project plans. The controller shall be housed on a heavy-duty, lockable, powder-coated metal or other approved housing.
1. Communication with Central Control Work Station: Type 1 control systems require no communication with an off-site central control work station. Type 2 control systems shall be equipped with a land-line phone, cell phone, Ethernet, wireless Ethernet, local radio or other type of modem that provides for communication between the controller and the off-site work station.
- B. Controllers for Type 3 Control Systems: Controllers for Type 3 control systems shall be of the microprocessor based electronic type and shall operate on 120 VAC, 60 Hz input. The controller shall be capable of operating no fewer than eight remote control valves and/or master valves simultaneously. The controller shall communicate with the remote control valves and decoders in the system via a two-wire cable. It shall be capable of operating four independent programs with eight or more start times per program per day. The controller shall also be capable of manual operation and operation by a remote, hand-held device. The controller shall retain all program information during power outages. The quantity of stations shall be as indicated on the project plans. The controller shall be housed in a heavy-duty, lockable, powder coated metal or other approved housing.
1. Communication with Central Control Work Station: Type 3 control systems shall be equipped with a land-line phone, cell phone, Ethernet, wireless Ethernet, local radio or other type of modem that provides for communication between the controller and the off-site work station.

## 2.9 CONTROLLER ENCLOSURES:

- A. Integral Controller Enclosures: Integral controller enclosures shall be free-standing vandal and weather resistant and shall be supplied by the controller manufacturer. The enclosure shall be designed for installation on a concrete slab. It shall be fabricated from stainless steel or powder-coated steel and shall have lockable access doors or panels that allow for access to the user interface panel and the control wire / cable terminal board. The enclosure shall have screened ventilation panels. A 120 VAC ground-fault interrupter convenience outlet shall be provided within the enclosure. The enclosure manufacturer and model shall be as identified on the project plans.
- B. Cabinet Type Controller Enclosures: Cabinet type enclosures shall be free-standing, vandal and weather resistant enclosures that are designed for installation on a concrete slab. The enclosure shall be fabricated from stainless steel, powder-coated steel, or painted steel. A single access door with continuous hinge shall provide access to the interior of the enclosure. The exterior of the enclosure shall include provisions for padlocking and shall have a protective steel plate that covers the padlock. The interior of the enclosure shall be equipped with a marine-grade plywood board for mounting the controller and associated wiring devices. A 120 VAC ground-fault interrupter convenience outlet shall be provided within the enclosure. The enclosure manufacturer and model shall be as identified on the project plans.

## 2.10 HAND-HELD-REMOTE CONTROL UNITS AND ANTENNA:

- A. Hand-Held Remote Control Units: Hand-held remote control units shall be battery powered devices that allow for the remote operation of the controller. The units shall be as manufactured by the controller manufacturer and as noted on the project plans.
- B. Antenna: When hand-held remote control units are specified, the controller shall be equipped with an antenna to allow for wireless communication between the devices. The type and model of antenna to be installed shall be as noted on the project plans.

## 2.11 FLOW SENSORS AND ACCESSORIES

- A. Flow Sensors: Flow sensors shall be of the six-blade impeller design with heavy duty PVC or brass body. Flow sensors shall be manufactured or distributed by the controller manufacturer and shall be fully compatible with the specified controller. The flow sensor manufacturer, type, model, and size shall be as noted on the project plans.
- B. Communication Cable: Communication cable between the flow sensor and the controller and between the controllers shall be (Type PE-39 shielded cable, 12 AWG, Type UF Copper wire, or two-wire cable) as recommended by the controller and flow sensor manufacturer.
  - 1. Conduit and Fittings for Communication Cable: Conduit and fittings for communication cable shall be Schedule 40 PVC conduit. Size shall be 3/4", minimum, or as required for the work.

2. Pull Boxes for Communication Cable Conduit: Pull boxes shall be constructed of HDPE plastic materials. Pull boxes shall be of the manufacturer and model as noted on the project plans. Box dimensions shall be 19-3/4" x 13-1/8" (clear opening) x 12" height (minimum dimensions).

2.12 MISCELLANEOUS AND INCIDENTAL EQUIPMENT:

- A. Decoder: Decoders shall be as manufactured and/or distributed by the flow sensor and controller manufacturer. The decoder shall transmit information between the controller and the remote control valve(s), sensor(s), or other device(s) via a two-wire path. The device shall be encapsulated in a moisture and UV resistant case for outdoor installation. The decoder model and type shall be as noted on the project plans.
- B. Surge Protectors: Surge protectors shall be as manufactured and/or distributed by controller manufacturer and shall provide surge protection for the system components. The surge protector model and type shall be as noted on the project plans.
- C. Grounding Equipment: Grounding equipment shall consist of a No. 6 solid copper ground wire that is connected to a 5/8" diameter by 8' long copper ground rod. Connections shall be made as detailed and per the control system manufacturer's recommendations.
- D. Other Incidental Equipment: The Contractor shall provide and install all other incidental equipment required for the proper operation of the irrigation control system.

2.13 LOW VOLTAGE CONTROL WIRING:

- A. Low Voltage Irrigation Control Wire for Type 1 and Type 2 Control Systems: Control wire shall be Type UF and shall be of the size and type recommended by the valve manufacturer. Wire size for control wires shall be #14 AWG or as noted on the drawings. Wire size for common ground wires shall be #12 AWG or as noted on the drawings. Wire shall be Underwriters Laboratory (UL) approved for direct burial.

The color of the insulation on the low-voltage wire(s) shall be as follows:

1. Control Wire to Master Valve(s): .....Orange
2. Control Wires to Remote Control Valves: ..... Red
3. Spare Control Wires (if noted on the project plans) ..... Green
4. Common Wire: .....White

- B. Waterproof Wire Splices for Low Voltage Control Wiring: Wire splices shall be of the two piece, sealant filled type which permit connection of 2 or 3 wires of 18 through 10 gauge size. Wire splices shall be Underwriter Laboratory (UL) listed.

#### 2.14 TWO-WIRE CONTROL CABLE:

- A. Two-Wire Control Cable for Type 3 Control Systems: Two-wire cable shall be of the dual conductor, solid core type. The conductor(s) shall be tin coated, soft-drawn, 12 AWG (minimum), copper wire in accordance with ASTM B-33-10. The conductor insulation shall be PVC and the outer jacket shall be polyethylene.
1. Waterproof Splices for Two-Wire Cable: Splices shall be designed to electrically connect two or more pre-stripped copper wires. It shall consist of a UV resistant polypropylene tube pre-filled with a moisture resistant gel. The gel filled tube shall have a lid that compresses the wire insulation when closed.

#### 2.15 SPRINKLER HEADS:

- A. Color Coding of Sprinkler Heads for Reclaimed Water Systems: All sprinkler heads installed in irrigation systems using reclaimed water shall be equipped with rubber tops or collars that are color coded purple.
- B. Large Radius Gear Drive Sprinkler Heads: Large-radius, gear-drive sprinkler head shall have a body, nozzle, and screen constructed of heavy duty plastic. Riser stem and retract spring shall be constructed of stainless steel. Inlet shall be 1 inch FPT and pop-up height shall be not less than inches (4"). Sprinklers shall be full circle or part circle. Part circle heads shall be adjustable from approximately 40 to 310 degrees. Radius of spray on both full and part circle heads shall be adjustable. Nozzles shall be removable/ replaceable. Sprinklers shall be equipped with an internal anti-drain valve. The large-radius, gear-drive sprinkler heads (full and part circle) manufacturer, model, and nozzle size shall be as noted on the project plans.
- C. Medium Radius Gear Drive Sprinkler Heads: Medium-radius, gear-drive sprinkler head shall have a body, nozzle, and screen constructed of heavy duty plastic. Riser stem and retract spring shall be constructed of stainless steel. Inlet shall be 3/4 inch FPT and pop-up height shall be not less than four inches (4"). Sprinklers shall be full circle or part circle. Part circle heads shall be adjustable from approximately 40 to 310 degrees. Radius of spray on both full and part circle heads shall be adjustable. Nozzles shall be removable. Sprinkler shall be equipped with an internal anti-drain valve. The medium-radius, gear-drive sprinkler head (full and part circle) manufacturer, model, and nozzle size shall be as noted on the project plans.
- D. Pop-Up Spray Sprinklers: Pop-up spray sprinklers shall have a heavy duty plastic body and riser stem, a stainless steel retract spring, and an integrally molded wiper seal. The pop-up spray sprinkler manufacturer, model, and nozzle size shall be as noted on the project plans.

#### 2.16 DRIP EMITTERS:

- A. Eight-Outlet Drip Emitters: Emitters shall be of the type with eight independent / removable emitter ports. The pressure compensating ports available having flow rates of 0.5 to 24 gph. Emitter shall have a 1/2" FPT inlet. The eight-outlet emitter manufacturer and model shall be as noted on the project plans.

- B. Six-Outlet Drip Emitters: Emitters shall be of the permanently assembled, pressure compensating, six-outlet type with ½" FPT inlets. The flow rate per outlet shall be nearly the same at inlet pressures of 15 to 50 psi. The six-outlet emitter manufacturer and model shall be as noted on the project plans.
- C. Single Outlet Drip Emitters – Threaded Inlet Type: Emitters shall be of the permanently assembled, pressure compensating, one outlet type with ½" FPT inlet. The flow rate per outlet shall be nearly the same at inlet pressures of 15 to 50 psi. The single outlet emitter manufacturer and model shall be as noted on the project plans.
- D. Single Outlet Drip Emitters – Barbed Inlet Type: Emitters shall be of the permanently assembled, pressure compensating, one outlet type with barbed inlet suitable for installation on polyethylene tubing. The flow rate per outlet shall be nearly the same at inlet pressures of 15 to 50 psi. The single outlet emitter manufacturer and model shall be as noted on the project plans.
- E. Emitter Distribution Tubing: Emitter distribution tubing shall be fabricated from polyvinyl materials with a .16" I.D. and a .22" O.D. The tubing manufacturer and model shall be as noted on the project plans.
- F. Emitter Lateral Line Flush Caps: Flush caps for systems using PVC laterals shall consist of a Schedule 40 PVC pipe riser, a Schedule 40 PVC male adapter fitting, and a Schedule 40 PVC threaded cap. Flush caps for systems using polyethylene tubing for drip laterals shall have a barbed insert, compression fitting with a threaded cap. The fitting shall be constructed of durable, UV resistant, ABS materials. Flush caps shall be installed as detailed.

## 2.17 ACCESS BOXES:

- A. Color Coding of Access Boxes:
  - 1. Valve Boxes for Valves in Pipelines Conveying Reclaimed Water: All access boxes installed above valves in pipelines conveying reclaimed water, regardless of valve type or location, shall be equipped with tops or lids that are color coded purple.
  - 2. Valve Boxes for Valves in Pipelines Conveying Potable Water: Access boxes installed above valves in pipelines conveying potable water shall be equipped with tops or lids that are green when the access box is installed within a turf area or tan when the access box is installed within a decomposed granite or other non-turf area.
- B. Valve Access Boxes in Areas with No Vehicular Traffic: Valve access boxes for gate valves, ball valves, master valves, flow sensors, remote control valve assemblies, quick-coupling valves, surge protectors, emitters, flush caps, and other similar devices installed in areas not subject to motor vehicle traffic shall be constructed of heavy-duty HDPE plastic materials. Valve box covers shall be permanently marked with the word "IRRIGATION". Valve access boxes shall be of the manufacturer(s) and model (s) as noted on the project plans. All boxes, exclusive of emitter line flush cap access boxes, shall be equipped with bolt-down lids. Box sizes and configurations shall be as follows:

Valve or Device	Top Opening Length (Min.)	Top Opening Width (Min.)	Access Box Height (Min.) With Extensions Added as Required
Master Valve	19-5/8"	13-1/4"	12"
Flow Sensor	19-5/8"	13-1/4"	12"
Remote Control Valve (Turf)	16-7/8"	11-3/4"	12"
Remote Control Valve (Drip)	19-5/8"	13-1/4"	12"
Isolation Valve (2" and Larger)	19-5/8"	13-1/4"	12"
Isolation Valve (Smaller than 2")	16-7/8"	11-3/4"	12"
Quick Coupling Valves	10" Diameter	10" Diameter	10"
Pressure Regulating Valves	19-5/8"	13-1/4"	12"
Air / Vacuum Release Valves	16-7/8"	11-3/4"	12"
Surge Protectors	16-7/8"	11-3/4"	12"
Ground Rods	16-7/8"	11-3/4"	12"
Flush Cap	6-1/8" Diameter	6-1/8" Diameter	8-3/4"
Multi-Outlet Emitter	6-1/8" Diameter	6-1/8" Diameter	8-3/4"
Single Outlet Emitter	6-1/8" Diameter	6-1/8" Diameter	8-3/4"

- C. Traffic Rated Valve Access Boxes: In instances where valve access boxes may be subject to vehicular traffic and in all other locations as may be noted or detailed on the project plans, access boxes shall be constructed of reinforced concrete, or of a high-strength composite material fabricated from polyester resin, fiberglass, and calcium carbonate. Lids on traffic rated access boxes shall be cast-iron.

#### 2.18 MISCELLANEOUS IRRIGATION SYSTEM EQUIPMENT:

- A. System Filter: The system filter shall be of the spin type with a wye configuration and with a powder or epoxy coated steel body and flanged ends. The filter element shall be a removable, 200 mesh, stainless steel screen. The filter shall be equipped with a flush valve. The system filter manufacturer, model, and size shall be as identified on the project plans.
- B. In-Line Filters: In-line filters shall have a glass-filled nylon body with removable, 200 mesh, stainless steel screen, and manual flush port. The filter manufacturer and model shall be as identified on the project plans.
- C. Detectable Marking Tape: Detectable marking tape to be installed above all mainlines shall be a five mil thick, five-ply composition, polyethylene tape. The tape shall have a 20 gauge solid aluminum foil core that is encapsulated within the polyethylene material. The tape shall be three inches (3") wide.
1. Tape for Reclaimed Water Irrigation Systems: Tape for reclaimed water systems shall have the words "CAUTION, RECYCLED / RECLAIMED WATER LINE BELOW" printed at regular intervals. Tape color shall be purple. The manufacturer and model of the

detectable marking tape to be installed above reclaimed mainlines shall be as Identified n the project plans.

2. Tape for Potable Water Irrigation Systems: Tape for potable water systems shall the words "CAUTION, IRRIGATION LINE BELOW" printed at regular intervals. Tape color shall be green. The manufacturer and model of the detectable tape to be installed above potable water mainlines shall be as Identified on the project plans.

### **PART THREE: EXECUTION**

#### **3.1 BLUE STAKING:**

- A. Blue Staking: The Contractor shall request that the project site be Blue Staked prior to the start of any excavation or trenching work. The Blue Stake request shall include a request to Pima County (or other applicable jurisdiction) that the location of all private (Pima County owned) utilities be marked. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

#### **3.2 LAYOUT**

- A. Layout of Irrigation System: Prior to the start of trenching and excavation work, the Contractor shall layout the irrigation system, staking out the location of mainlines, master valves, flow sensors, remote control valves, sprinkler heads and other equipment as shown on the drawings. All deviations from the layout shown on the drawings impacting the length of piping runs or the configuration of the system shall be approved by the Owner's Representative.

#### **3.3 WATER METER INSTALLATION**

- A. Water Meter Installation: The Contractor shall coordinate the installation of new water meter(s) as specified herein and/or as identified on the project plans. The location of the water meter shall be as approved by the water provider and the Owner's Representative. The Contractor shall pay for all fees and charges associated with the meter installation.

#### **3.4 BACKFLOW PREVENTER INSTALLATION**

- A. Backflow Preventer: Backflow preventers shall be installed as detailed in all locations shown on the project plans. All backflow preventers shall be tested by an individual certified by Tucson Water or the appropriate water provider. Backflow preventers that do not pass the test shall be repaired or replaced and the test repeated. Test certificates, signed by the tester, shall be filed with the water provider in accordance with the water utility's requirements. A copy of the test report(s) shall be provided to the Owner's Representative.
- B. Backflow Preventer Security Enclosure: The backflow preventer security enclosure shall be installed as detailed. The device shall be positioned so as to allow for the opening and closing of the security enclosure without interfering with the backflow preventer.

3.5 TRENCHING FOR PIPE AND CONTROL WIRING

- A. Trenching: Trench excavations shall be straight and true with uniform bottom for bearing of pipe. Minimum depth of cover on pipe, sleeves, and wire shall be as follows:
1. PVC Sleeves under Roadways and Parking Areas..... 18 inches
  2. PVC Sleeves for Mainlines under Walkways..... 18 inches
  3. PVC Sleeves for Lateral Lines under Walkways ..... 12 inches
  4. PVC Mainline..... 18 inches
  5. Detectable Marking Tape over Mainline ..... 8 inches
  6. PVC Lateral Lines ..... 12 inches
  7. Control and Common Wires ..... 18 inches
  8. Communication Cable / Conduit: ..... 18 inches
  9. Polyethylene Tubing: ..... 8 inches
- B. Barriers to Prevent Public Access to Open Trenches: The Contractor shall provide barriers as required to restrict public access to open irrigation trenches. Barriers shall be in compliance with applicable construction site safety regulations and the Contractor’s approved safety plan.

3.6 PLACEMENT OF SLEEVES AND (MAINLINE / LATERAL LINE) PIPE

- A. Sleeves: Sleeves shall be installed as detailed. Separate sleeve shall be provided for pipe and control wire. Sleeve size shall be as noted. If not noted, the sleeve shall be a minimum of two standard pipe sizes larger than the pipe enclosed.
- B. Mainline and Lateral Line Pipe: Bedding material shall be placed in the bottom of trench as detailed before laying pipe. Do not install pipe in trench that is wet or when conditions are otherwise unsuitable for the work. Keep inside of pipe clean during installation. Snake pipe from side to side of trench to allow for expansion and contraction. Provide 2 inch minimum vertical and horizontal clearance between irrigation pipes. Provide 12 inch minimum clearance between irrigation pipes and pipe, conduit, or cable of other trades.

3.7 CONSTRUCTION OF PIPE JOINTS:

- A. PVC Pipe – Solvent Weld and Threaded Joints: Make all solvent weld joints using only procedures recommended by the pipe, fitting, and solvent weld cement manufacturers. Make all threaded connections using teflon tape on male threads.
- B. PVC Pipe – Mechanical Joints: Make all mechanical joints using only the procedures recommended by the pipe and gasketed fitting manufacturer.

3.8 FLUSHING AND PRESSURE TESTING OF MAINLINE:

- A. Notification: The Contractor shall notify the Owner's Representative of his intent to perform pressure testing 72 hours prior to the scheduled test time. Except as otherwise approved, all tests shall be performed in the presence of the Owner's Representative. The entire mainline

shall be tested at one time except for instances where project phasing requires testing of individual segments of the mainline system.

- B. Tools and Equipment: The Contractor shall furnish all tools, materials, fittings, and equipment required for testing and shall make all temporary connections.
- C. Trench and Backfill Conditions for Testing: The trench(es) shall not be backfilled until pressure testing of mainline has been successfully completed. Center loading of mainline pipe during testing is acceptable. All joints shall be exposed during testing operations.
- D. Flushing: After all mainline piping and risers are connected in place and all related work is complete, open each control valve(s) and use a full head of water to flush the mainline system.
- E. Testing: The mainline shall be tested at a pressure of 100 psi for a period of 4 hours. For acceptance, the original test pressure shall be maintained for the duration of the test.
- F. Repairs: All leaks or defects which develop under pressure testing shall be promptly repaired and the test repeated until satisfactory results have been achieved. Repairs shall be made using only materials and procedures specified herein.

### 3.9 CONTROL WIRE INSTALLATION

- A. Control Wiring: Wires shall be snaked in trench locations shown on drawings at a uniform depth of 18 inches minimum relative to finish grade. A minimum of 1 foot in every 10 feet of trench shall be in excess for snaking the wire. Where ever possible, mainline trenches shall be used for installation of wire. Tie a loose 20 in. loop in all wiring at changes of direction of greater than 30 degrees and untie all loops after all connections have been made. All wiring shall be taped together every 10 feet using plastic electrical tape wrapped at least 2 times around the bundle of wires.
  - 1. Wire Splices: Each end of the control or "hot" wire and the common or "ground" wire shall be brought to the remote control valve and a coil of wire shall be neatly looped in the access box as detailed. Splices shall be made using waterproof wire splices. Wire shall be spliced at remote control valve locations only.

### 3.10 TWO-WIRE CABLE INSTALLATION:

- A. Two-Wire Cable: Except as may be noted on the project plans all two-wire cable shall be installed in conduit as detailed. Pull boxes shall be provided at all changes in direction greater than 30 degrees and at intervals not exceeding 200' spacing.
  - 1. Two-Wire Cable Splices: The two-wire cable and associated conduit shall be extended into the remote control valve / decoder access box and a coil of wire shall be neatly looped inside the access box as detailed. Splices shall be made using waterproof wire splices. Except as may be approved by the Owner's Representative, the two-wire cable shall be spliced at remote control valve locations only.

### 3.11 BACKFILLING OF TRENCHES

- A. Placement of Bedding Material: Place select backfill material around pipe to provide minimum cover shown on the details. Carefully tamp or water-in bedding material around pipe.
- B. Placement of Backfill: Place excavated material as backfill in lifts of six inches, maximum. Carefully compact each lift as work progresses. Grade top of trenches to be level with adjacent finished grade. All trenches improperly backfilled or where settlement occurs shall be re-excavated and compacted as specified.
- C. Removal of Excess Material: Excavated material that is removed from trenches and not used as backfill shall be carefully removed from the site and disposed of in an approved location at the Contractor's expense.

### 3.12 INSTALLATION OF VALVES AND VALVE ACCESS BOXES:

- A. Valves: Gate valves, ball valves, master valves, remote control valves, pressure regulating valves, quick coupling valves, and vacuum / air release valves shall be installed as detailed. Use teflon tape on all threaded connections.
- B. Valve Access Boxes: Install valve access boxes such that top of box is parallel to and flush with the surrounding finished grade, or as detailed. Provide gravel sumps, brick footings, and filter fabric as detailed. Where more than one access box is to be installed in a given location, group boxes together and keep boxes within a uniform alignment. Provide adequate clearance around enclosed valves to allow for valve operation and/ or removal.

### 3.13 CONTROL SYSTEM INSTALLATION

- A. Controller(s): The controller(s) shall be installed as detailed, in the location(s) approved by the Owner's Representative. Extend electrical power and telephone / Ethernet connections to the new controller(s) as shown on the project plans and make connections. All work shall be in accordance with applicable code requirements.
- B. Programming of Controllers: The Contractor shall be responsible for the initial programming of all controllers. Programming work shall be performed by a technician certified by the control system manufacturer. Controllers shall be programmed to operate as stand-alone controller during construction and during the initial Contractor Maintenance Period.
  - 1. Verification of Central Control System Operation: Prior to Final Acceptance of the Work, the Contractor shall coordinate the programming of Type 2 and Type 3 controllers with appropriate Pima County staff. Testing shall be performed to ensure that the system installed in the field properly communicates with the County's off-site workstation. All deficiencies associated with equipment installed by the Contractor shall be repaired by the Contractor prior to Final Acceptance of the Work.

- C. Grounding Equipment: Grounding equipment shall be installed at each controller in accordance with the controller manufacturer's written recommendations and applicable codes.
- D. Surge Protectors: Surge protectors shall be installed at each controller in accordance with the controller manufacturer's written recommendations.

#### 3.14 FLOW SENORS AND COMMUNICATION CABLE:

- A. Flow Sensors: Flow sensors shall be installed as detailed and in accordance with the manufacturer's written instructions. Control wire / cable shall be extended from the flow sensor to the controller as detailed and recommended by the manufacturer(s).
- B. Incidental Equipment: Decoders, surge protectors, and other devices shall be installed at each flow sensor in accordance with the control system manufacturer's written recommendations.

#### 3.15 SPRINKLER HEADS:

- A. Large-Radius and Medium-Radius, Gear-Drive Sprinkler Heads: Install gear drive sprinkler heads on double swing joints so that top of head matches finished grade as detailed. Use teflon tape on all threaded connections, exclusive of "O" ring connections. Flush lateral line and clean inlet screen prior to installation of nozzle. Adjust radius of spray and orientation of head and nozzle so that spray pattern matches the area to be irrigated and minimizes over-spray on to adjacent surfaces.
  - 1. Nozzle Adjustment: Sprinkler heads shall be installed with the nozzles noted on the drawings. If necessary to provide complete and uniform coverage, the Contractor shall remove and replace the specified nozzles and supply and install nozzles that are one size larger or one size smaller than that specified. Nozzle replacement work, if required, shall be performed by the Contractor at no cost to the Owner.
- B. Pop-up Spray Sprinkler Heads: Install pop-up sprinkler heads on swing joints so that top of head matches finished grade as detailed. Use teflon tape on all threaded connections, exclusive of "O" ring connections. Flush lateral line and clean inlet screen prior to installation of nozzle. Adjust radius of spray and orientation of head and nozzle so that spray pattern matches the area to be irrigated and minimizes over-spray on to adjacent surfaces.
  - 1. Nozzle Adjustment: Sprinkler heads shall be installed with the nozzles noted on the drawings. If necessary to provide complete and uniform coverage, the Contractor shall remove and replace the specified nozzles and supply and install nozzles that are one size larger or one size smaller than that specified. Nozzle replacement work, if required, shall be performed by the Contractor at no cost to the Owner.

3.16 DRIP EMITTERS:

- A. Drip Emitters: Install drip emitters in access boxes and extend distribution tubing to locations around the irrigated plant as detailed.

3.17 MISCELLANEOUS IRRIGATION EQUIPMENT:

- A. In-Line Filters: Install in-line filters as detailed. Position filter in access box so that the unit can be disassembled and the filter removed and/or replaced, without removal of the access box.
- B. Detectable Marking Tape: Install detectable marking tape above all mainline pipe as detailed.

3.18 OPERATIONAL TESTING:

- A. Operational Test: An operational test shall be performed by the Contractor after the irrigation system installation is complete. The test shall demonstrate that all controller and control valves perform properly and that all sprinkler heads and emitters are operating correctly and are providing adequate irrigation water to landscape plantings. All tests shall be performed in the presence of the Owner's Representative. Irrigation system components found to be operating incorrectly or to be defective shall be replaced or repaired by the Contractor at no cost to the Owner.
- B. Schedule for Performance of Operational Test: The operational test shall be performed at the date and time of the Substantial Completion inspection. The operational test may be performed in advance of the Substantial Completion inspection, if requested by the Contractor. The request for an operational test inspection shall be submitted to the Owner's Representative not-less-than seven (7) days prior to the requested inspection date.

3.19 REPAIR OF DAMAGE BY LEAKS:

- A. Repair of Damage: The Contractor shall be responsible for damages to the slabs, curbs, roadways, walkways, piping systems, electrical systems, buildings and associated equipment and contents caused by leaks in the irrigation piping systems being installed or having been installed by him. The Contractor shall repair all damage so caused at his expense. All repair work shall be performed in a manner that is satisfactory to the Owner's Representative, and at no cost to the Owner.

3.20 CLEAN-UP:

- A. Clean up: Perform cleaning operations during the installation of the work and upon completion of the project. Remove from the site all excess materials, debris, and equipment. Legally dispose of all excess and waste materials. Repair all damage resulting from irrigation system installation.

### 3.21 MAINTENANCE AND GUARANTEE:

- A. Maintenance during Construction: The Contractor shall operate and maintain the irrigation system during project construction. Operation and maintenance procedures shall include, but not be limited to: programming of the controller(s), repair / adjustment of sprinklers, repair / replacement of emitters, and replacement of defective installations. Maintenance during construction shall continue until the issuance of a Certificate of Substantial Completion .
- B. Inspection of Completed Irrigation Work: Upon substantial completion of the irrigation work, the Contractor shall notify the Owner's Representative who will schedule an inspection of the irrigation system improvements. During the inspection, items which are incomplete or which must be repaired or replaced will be identified. The Issuance of a Certificate of Substantial Completion will be contingent on the completion or correction of noted items.
- C. Maintenance after Substantial Completion: After issuance of a Certificate of Substantial Completion, the Contractor shall continue to operate and maintain the irrigation system for a period of 60 consecutive calendar days. Operation and maintenance procedures shall include, but not be limited to: programming of the controller(s), repair / adjustment of sprinklers, repair / replacement of emitters, and replacement of defective installations. Upon satisfactory completion of the initial Contractor maintenance period, the Owner will assume responsibility for irrigation system operation and maintenance.
  - 1. Irrigation Maintenance Requirements: Activities and tasks associated with the 60 day maintenance period shall include, but not be limited to:
    - a. Daily inspection of the project to check on-site conditions and to perform activities required to correct safety deficiencies and/or to address field conditions impacting the proper operation of the irrigation system.
    - b. Daily observation of the turf grass irrigation system operation to verify that sprinklers are performing correctly and that all turf areas are receiving adequate and appropriate irrigation water.
    - c. Weekly checking and adjustment of the irrigation controller program(s) as needed to provide appropriate application of water to the project plantings.
    - d. Weekly inspection of the operation of each sprinkler to check for proper pop-up and retraction, arc adjustment, radius adjustment, nozzle performance, rubber cover installation, and head height adjustment.
    - e. Weekly inspection of the operation of each drip emitter to check for proper water flow from each of the emitter distribution tubing outlets.
    - f. Weekly flushing of the in-line filter at each drip zone remote control valve assembly.
    - g. As-needed repair of leaks and other system deficiencies.
    - h. As-needed replacement of defective irrigation system equipment.
  - 2. Suspension of Initial Contractor Maintenance Period for Non-Compliance: Failure to properly operate and maintain the irrigation system as specified herein, as determined by the Owner's Representative, will result in the suspension of the number of days being credited towards the initial 60 day Contractor maintenance period. The suspension will

remain in effect until such time as the remedial actions required by the Owner's Representative have been implemented by the Contractor.

### 3.22 INSTALLATION OF RECLAIMED WATER SIGNS:

- A. Installation of Reclaimed Water Signs: On projects using reclaimed water, the Contractor shall assist Tucson Water with the installation of signs noting reclaimed water use for irrigation. Except as may be noted on the project plans, the signs will be provided by Tucson Water.

### 3.23 STANDARDS FOR FINAL ACCEPTANCE OF THE LANDSCAPE IMPROVEMENTS

- A. Standards for Acceptance of the Irrigation System: Standards for acceptance of the irrigation system include, but are not limited to, the following:
1. On-site control system (controller(s) and remote control valves have been tested and are operating correctly.
  2. Communication between the on-site control system and Pima County's off-site central control work station has been established and is working properly.
  3. All sprinkler heads are popping-up correctly and sealing in the up position during operation to eliminate flows from the perimeter of the riser stem.
  4. All sprinkler heads are retracting properly to the fully closed or down position.
  5. All sprinkler heads are set plumb so that riser stem extends vertically when in the up position.
  6. The arc of all part-circle sprinkler heads has been adjusted to provide water to turf grass areas and to avoid overspray on adjacent surfaces.
  7. The inlet screens and nozzles of all sprinkler heads have been cleaned and are set in the proper, sealed position.
  8. The radius of spray for all sprinklers has been adjusted to provide uniform coverage of the turf area with minimal overspray on to adjacent surfaces.
  9. The top of all sprinkler heads have been adjusted to match finished grade as detailed on the project plans.
  10. The rubber cover and/or top of all sprinkler heads are undamaged and correctly attached to the sprinkler.
  11. All drip emitter lateral lines have been flushed to remove contamination.
  12. All drip emitters are operating correctly and providing uniform flow the irrigated plants.
  13. All emitter distribution tubing has been extended to the locations detailed on the project plans and covered with soil or surfacing material as detailed.
  14. All irrigation system components are in place and operating as detailed on the project plans, as specified herein, as required by the irrigation equipment manufacturer, and as required for proper operation of the irrigation system.

3.24 GUARANTEE:

- A. Guarantee: The Contractor shall guarantee the irrigation system to be free of defects in materials and workmanship for a period of one year from the date of Final Acceptance. All material and equipment that proves defective within that period shall be promptly repaired or replaced by the Contractor at no additional cost to the Owner. The guarantee period for any part so repaired or replaced shall be extended for a period of one year from the date of repair or replacement.

END OF SECTION 32-80-00

## **SECTION 32-90-00 - LANDSCAPE WORK**

### **PART I - GENERAL**

#### **1.1 RELATED DOCUMENTS:**

- A. The General Provisions of the Contract including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to the work specified in this section.

#### **1.2 DESCRIPTION OF WORK:**

- A. The work covered by this Section includes, but is not limited to, the:
  - 1. Fine grading of landscaped areas
  - 2. Excavation of plant pits
  - 3. Replanting of salvaged specimen trees
  - 4. Planting of Contractor provided nursery grown trees, shrubs, and cacti
  - 5. Planting of Owner (Pima County) provided nursery grown trees, shrubs, and cacti
  - 6. Soil preparation for turf grass planting
  - 7. Planting and initial maintenance of turf grass
  - 8. Installation of decomposed granite and other aggregate surfacing materials
  - 9. Installation of concrete headers
  - 10. Hydroseeding of designated areas with native plant seed
  - 11. Installation of slow-release watering gel (for non-irrigated) plantings
  - 12. Installation of preservation fencing
  - 13. Installation of rodent protection cages
  - 14. Clean up of soil, debris, and excess materials from the project site
  - 15. Initial maintenance of the landscape improvements
- B. The extent of the landscape work is shown on the drawings and details.

#### **1.3 RELATED WORK:**

- A. Related work includes, but is not limited to:
  - 1. Earthwork and site grading
  - 2. The installation of an automatic irrigation system.
  - 3. The construction of other site improvements

#### **1.4 COORDINATION:**

- A. The Contractor shall coordinate all planting and related landscape work with the Owner's Representative. Work that is completed or in-progress shall be protected during installation of landscape plantings. The Contractor shall notify the Owner's Representative of field conditions that prevent the installation of landscape improvements as shown.

1.5 REQUIRED LICENSURE:

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

1.6 COMPLIANCE WITH APPLICABLE REGULATIONS:

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits, and pay for all associated fees.

1.7 REFERENCE SPECIFICATIONS:

- A. American National Standards Institute
  - 1. ANSI Z60.1-2014 American Standard for Nursery Stock
  - 2. ANSI A-300 Tree Care Operation: Tree, Shrub, and other Woody Plant Maintenance - Standard Practices
- B. Arizona Nursery Growers Association
  - 1. Growers Committee Recommended Tree Specifications

1.8 SUBMITTAL REQUIREMENTS:

- A. General: The Contractor shall make the submittals identified below. Submittals shall be made and approved prior to the delivery of material to the site and its incorporation into the work.
- B. Certificates of Compliance: Submit three (3) copies of the following certificates of compliance to the Owner's Representative for review and approval, as applicable.
  - 1. Turf Grass Sod: The certificate, signed by the grower, shall indicate that the sod is of the species and variety specified or noted on the project plans.
  - 2. Turf Grass Sprigs: The certificate, signed by the grower, shall indicate that the sprigs are of the species and variety specified or noted on the project plans.
  - 3. Turf Grass Seed: The certificate, signed by the supplier, shall indicate the seed is of the species and variety specified or noted on the project plans, that it complies with these specifications, and that it is in compliance with applicable state statutes.
  - 4. Native Plant Seed: The certificate, signed by the supplier, shall indicate that the seed is of the species mix specified or noted on the project plans, that it complies with these specifications, and that it is in compliance with applicable state statutes.

5. Organic Soil Conditioner: The certificate, signed by the supplier, shall indicate that the material complies with the project specifications.
  6. Fertilizer: The certificate shall be a copy of the manufacturer’s guaranteed statement of analysis indicating compliance with these specifications.
  7. Soil Sulfur: The certificate shall be a copy of the manufacturer’s guaranteed statement of analysis indicating compliance with these specifications.
  8. Gypsum: The certificate shall be a copy of the manufacturer’s guaranteed statement of analysis indicating compliance with these specifications.
  9. Slow-Release Watering Gel: The certificate shall indicate that the slow-release watering gel meets the requirements of these specifications.
- C. Samples: Submit the following samples to the Owner’s Representative for review and approval.
1. Decomposed Granite and/or Crushed Rock: One cubic foot of the gradation and color proposed for use on the project.
  2. River Rock and/or Rip-Rap Material: One cubic foot of the gradation proposed for use on the project.

**PART 2 - MATERIALS**

2.1 TOPSOIL:

- A. Topsoil: Topsoil shall be fertile, friable soil obtained from well-drained arable land which has or is producing healthy crops, grasses, or other vegetation. It shall be capable of sustaining healthy plant growth. The topsoil shall be reasonably free of subsoil, refuse, roots, heavy clay, clods, noxious weed seeds, phytotoxic materials, coarse sand, large rocks, and other deleterious materials. The topsoil shall have the following physical characteristics.

pH .....	6.0 to 8.3
Soluble Salts (ppm).....	2000 (maximum)
Exchangeable Sodium (%) .....	5% (maximum)
Exchangeable Sodium (ppm).....	300 (maximum)
P.I.....	5 - 20
Gradation (Passing 2" Screen).....	100 %
Gradation (Passing ½" Screen) .....	85 - 100 %
Gradation (Passing No. 40 Screen).....	35 - 100 %

- B. Native Soil: Native soil shall be the existing surface soil on the project site.
1. Removal of Extraneous Materials from Native Soils: Prior to the use of on-site native soil for the plant pit backfill or for the preparation of planting beds for turf grass, all large roots, brush, rocks with a dimension of three inches (3") or larger, clay lumps, caliche, debris, and other extraneous material shall be removed from the soil and disposed of off-site.

## 2.2 SOIL AMENDMENTS

- A. Organic Soil Conditioner: Organic soil conditioner shall be composted, ground, or shredded fir or ponderosa pine bark shavings with at least 85% able to pass through a 1/4" screen. The pH shall not exceed 7.5. The material shall be hygroscopic or contain a wetting agent, and shall be Nitrogen stabilized with a 0.5 percent Nitrogen content.
- B. Soil Sulfur: Soil sulfur shall be agricultural sulfur for soil treatment. It shall be grained or pelleted, containing 90% (minimum) sulfur and 10% (maximum) inert ingredients. Soil sulfur shall be Disper-Sul Elemental Sulfur or approved equal.
- C. Gypsum: Gypsum shall be agricultural / horticultural gypsum specifically manufactured for use as a soil amendment.

## 2.3 FERTILIZERS

- A. General Requirements: All fertilizers used on the project shall be in pelleted form and of recent manufacture. Fertilizers shall be delivered to the site in the original unopened containers bearing the manufacturer's guaranteed statement of analysis.
- B. Ammonium Phosphate: Ammonium Phosphate (16-20-0) shall be commercial fertilizer containing in available form a minimum of 16% Nitrogen and 20% Phosphoric Acid.
- C. Other Fertilizers: Other fertilizers, as may be noted on the project plans, shall be of analysis identified on the project plans.

## 2.4 PREPARED PLANTING SOIL MIX

- A. Prepared Soil for Trees and Shrubs: The prepared soil mix for the backfill of tree and shrub plant pits shall consist of a uniform mixture, by volume and loose measure, of the following components per cubic yard: 20 cubic feet of native/on-site soil, 7 cubic feet of organic soil conditioner, 4 lb. soil sulfur, and 3 lb. of ammonium phosphate fertilizer. Prepared planting soil shall be thoroughly blended prior to placement in plant pits.
- B. Prepared Topsoil for Trees and Shrubs: The prepared topsoil mix for the backfill of tree and shrub plant pits shall consist of a uniform mixture, by volume and loose measure, of the following components per cubic yard: 20 cubic feet of import topsoil, 7 cubic feet of organic soil conditioner, 4 lb. soil sulfur, and 3 lb. of ammonium phosphate fertilizer.

Prepared topsoil shall be thoroughly blended prior to placement in plant pits.

- C. Prepared Planting Cacti and Stem Succulents: Prepared planting soil mix for cacti and stem succulents shall consist of on-site native soil with 0.25 lbs. of soil Sulfur incorporated into the soil backfill at each plant.
- D. Prepared Soil for Turf Areas: Prepared soil for turf areas shall be native, on-site soil with amendments incorporated as specified herein.

## 2.5 TOP-DRESSING MATERIALS

- A. Sand: Sand shall be washed mortar or concrete sand meeting the following gradation.

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100%
No. 4	95-100 %
No. 200	0-4%

## 2.6 CONTRACTOR PROVIDED NURSERY GROWN TREES, SHRUBS, AND CACTI

- A. Plant Form and Quality: All nursery grown trees, shrubs, cacti shall be normally developed individuals of their species. The habit of branching, development of foliage, and outline shall conform to grades of sound, first quality nursery stock for the subject species. All plants shall be free of disease, insects, insect eggs and larvae, animals, or animal damage.
- B. Plant Size: Plant size shall conform to the measurements specified on the plant list, and all provisions of ANSI Z60.1-2014 "American Standards for Nursery Stock" or the "Growers Committee Recommended Tree Specifications" by the Arizona Nursery Association, whichever is the more stringent specification. Minimum caliper and other dimensions shall be as noted on the drawings.
- C. Plant Root Systems: Container grown plants shall be in containers for a sufficient length of time for the root system to hold the earth when taken from the container but not long enough to become rootbound or cause a "hardening off" of the root system. No plant shall be loose in the root ball.

## 2.7 OWNER (PIMA COUNTY) PROVIDED TREES, SHRUBS, AND CACTI

- A. Owner (Pima County) Provided Trees, Shrubs, and Cacti: Owner provided trees shrubs and cacti shall be plants as grown and/or maintained in the Pima County Native Plant Nursery. The species, quantity, and size of Owner provided plants shall be as noted on the project plans. Trees may be furnished in standard nursery containers, tree pots, or tall pots as noted on the project plans.

1. Standard Nursery Containers: Standard nursery container shall be One Gallon (#1), Two Gallon (#2), Five Gallon (#5), and Fifteen Gallon (#15) containers and 20", 24", 36", 42", and 48" boxes as defined in ANSI Z60.1-2014.
2. Tree Pots: Tree pots shall be nursery containers that are approximately 24" tall by 11" in diameter or as noted on the project plans.
3. Tall Pots: Tall pots shall be pots constructed of 8" diameter PVC pipe cut in half vertically and banded together to form a plant container that will stimulate the development of deep roots. Tall pots will be 15" or 30" tall, or as noted on the project plans.

## 2.8 SALVAGED SPECIMEN PLANTS

- A. Salvaged Specimen Plants: Except as may be noted on the project plans, salvaged specimen trees, shrubs, stem succulents, and cacti shall be those plants salvaged from the project site in conjunction with this project.

## 2.9 TURF GRASS

- A. Turf Grass Sod: Sod shall be freshly cut sod of *Cynodon dactylon* Variety "Mid-Iron" (Mid-Iron Hybrid Bermuda Grass). Sod shall be cut from turf that is dense, healthy, and free of noxious weeds. Sufficient root system shall be provided to ensure the establishment of new turf after the sod has been installed. Sod shall be cut, delivered to the site and installed within a 24 hour period. Sod shall be protected from sun or wind-caused dehydration from the time of cutting to the time of installation.
  1. Overseeding: Sod planted when the specified bermuda grass is dormant or nearing dormancy, as determined by the Owner's Representative, shall be overseeded with annual rye-grass. Overseeded sod shall be normal for the turf-grass industry.
  2. Sod Netting: Sod shall be supplied without integrally netting. All netting or mesh used to separate sod rolls during transport shall be removed prior to sod installation. The netting material shall be removed from the project site.
- B. Turf Grass Sprigs: Sprigs shall be healthy living sprigs (stolons) of *Cynodon dactylon* Variety "Mid-Iron" (Mid-Iron Hybrid Bermuda Grass) and shall be supplied without adhering soil. Sprigs shall include two to three nodes and shall be 4 inches to 6 inches long. Sprigs shall be obtained from sources licensed to grow the specified variety and shall be cut from sod that is healthy and dense. Sprigs that are damaged during harvesting, transport or storage will be rejected.
- C. Turf Grass Seed: Seed shall be hulled, hybrid *Cynodon dactylon* (Hybrid Bermuda Grass) seed. The variety shall be as noted on the project plans. If not noted, the variety shall be as selected by Pima County. The seed shall be from the latest season's crop and shall be delivered to the site in the original, unopened, containers bearing the supplier's guaranteed statement of analysis for: species mixture, purity, germination, weed content, and inert material content.

The percentage of noxious weed seed allowable shall be as defined by current State of Arizona statutes related to agricultural seed. Seed that has become wet, moldy, or otherwise damaged during transit or storage will be rejected.

#### 2.10 MATERIALS FOR TURF GRASS HYDROSEEDING AND/OR HYDROSPRIGGING

- A. Wood Fiber Mulch: Mulch shall be virgin or recycled wood cellulose fiber produced specifically for hydraulic application and shall not contain any germination or growth inhibiting substances. The mulch shall contain a temporary, non-toxic green dye to aid in the uniform application of the mulch slurry. When applied to the soil surface, the mulch shall form an absorbent cover that allows for the percolation of water into the underlying soil.
- B. Water: Water shall be potable.
- C. Turf Grass Sprigs: Sprigs shall be Hybrid Bermuda Grass sprigs as specified herein.
- D. Turf Grass Seed: Seed shall be Hybrid Bermuda Grass seed as specified herein.

#### 2.11 MATERIALS FOR NATIVE PLANT HYDROSEEDING

- A. Native Plant Seed: Seed shall be State Certified seed of the latest season's crop and shall be delivered to the site in the original, unopened, containers bearing the supplier's guaranteed statement of analysis for: species mixture, purity, germination, weed content, and inert material content. The percentage of noxious weed seed allowable shall be as defined by current State of Arizona statutes related to agricultural seed. Seed that has become wet, moldy, or otherwise damaged during transit or storage will be rejected.
- B. Seed Mix: The seed mix shall be as noted on the project plans.
- C. Wood Fiber Mulch: Mulch shall be virgin or recycled wood cellulose fiber produced specifically for hydraulic application and shall not contain any germination or growth inhibiting substances. The mulch shall contain a temporary, non-toxic green dye to aid in the uniform application of the mulch slurry. When applied to the soil surface, the mulch shall form an absorbent cover that allows for the percolation of water into the underlying soil.
- D. Water: Water shall be potable.

#### 2.12 INORGANIC SURFACING MATERIALS

- A. Decomposed Granite Surfacing: Decomposed granite shall be durable granite material that has been screened to remove particles over one-quarter inch (1/4") in diameter or of the gradation noted on the project plans. Except as may be approved by the Owner's Representative, all material used on the project shall be from the same source and shall match the approved sample. The color of the decomposed granite shall be as noted on the project plans.

- B. Crushed Rock Surfacing: Crushed rock surfacing shall be durable granite material that has been crushed and screened to provide a uniform gradation of one-half inch (½") or of the gradation noted on the project plans. Except as may be approved by the Owner's Representative, all material used on the project shall be from the same source and shall match the approved sample. The color of the crushed rock shall be as noted on the project plans.
- C. River Rock Surfacing and Rip-Rap: River rock for landscape surfacing and/or rip rap shall be Salt River Rock that has been screened to provide the range of rock sizes noted on the project plans. The river rock shall be free from soil, soil clumps, debris, and other extraneous materials. Except as may be approved by the Owner's Representative, all material used on the project shall be from the same source and shall match the approved sample.
- D. Angular Rock Rip-Rap: Angular rock for landscape surfacing and/or rip rap shall be native surface rock that has been screened to provide the range of rock sizes noted on the project plans. The rock shall be free from soil, soil clumps, debris, and other extraneous materials. Except as may be approved by the Owner's Representative, all material used on the project shall be from the same source and shall match the approved sample.

#### 2.13 STAKING MATERIALS:

- A. Tree Stakes: Tree stakes shall be 2 inch (min.) diameter by 8 feet (min.) long peeled lodge pole pine stakes. Stakes shall be pressure treated with a wood preservative that is approved by state and federal regulatory agencies. Stakes longer than 8 feet shall be utilized, at no additional cost to the Owner, if required to properly support the trees installed on the project.
- B. Guy Wire: Guy Wire shall be 12 gauge, annealed, galvanized wire.
- C. Chaffing Guards: Chaffing guards shall be new, ½ or ¾ inch diameter, reinforced rubber or vinyl hose. Guards shall be 12 inches in length, minimum, as required to protect tree from damage by guy wires.

#### 2.14 HORTICULTURAL CHEMICALS:

- A. Pre-emergent Herbicide: The pre-emergent herbicide shall be "Surflan" or approved equal.
- B. Post-emergent Herbicide: The post emergent herbicide shall be "Round-up" or approved equal.

#### 2.15 RODENT PROTECTION CAGES:

- A. Rodent Protection Cages: Rodent protection cages shall be constructed of steel hardware cloth with ¼" by ¼" horizontal and vertical wire spacing. Height shall be as detailed on the project plans. Hardware cloth shall be galvanized after weaving / welding.
  - 1. Anchor Stakes for Rodent Protection Cages: Anchor stakes shall be No. 3 rebar stakes. Stake length shall be as detailed.

## 2.16 PRESERVATION FENCING:

- A. Preservation Fencing: Preservation fencing for identifying the limits of areas to be preserved during construction shall be heavy-duty, high-visibility, UV resistant, polypropylene plastic mesh fencing. Color shall be OSHA Orange. Height shall be as detailed or noted on the project plans.
  - 1. Posts for Preservation Fencing: Posts shall be heavy-duty painted or galvanized steel "T" posts with a weight of not less than 1.25 lbs. per linear foot of post.

## 2.17 TIME RELEASE WATERING GEL:

- A. Time Release Watering Gel: Time release watering gel shall consist of 97.85% potable water, 2% cellulose gum, and 0.15% aluminum sulfate. It shall be packaged in 1 quart size tubes.

The time release gel shall be specifically manufactured for the temporary irrigation of drought tolerant plants. Manufacturer of gel and type of packet shall be as noted on the project plans.

## **PART 3 - EXECUTION**

### 3.1 BLUE STAKING

- A. Blue Staking: The Contractor shall have the work area Blue Staked prior to the start of any landscape excavation work. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

### 3.2 INSTALLATION OF PRESERVATION FENCING:

- A. Installation of Preservation Fencing: The Contractor shall install fencing, as detailed, around the perimeter of areas to be preserved. Fencing shall be installed prior to the start of any clearing, excavation, or other construction activity. The location of the fence shall be as shown or noted on the project plans. Except as may be directed by the Owner's Representative, all preservation fencing shall be removed prior to Final Acceptance of the Work.

### 3.3 INSPECTION OF EXISTING PLANTS

- A. Identification and Marking of Plants to be Preserved-in-Place: Individual plant specimens to be preserved-in-place shall be as shown on the project plans. Plants to be preserved-in-place may have been identified with metal tags. The Contractor shall prominently mark all plants to be preserved-in place with bright colored flagging tape or other approved method all specimen plants to be preserved-in-place.

### 3.4 PRUNING OF EXISTING TREES AND SHRUBS TO BE PRESERVED-IN-PLACE

- A. Pruning of Existing Trees and Shrubs to be Preserved-in-Place: Existing trees and shrubs to be preserved-in-place in close proximity to new park improvements shall be pruned to remove dead and broken limbs, to remove parasites (such as mistletoe), and to remove limbs that are in conflict with new park improvements such as walkways, drives, and parking lots. Pruned material shall be removed from the site or chipped and disposed of on-site. Disposal location and the manner of disposal shall be as approved the Owner's Representative.

### 3.5 REMOVAL OF TREES AND SHRUBS

- A. Removal of Existing Trees and Shrubs: Existing trees and shrubs within the designated limits of work and not identified as to be preserved-in-place shall be removed. Cleared plant material shall be removed from the site or chipped and disposed of on-site. Disposal location and the manner of disposal shall be as approved the Owner's Representative.

### 3.6 PROTECTION OF PLANTS TO BE PRESERVED-IN-PLACE WITHIN THE PROJECT WORK AREA:

- A. Protection of Plants to be Preserved-in-Place within the Project Work Area: All plants within the limits of work and designated as to remain-in-place shall be protected during project construction. The Contractor shall provide barricades around individual plants or areas. Plants that are damaged by the Contractor's activities shall be replaced with boxed specimen plants of the same species as the plant damaged. Replacement trees shall be 48" box size, minimum. Replacement shrubs shall be 24" box size, minimum. Replacement plants shall be provided and installed at the Contractor's expense.

### 3.7 LAYOUT:

- A. Layout: The Contractor shall layout his work, staking out the location of plant materials as shown on the drawings. Tree locations shall be approved by the Owner's Representative prior to the excavation of plant pits.

### 3.8 INSPECTION OF PLANT MATERIALS AND PLANT PITS:

- A. On-Site Inspection of Plant Materials at Time of Delivery: The Contractor shall notify the Owner's Representative of his intent to deliver plants to the project site 72 hours prior to the scheduled delivery time. The Owner's Representative may elect to inspect plants at the time of delivery. Plants that are rejected at the time of delivery shall be immediately removed from the project site.
- B. Inspection of Plant Pits: All plant pits shall be inspected and approved by the Owner's Representative prior to the placement of prepared soil or prepared topsoil and prior to the installation of plants.

### 3.9 RECEIPT OF OWNER PROVIDED PLANTS:

- A. Receipt of Owner Provided Plants: All Owner Provided plants will be made available to the Contractor at the Pima County Native Plant Nursery or at other location(s) as may be designated on the project plans. It shall be the Contractor's responsibility to pick-up, load, transport, and unload the plants at the project site.
  - 1. Inspection of Plants at the Time of Delivery: The Contractor shall inspect all Owner Provided plants at the source nursery. Plants that are damaged, diseased , or otherwise unsuitable for the work may be rejected with the concurrence of the Owner's Representative. Plants that are accepted by the Contractor shall be subject to the plant guarantee as specified herein.

### 3.10 PLANTING OF TREES, SHRUBS, AND CACTI SUPPLIED IN STANDARD NURSERY POTS AND TREE POTS:

- A. Seasonal Limitations: The planting of trees, shrubs, and cacti may be conducted at any time selected by the Contractor consistent with the overall project completion schedule. Planting operations conducted during extremely hot, cold, or windy periods shall be performed at the Contractor's risk. Plants which die or become damaged due to weather conditions shall be replaced by the Contractor at no additional cost to the Owner.
- B. Excavation of Plant Pits: Plant pits and plant beds shall be excavated to dimensions detailed. All rock in the excavated soil with a dimension of three inches (3") or larger, shall be removed and disposed of off-site.
- C. Tests for Drainage: When the excavation of plant pits is difficult and it appears that the drainage of irrigation water may not be adequate, the Owner's Representative may direct the Contractor to test selected plant pits for drainage. The testing of up to 25 percent of the total number of plant pits shall be performed by the Contractor, if requested, at no additional cost to the Owner. Testing shall consist of partially filling the pit with water and measuring the rate of infiltration. For acceptance, the pit shall drain at a rate of not less than 6" in 60 minutes. All pits which have not drained at the rate noted shall be deepened or relocated as directed by the Owner's Representative. Deepening shall consist of the construction of a 6" diameter "chimney" to the depth required to achieve an acceptable drainage rate. The deepening or relocation of up to 25 percent of the total number of plant pits shall be performed by the Contractor at no additional cost to the Owner.
- D. Plant Pit Sizes: Plant pit sizes shall be as indicated on the details for the plant type and container size noted.
- E. Removal of Plants from Containers: Plants in containers shall be removed from containers immediately prior to planting in a manner that will not injure the roots, stems, or foliage. Plants that are damaged during planting operations shall be replaced by the Contractor, at his expense, with plants of the same species, variety, and size as originally specified.

- F. Planting Depth: Trees and shrubs shall be set such that the top of the rootball relative to finished grade, is as detailed. Plants that settle shall be excavated, removed, and reset to match the detailed condition.
- G. Staking: Trees of the sizes noted herein as to be staked be staked and guyed the same day they are planted. The number of stakes and the manner in which trees are secured to stakes shall be as detailed.
  - 1. Request for Waiver from Staking Requirement: The Contractor may request a waiver from the requirement to stake trees if it appears staking will not be necessary or beneficial. The waiver may be granted, in part or full, at the sole discretion of the Owner's Representative.

### 3.11 PLANTING OF TREES AND SHRUBS SUPPLIED IN TALL POTS:

- A. Seasonal Limitations: The planting of trees and shrubs supplied in tall-pots may be conducted at any time selected by the Contractor consistent with the overall project completion schedule. Planting operations conducted during extremely hot, cold, or windy periods shall be performed at the Contractor's risk. Plants that die or become damaged due to weather conditions shall be replaced by the Contractor at no additional cost to the Owner.
- B. Excavation of Plant Pits for Tall Pot Plants: Tall pot plant pits shall be augured to the diameter and depth detailed on the project plans. Care shall be taken to avoid soil from sloughing into the excavation.
- C. Pre-Irrigation of Plant Pit: Prior to installing the plant, the pit shall be filled with water and allowed to fully drain. The process shall be repeated two additional times. The Contractor shall be responsible for providing a temporary water source and for transporting water to the site as required for the pre-irrigation of plant pits.
- D. Installation of Tall Pot Plant: Prior to planting, all screens at the bottom of the tall pot shall be removed. The tall pot plant and container shall then be inserted into the pit. If needed, the soil shall be placed in the bottom of the pit to provide for the appropriate planting elevation. The pot / container shall then be removed using hay-hooks or other approved equipment. After removal of the pot / container, the pit shall be backfilled with native soil. Soil shall be placed in lifts and each lift thoroughly watered in as required to prevent settlement of the backfill.
- E. Salvage and Return of Tall Pots / Containers: All tall pot containers shall be collected and returned to the Pima County Native Plant Nursery. Delivery and unloading of the salvaged container materials shall be performed by the Contractor at his expense.

3.12 PRUNING OF TREES AND SHRUBS

- A. Pruning of Trees and Shrubs: Trees and shrubs shall be pruned by qualified personnel as required to promote healthy plant development and form consistent with the park environment. Pruning work shall be performed in accordance with ANSI A-300 (Tree Care Operations: Tree, Shrub, and other Woody Plant Maintenance - Standard Practices).

3.13 PREPARATION OF AREAS FOR TURF GRASS PLANTING

- A. Completion of Soil Preparation and Irrigation System Installation: The planting of turf grass shall not commence until the soil preparation has been completed and the irrigation system in the area to be planted has been made fully operational.
- B. Schedule for Planting: Seed, sprigs, and sod that is not overseeded shall be planted between May 1 and July 15, only. Overseeded sod may be planted between October 1 and April 1.
- C. Ripping of Soils with Shallow Caliche or other Adverse Soil Conditions: When noted on the project plans, areas with shallow or other adverse soil conditions shall be ripped to a minimum depth of twelve inches (12") or to the depth noted on the plans, whichever is greater. The equipment used to scarify these areas shall have teeth with a spacing of not more than eighteen inches (18") on-center. If a single ripping bar is used, passes shall be made at 18" on-center. After ripping, the area shall be graded to the lines and grades shown or noted on the project plans.
- D. Subgrade Preparation: After completion of initial grading work, the subgrade in turf grass areas shall be ripped or scarified to a minimum depth of six inches (6") as required to eliminate surface compaction. If necessary the ripping / scarifying work shall be accomplished with two passes at right angles. Rock with a dimension of three inches 3" or greater shall be removed from soil surface.
- E. Application of Soil Amendments: Soil amendments shall be applied to the surface of the scarified subgrade at the rates noted on the project plans. If not noted on the plans, the following rates shall be utilized.

Soil Sulfur (DisperSul): .....10 Lbs. per 1000 Square Feet  
Fertilizer - Ammonium Phosphate (16-20-0): .....5 Lbs. per 1000 Square Feet  
Gypsum:.....60 Lbs. per 1000 Square Feet

- F. Tilling of Amendments: Immediately following the application of soil amendments the area shall be tilled to thoroughly incorporate the amendments into the top six inches (6") of soil.
- G. Fine Grading and Rock Removal: The prepared soil shall be brought to the lines and grades shown on the plans. All rock with a dimension of 1" or larger shall be removed from the soil surface. Rock removal shall be repeated after the irrigation system has been made operational and the initial irrigation cycles conducted.

1. Grading of Turf Grass Fields: The finished grades in all turf grass athletic fields shall be established using laser leveling techniques.
  2. Surface Tolerances: The finished grades in turf grass areas shall be within plus or minus 1/10 of a foot of the grades noted on the drawings or interpolated from the contours shown on the drawings. Within the field areas the surface shall not vary more than 3/4 inch from the bottom surface of a ten foot (10') straightedge when the straightedge is laid on the prepared soil surface.
- H. Coordination with Irrigation Work: The planting of turf grass shall not commence until the irrigation system has been made fully operational within the work area.
1. Pre-Irrigation of Areas to be Planted with Turf Grass: The irrigation system in all areas to be planted with turf grass shall be operated as required to wet the top four inches (4") of soil and as required for settlement of soil in graded areas. Areas that settle shall be filled or repaired as required to meet the surface tolerances noted herein.

3.14 HYDROSEEDING OF TURF GRASS AREAS

- A. Turf Grass Hydroseeding: The hydroseed slurry shall be made immediately prior to its application and shall consist of the following materials.
- Seed ..... 100 Lbs. Pure Live Seed (PLS) per Acre  
 Wood Fiber Mulch..... 2000 lbs. per Acre  
 Water:..... As required for slurry application
- B. Slurry Application: The hydroseed slurry shall be applied to provide uniform coverage over the designated area(s). The Contractor shall take appropriate measures to prevent seed and mulch from being applied to areas not designated to be planted with turf grass and shall clean-up all over-spray on walls, paved surfaces, or areas surfaced with decomposed granite.
- C. Irrigation of Seeded Areas: Immediately following sprigging operations, the planted area shall be irrigated, Thereafter, the area shall be kept continuously moist until the turf grass has become established. After establishment, the area shall be irrigated daily, or at other appropriate interval, until Final Acceptance of the work.

3.15 HYDROSPRIGGING OF TURF GRASS AREAS

- A. Turf Grass Hydrosprigging: The hydrosprig slurry shall be made immediately prior to its application and shall consist of the following materials.
- Sprigs .....50 Bushels (minimum) per Acre  
 Wood Fiber Mulch..... 2000 lbs. per Acre  
 Water:..... As required for slurry application

- B. Slurry Application: The hydrosprig slurry shall be applied to provide uniform coverage over the designated area(s). The Contractor shall take appropriate measures to prevent sprigs and mulch from being applied to areas not designated to be planted with turf grass and shall clean-up all over-spray on walls, paved surfaces, or areas surfaced with decomposed granite.
- C. Irrigation of Sprigged Areas: Immediately following sprigging operations, the planted area shall be irrigated. Thereafter, the area shall be kept continuously moist until the turf grass has become established. After establishment, the area shall be irrigated daily, or at other appropriate interval, until Final Acceptance of the work.

3.16 SODDING OF TURF GRASS AREAS

- A. Placement of Sod: Sod shall be laid with tight joints and with ends of rolls offset from the adjacent end joint. Open joints shall be top-dressed with sand. Topdressing work shall be completed within 24 hours of the placement of sod. The installed sod shall be rolled with a water-filled, hand-propelled drum roller or other approved equipment.
- B. Irrigation of Sodded Areas: Immediately following sodding operations, the planted area shall be irrigated. Thereafter, the area shall be kept continuously moist until the turf grass has become established. After establishment, the area shall be irrigated daily, or at other appropriate interval, until Final Acceptance of the work.

3.17 TURF GRASS MOWING AND REFERTILIZATION

- A. Mowing: After initial establishment, the turf grass area shall be mowed not less than one time per week until Final Acceptance of the Work. Mowing shall be performed with a reel-type mower with no more than 50% of the blade length removed with each cutting.
- B. Refertilization: Forty-five days after the initial installation of the sod, it shall be refertilized with Ammonium Phosphate (16-20-0) fertilizer at a rate of 4 lbs. per 1000 square feet.

3.18 NATIVE PLANT HYDROSEEDING WORK

- A. Soil Preparation: All areas to be seeded shall be brought to the lines and grades shown on the plans. Areas used for haul roads or otherwise compacted during project construction shall be scarified to a depth of four inches (4"). Except as may be approved by the Owner's Representative, surface rock with a dimension of four inches (4") or greater, shall be removed and disposed of off-site.
- B. Hydroseed Slurry: The hydroseed slurry shall be made immediately prior to its application and shall consist of the following materials.

Native Plant Seed: ..... Rates as specified on the Project Plans  
 Wood Fiber Mulch: .....2000 lbs. per acre  
 Water:..... As required for slurry application

- C. Slurry Application: The hydroseed slurry shall be applied to provide uniform coverage over the designated area(s). The Contractor shall take appropriate measures to prevent seed from being applied to areas not designated to receive seed, and shall clean-up all over-spray on walls, paved surfaces, or areas surfaced with inorganic surfacing materials.

### 3.19 INORGANIC SURFACING MATERIALS

- A. Decomposed Granite Surfacing: All areas to be surfaced with decomposed granite shall be brought to the lines and grades shown on the drawings with allowances made for the depth of the surfacing material. Prior to the placement of the decomposed granite, the subgrade shall be treated with pre-emergent herbicide. The herbicide application shall be made in accordance with the manufacturer's written instructions and shall be made by an Applicator licensed by the State of Arizona. The decomposed granite shall be installed over the treated subgrade to the depth noted on the plans. The material shall be fine graded, wetted, and rolled with a hand propelled, water filled drum roller.
  - 1. Reveal at Paved Surfaces: A reveal shall be provided as the interface of decomposed granite / crushed rock areas and paved surfaces. The reveal dimension shall be as detailed. Where not detailed, the reveal shall be one inch (1").
- B. Crushed Rock, River Rock, and Rip-Rap Surfacing: All areas to be surfaced with crushed rock, river rock, or rip-rap shall be brought to the lines and grades shown on the drawings with allowances made for the depth of the surfacing material. Prior to the placement of the rock material, the subgrade shall be treated with pre-emergent herbicide. The herbicide application shall be made in accordance with the manufacturer's written instructions and shall be made by an Applicator licensed by the State of Arizona. The rock material shall be installed over the treated subgrade to the depth noted on the project plans.
  - 1. Reveal at Paved Surfaces: A reveal shall be provided as the interface of decomposed granite / crushed rock areas and paved surfaces. The reveal dimension shall be as detailed. Where not detailed, the reveal shall be one inch (1").

### 3.20 INSTALLATION OF RODENT PROTECTION CAGES:

- A. Installation of Rodent Protection Cages: Rodent protection cages shall be installed as detailed at all plants designated to receive rodent protection as noted on the project plans. (If not noted as a requirement on the project plans, the Contractor may elect to install rodent protection cages at his expense). Cages shall be anchored with rebar stakes as detailed.
- B. Removal of Rodent Protection Cages: Except as may be directed by the Owner's Representative, all rodent protection cages shall be removed by the Contractor prior to final acceptance of the work.

3.21 INSTALLATION OF SLOW-RELEASE WATERING GEL:

- A. Plants to Receive Slow-Release Watering Gel: Plants to receive slow-release watering gel shall be as identified on the project plans.
- B. Installation Method: Slow release watering gel packets shall be installed as detailed. If not detailed on the project plans, the gel packets shall be installed via direct burial adjacent to, and at the base of, the plant rootball.
- C. Quantity of Slow-Release Gel Packets to be Installed at Each Plant: The quantity of gel packets to be installed at each plant at the time of planting shall be as noted on the project plans. If not noted, the minimum quantity shall be as follows:

Plant Type:	Size:	Quantity of Gel Packets
Cactus / Succulent	Cutting or 1 Gal.	1
Cactus / Succulent	5 Gal.	2
Woody Shrub / Tree	1 Gal.	3
Woody Shrub / Tree	5 Gal.	5
Herbaceous Plant	1 Gal.	1
Other	Varies	As Directed by Owner's Representative

- D. Replacement Slow-Release Gel Packets: If required, replacement gel packets shall be installed at the interval(s) noted on the project plans.

3.22 LANDSCAPE MAINTENANCE:

- A. Maintenance During Construction: The Contractor shall maintain all trees, shrubs, cacti, turf areas, hydroseeded areas, decomposed granite, and other landscape improvements during project construction. Maintenance shall include, but not be limited to: irrigation, fertilization, pruning, mowing, weed removal, clean-up, herbicide application, and repair of damaged staking. Plants or turf areas which die or become diseased during the construction period shall be replaced at no additional cost to the Owner. Maintenance during construction shall continue until issuance of a Certificate of Substantial Completion.
- B. Inspection of Completed Landscape Planting Work: Upon completion of the landscape planting work, the Contractor shall notify the Owner's Representative who will schedule an inspection of the landscape improvements. During the inspection items that are incomplete or that must be repaired or replaced will be identified. Completion or correction of items noted will be required prior to the issuance of a Certificate of Substantial Completion.
- C. Maintenance after Substantial Completion: After issuance of a Certificate of Substantial Completion, the Contractor shall continue to operate and maintain the landscape improvements for a period of 60 consecutive calendar days. Maintenance shall include, but not be limited to: irrigation, fertilization, pruning, mowing, weed removal in decomposed

granite or raked-earth areas, site clean-up, herbicide application, and repair of damaged staking. Plants or turf areas which die or become diseased during the maintenance period, shall be replaced at no additional cost to the Owner. After satisfactory completion of the maintenance period, the Owner will assume responsibility for landscape maintenance.

1. Landscape Maintenance Requirements: Activities and tasks associated with the 60 day maintenance period shall include, but not be limited to:
  - a. Daily inspection of the site to check on site conditions and to perform remedial activities required to correct safety deficiencies and/or to address field conditions impacting the health of landscape plantings
  - b. Weekly mowing of all turf areas
  - c. Weekly removal of surface rock larger than one inch (1") from all turf areas
  - d. Weekly repair of surface irregularities within all turf areas
  - e. Weekly repair of all damaged tree staking
  - f. As-specified refertilization of all turf areas
  - g. As-needed replanting of all turf areas with insufficient turf grass development
  - h. As-needed replacement of dead, damaged, or diseased plants
  - i. As-needed pruning of plants as required for plant development as appropriate for park environment
  - j. As-needed application of horticultural chemicals to control diseases and pests
  - k. As-needed implementation of measures to protect plants from animal damage
  - l. As needed repair of erosion
  - m. As-needed removal of weeds from areas with decomposed granite or other inorganic surfacing
  - n. As-needed fine grading of areas with decomposed granite or other inorganic surfacing
  - o. As needed reseeding or repair of damage to areas hydroseeded with native plants
  - p. As-needed clean-up of landscape improvements and park facilities.
  
2. Suspension of Initial Contractor Maintenance Period for Non-Compliance: Failure to comply with the maintenance requirements specified herein, as determined by the Owner's Representative, will result in the number of days being credited to the initial 60 day maintenance period being suspended. The suspension will remain in effect until such time as the remedial action(s) required by the Owner's Representative have been implemented by the Contractor.

### 3.23 STANDARDS FOR FINAL ACCEPTANCE OF THE LANDSCAPE IMPROVEMENTS

- A. Standards for Acceptance of Trees, Shrubs, and Cacti: Standards for acceptance of trees, shrubs, cacti, and other plants include, but are not limited to, the following:
  1. All trees, shrubs, cacti, and other plants are in place as shown on the project plans, including replacement plants, as required
  2. All tree stakes, guy wires, and chaffing guards are in-place and adjusted as shown on the project plans

3. All trees have been pruned in accordance with these specifications
- B. Standards for Acceptance of Turf Grass: Standards for acceptance of turf grass areas include, but are not limited to, the following:
1. Turf grass areas are free of surface rock larger than 1" in diameter
  2. Turf grass cover has successfully been established in all designated areas
  3. Surface irregularities (depressions, humps, etc.) in all turf grass areas have been repaired
  4. Turf grass has been mowed in accordance with these specifications
  5. Turf grass has been refertilized in accordance with these specifications
  6. Turf grass diseases have been successfully treated as required for a healthy stand of grass
- C. Standards for Acceptance of Areas with Inorganic Surfacing: Standards for acceptance of areas with inorganic include, but are not limited to, the following:
1. Surfacing is free from erosion and displacement of material
  2. The finished grade of surfacing material has been maintained and the surface has been raked to provide neat and clean appearance
  3. The reveal where the surfacing material abuts paved surfaces has been maintained or re-established as detailed or noted on the project plans.
  4. Surfacing is free of weeds, turf grass, and other plants except as shown noted on the project plans
- D. Standards for Acceptance of Areas Seeded with Native Plants: Standards for acceptance of areas seeded with native plants include, but are not limited to, the following:
1. Areas are free from erosion and displacement of soil material
  2. Areas where seed and mulch have been displaced have been reseeded and remulched
  3. Native plants are established or germinating consistent with seasonal temperatures and precipitation

### 3.24 GUARANTEE:

- A. Contractor Installed Plant Material: The Contractor shall guarantee all Contractor installed plant materials for a period of one year commencing on the date of Final Acceptance. Plants which become diseased or which die during the guarantee period, for reasons other than neglect, improper maintenance, Acts-of-God, or causes deliberate, as determined by the Owner's Representative, shall be replaced by the Contractor at no additional cost to the Owner.

END OF SECTION – 32-90-00

## **SECTION 32-96-00 - NATIVE PLANT SALVAGE WORK**

### **PART ONE: GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Provisions of the Contract, including all General and Supplementary Conditions and Supplements and Amendments to the General Conditions of the Contract apply to work specified in this section.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this section includes, but is not limited to, the:
  1. Salvage, maintenance, and replanting of specimen native trees and shrubs
  2. Salvage, maintenance, and replanting of specimen cacti and stem succulents
  3. Set-up, operation, and removal of a temporary plant holding nursery

The extent of the native plant salvage work is shown on the drawings and details.

#### **1.3 RELATED WORK**

- A. Related work includes, but is not limited to, the:
  1. Construction / installation of landscape improvements.
  2. Installation of an automatic irrigation system.

#### **1.4 COORDINATION**

- A. The Contractor shall coordinate all native plant salvage work with the Owner's Representative. Work that is completed or in-progress shall be protected during the implementation of native plant salvage work. The Contractor shall notify the Owner's Representative of field conditions which prevent implementation of the native plant salvage and replanting work as shown.

#### **1.5 REQUIRED LICENSURE**

- A. All work shall be performed by a Contractor licensed by the State of Arizona Registrar of Contractors. The commercial license classification held by the Contractor shall be appropriate for the work to be performed.

#### **1.6 COMPLIANCE WITH APPLICABLE REGULATIONS**

- A. The Contractor shall comply with all local, state, and federal regulations regarding materials, methods of work, and disposal of excess and waste materials. The Contractor shall provide notices required by governmental authorities, request required inspections, obtain required permits, and pay for all associated fees.

1.7 REFERENCE SPECIFICATIONS:

A. American National Standards Institute

1. ANSI A-300 Tree Care Operation: Tree, Shrub, and other Woody Plant Maintenance - Standard Practices

1.8 REQUIRED EXPERIENCE

- A. The Contractor shall have prior experience with the successful implementation of native plant salvage work and shall provide the Owner's Representative with the project name, project location, client contact name, and client contact's phone number for not less than three (3) previous projects involving the side-boxing of specimen native trees and the transplanting of specimen cacti. The Owner reserves the right to reject any and all contractors who cannot demonstrate the specified prior experience.

1.9 TEMPORARY HOLDING NURSERY

- A. Holding Nursery: It shall be the responsibility of the Contractor to establish an on-site holding nursery for the temporary storage and maintenance of the salvaged plants.
1. Nursery Location: The nursery shall be in the on-site location(s) shown on the plans or in an off-site location as approved by the Owner's Representative.
  2. Nursery Security: It shall be the responsibility of the Contractor to provide security fencing for the temporary holding nursery.
  3. Water Source: The Contractor shall provide a temporary water source for the holding nursery and shall pay all charges and fees for temporary and/or permanent meters.
  4. Irrigation System: The on-site holding nursery shall be developed with an automatic drip irrigation system for all boxed trees and shrubs. The Contractor shall be responsible for the design, installation, operation, and subsequent removal of the irrigation system. The drip irrigation system shall be as approved by the Owner's Representative.
  5. Payment for Water Used at On-Site Holding Nursery: The Contractor shall be responsible for payment of all charges for water used at the on-site holding nursery.

1.10 VERIFICATION OF PLANTS TO BE SALVAGED

- A. Field Verification of Plants to be Salvaged: The specimen plants to be salvaged are shown on the project plans and may be tagged with metal tags and colored flagging tape. The Contractor shall verify the location and identification number of all plants to be salvaged. The Contractor shall notify the Owner's Representative of all plants shown on the plans but not found or adequately identified in the field at the start of native plant salvage work.

### 1.11 PLANT REMOVAL PERMITS AND TAGS

- A. Plant Permits: The acquisition of all State of Arizona Department of Agriculture permits and tags, as may be required for the shipment of plants off-site including the shipment of plants to a temporary off-site holding nursery, shall be the responsibility of the Contractor.

### 1.12 SUBSTITUTE PLANTS

- A. Substitute Plants: The Contractor may propose the salvage of substitute plants for the specimen plants shown or listed on the project drawings if, in the opinion of the Contractor, the proposed substitute plant has a higher probability of survival than the designated plant. Substitute plants shall be of the same species and approximate size as the designated plant. Approval of the substitute plants will be at the sole discretion of the Owner's Representative. If approved, the substitution shall be made a no additional cost to the Owner.

### 1.13 EXCESS PLANTS

- A. Definition of Excess Plants: Plants within the approved Limits of Grading as shown on the drawings that are not identified as "Plants to be Salvaged" or "Plants to be Preserved-in-Place" are considered excess plants.
- B. Disposition of Excess Plants: Excess plants may be salvaged by the Contractor. Excess plants that are salvaged may be stored in the temporary holding nursery for potential use as replacement plants for salvaged plants that die during the plant guarantee period. Excess plants may also be salvaged and removed from the site by the Contractor. All labor, materials, and equipment used to salvage excess plants shall be at the Contractor's expense. The Contractor shall also be responsible for the acquisition of State of Arizona Department of Agriculture permits / tags required for the transport of excess plants off-site.

## **PART TWO: MATERIALS**

### 2.1 PLANT MATERIALS TO BE SALVAGED

- A. Trees and Shrubs: Trees and shrubs to be salvaged are existing trees and shrubs on the project site. The approximate location and the species, size and type of plant are shown or noted on the project drawings.
- B. Cacti, Stem Succulents, and Related Plants: Cacti, stem succulents, and related plants to be salvaged are existing plants on the project site. The approximate location and the species, size, and type of plant are shown or noted on the project drawings.

### 2.2 BOXING MATERIALS

- A. Box Materials: The lumber and other materials used in the construction of boxes for specimen plants shall be new and shall be standard for the native plant salvage industry.

- B. Banding Materials: Banding shall be heavy duty steel banding. Bands shall be a minimum of ½” wide and shall have a break-strength of not less than 1,450 lbs.

### 2.3 PREPARED SOIL BACKFILL MATERIAL

- A. Prepared Soil Backfill for Trees and Shrubs: Soil backfill for salvaged trees and shrubs shall consist of a uniform mixture of native soil from the project site with soil amendments. Amendments and application rates shall be as follows:

1. Soil Sulfur: 4.0 lbs. per Cubic Yard of Backfill
2. Fertilizer (Ammonium Phosphate 16-20-0): 3.0 lbs. per Cubic Yard of Backfill

- B. Prepared Soil Backfill for Cacti, Stem Succulents, and Ocotillo: Soil backfill for cacti, stem succulents, and ocotillo shall be a uniform mixture of native on-site soil and amendments. Amendments and application rates shall be as follows:

1. Soil Sulfur: 4.0 lbs. per Cubic Yard of Backfill

### 2.4 TEMPORARY IRRIGATION SYSTEM MATERIALS AND EQUIPMENT

- A. Irrigation Materials and Equipment: The materials and equipment used in the construction of the irrigation system for the temporary holding nursery shall be new, durable, and adequate for the provision of adequate water to the stored specimen plants. They shall be free of leaks and other defects.

## **PART THREE: EXECUTION**

### 3.1 BLUE STAKING

- A. Blue Staking: The Contractor shall request that the project site be Blue Staked prior to the start of any excavation work. Blue Staking shall be kept current during the course of the project. All utilities damaged by the Contractor in conjunction with the native plant salvage work shall be repaired or replaced by the Contractor, as required by the Owner or appropriate utility company, at the Contractor's expense.

### 3.2 VEHICULAR ACCESS TO THE SITE

- A. Vehicular Access to the Site: Vehicular access to the plants to be salvaged shall be from within the approved limits of grading. Vehicular access to plants from areas outside the approved limits of grading is prohibited.

3.3 PROTECTION OF PLANTS AND NATURAL AREAS TO BE PRESERVED

- A. Protection of Plants and Natural Areas to be Preserved: All plants and natural areas outside the limits of grading, or designated as to be preserved-in-place, shall be protected during the implementation of the native plant salvage work.

3.4 APPROVED SALVAGING TECHNIQUES

- A. Tree Salvaging Techniques: All trees shall be salvaged using approved side-boxing techniques. The transplanting of trees with a tree spade will not be allowed.
- B. Shrub Salvaging Techniques: All shrubs shall be salvaged using approved side-boxing techniques. The transplanting of shrubs with a tree spade will not be allowed.
- C. Cacti, Stem Succulents, and Ocotillo Salvaging Techniques: Cacti, stem succulents, and ocotillo shall be salvaged using bare-root transplanting techniques. Other techniques may be used if approved by the Owner's Representative.

3.5 MINIMUM BOX SIZES FOR TREES AND SHRUBS

- A. Minimum Box Sizes for Trees: Except as approved by the Owner's Representative, minimum box sizes for trees shall be as listed below. Larger box sizes may be utilized if deemed necessary or appropriate by the Contractor. The minimum box sizes are based on caliper of the tree trunk (for single trunk trees) or the combined caliper of the two largest trunks (for multi-trunk trees) as follows:

<u>Tree Caliper</u>	<u>Minimum Box Size</u>
1.0" - 2.5"	24" Box
2.0" - 4.0"	30" Box
3.5" - 5.5"	36" Box
5.0" - 7.5"	42" Box
7.0" - 9.5"	48" Box
9.0" - 11.5"	54" Box
11.0" - 13.5"	60" Box
13.0" - 15.5"	66" Box
15.0" - 17.5"	72" Box

- B. Minimum Box Sizes for Shrubs: Box sizes for shrubs shall be as selected by the Contractor and as required to ensure the survival of the shrub after transplanting.

3.6 SALVAGING AND REPLANTING OF TREES AND SHRUBS

- A. Salvaging of Trees and Shrubs: Trees and shrubs shall be salvaged as follows:
  - 1. Pruning: The plant shall be pruned to facilitate salvage work. Pruning work shall be implemented in accordance with technical bulletin ANSI-A-300.

2. Excavation of Rootball: The sides of the rootball shall be excavated in a manner that maintains an intact root ball and soil mass.
3. Installation of Side Panels: The side panels of the box shall be installed and secured.
4. In-field Irrigation: The plant shall be watered daily, or at other interval approved by the Owner's Representative, for a period of not less than 28 days. The volume of water applied shall be sufficient to keep all soil within the box continuously wet.
5. Installation of Box Bottom Panel: Upon completion of the in-field holding and irrigation period, the roots extending below the bottom of the box shall be cut and the bottom box panel shall be installed and secured with metal banding.
6. Transporting to Holding Nursery: The boxed plant shall then be transported to the temporary on-site holding nursery where it can be irrigated daily. Lifting and transporting equipment shall be of the size, type, and capacity that will prevent damage to the plant and/or root ball box.
7. Maintenance of Trees and Shrubs in the Holding Nursery: Salvaged trees and shrubs shall be maintained in the holding nursery as specified herein.
8. Backfilling of Excavations: Excavations resulting from the removal of plants shall be backfilled. The backfilling of excavations shall be completed on the same day as the plant is removed. Backfilling operations in areas to be paved shall be performed in manner that ensures the compaction required under the pavement for the full depth of the excavation.
9. Replanting of Trees and Shrubs: Salvaged / boxed trees and shrubs shall be replanted in the locations shown or noted on the project plans. Replanting work shall not begin until the area to be planted has been brought to appropriate finished grade and the irrigation system has been made fully operational. Boxed trees and shrubs shall be transported and placed using equipment of a size, type, and capacity that will prevent damage to the plant and/or root ball box.

### 3.7 SALVAGE AND REPLANTING OF SAGUARO CACTI

- A. Salvaging and Replanting of Saguaro Cacti: Saguaro cacti shall be salvaged using bare root techniques. Sufficient root shall be included with the saguaro to facilitate the re-establishment of the plant after transplanting. Saguaro cacti shall be salvaged as follows:
  1. Marking of Plant Orientation: All saguaro cacti to be transplanted shall be marked with a small marking of water based paint to indicate the north side of the plant in its original location.

2. Installation of Temporary Supports: Saguaro shall be supported as required for the safe implementation of the work. Support may consist of anchoring and bracing the saguaro to a truck-mounted moving rig.
3. Excavation of Root System: The root system shall be excavated as required to provide an adequate root system for survival after transplanting. Roots shall be cut with a sharp saw or shears.
4. Inoculation of Root System: Immediately following the removal of the saguaro from its original location, all cut or damaged portions of the root system shall be treated with soil sulfur and antibiotic.
5. Transporting of Saguaro Cacti Spears up to Eight Feet Tall: Saguaro cacti spears up to eight feet in height may be transplanted using a truck or trailer mounted saguaro transplanting rig or other equipment selected by the Contractor.
6. Transporting of Saguaro Cacti Spears Taller than Eight Feet and Saguaros with Arms: Except as approved by the Owner's Representative, all saguaro spears greater than six feet in height and all saguaros with arms shall be moved using a truck or trailer mounted saguaro moving rig. The rig shall be capable of supporting and stabilizing the entire length of the main stem and all arms during the transplanting operation.
7. Replanting of Saguaro Cacti: Except as approved by the Owner's Representative, saguaro cacti shall be replanted in the final replanting locations as shown on the drawings. Saguaro cacti shall be replanted such that the soil line after planting matches the soil line prior to transplanting. The plant pit shall be backfilled with pea gravel around the roots and prepared planting soil mix in the balance of the pit as detailed.
8. Orientation of Saguaro Cacti: The orientation of all saguaro cacti after transplanting shall match the orientation of the plant prior to transplanting.
9. Installation of Temporary Shade Cloth: The top of all transplanted saguaros shall be covered with shade cloth as detailed. The shade cloth shall be secured to the plant in a manner that does not cause injury.
10. Bracing: Temporary bracing shall be provided by the Contractor if needed to stabilize the saguaro after planting. Padding shall be provided to prevent the bracing from damaging the saguaro. Bracing and padding shall be subject to the review and approval of the Owner's Representative.

3.8 SALVAGING AND REPLANTING OF CACTI (OTHER THAN SAGUARO), STEM SUCCULENTS, AND OCOTILLO:

- A. Salvaging of Cacti, Stem Succulents, and Ocotillo: Cacti (other than saguaros), stem succulents, and ocotillo shall be salvaged using bare root techniques. Salvage and replanting work shall be performed as follows:
1. Excavation of Root System: The root system shall be excavated as required to provide an adequate root system for survival after transplanting. Roots shall be cut with a sharp saw or shears.
  2. Healing-in of Plants at Holding Nursery: All salvaged cacti, ocotillo, and stem succulents shall be transported to the temporary on-site holding nursery and healed-in. Plants shall be periodically irrigated as required for the subject species. Plants shall be protected from damage.
  3. Replanting of Cacti (other than Saguaros), Stem Succulents, and Ocotillo: Plants shall be replanted as detailed in the locations shown on the project drawings. Irrigation shall be extended only to plants of those species noted on the drawings.

3.9 MAINTENANCE OF PLANTS IN THE ON-SITE HOLDING NURSERY

- A. Maintenance of Salvaged Trees and Shrubs: All trees and shrubs shall be irrigated daily or at other interval approved by the Owner's Representative. The daily application of water shall be sufficient to keep the entire soil volume within the root ball continuously moist. Irrigation applications shall be adjusted based on changes in weather conditions.
- B. Maintenance of Cacti, Stem Succulents, and Ocotillo: Plants shall be maintained in a manner appropriate for the species and as required to ensure the health of the plant.

3.10 MAINTENANCE

- A. Maintenance during Construction: The Contractor shall operate the on-site holding nursery and maintain all salvaged plants during construction and until all salvaged plants have been replanted on the project site.
- B. Inspection of Completed Replanting Work: Upon completion of the native plant salvage and replanting work, the Contractor shall notify the Owner's Representative who will schedule an inspection of the subject work. During the inspection, items which are incomplete or which must be repaired or replaced will be identified. Completion or correction of items noted will be required prior to the issuance of a Certificate of Substantial Completion.
- C. Maintenance after Substantial Completion: After issuance of a Certificate of Substantial Completion, the Contractor shall continue to operate and maintain the salvaged and replanted plants for a period of 60 consecutive calendar days.

Maintenance shall include, but not be limited to: irrigation, fertilization, pruning, weed removal, and the as-needed application of horticultural chemicals. Salvaged and replanted plants which die or become diseased during the maintenance period, shall be replaced at no additional cost to the Owner. Replacement plants shall be of the same size and species as the plant being replaced. After satisfactory completion of the maintenance period, the Owner will assume responsibility for plant maintenance.

1. Suspension of Initial Contractor Maintenance Period for Non-Compliance: Failure to properly maintain the salvaged and replanted native plants as specified herein, as determined by the Owner's Representative, will result in the suspension of the number of days being credited towards the initial 60 day Contractor maintenance period. The suspension will remain in effect until such time as the remedial actions required by the Owner's Representative have been implemented by the Contractor.

### 3.11 GUARANTEE

- A. Salvaged Plant Guarantee: The Contractor shall guarantee all Contractor salvaged and replanted native plants for a period of one year commencing on the date of Final Acceptance. Plants which become diseased or which die during the guarantee period, for reasons other than neglect, improper maintenance, Acts-of-God, or causes deliberate, as determined by the Owner's Representative, shall be replaced by the Contractor at no additional cost to the Owner. Replacement plants shall be of the same size and species as the original plant. To satisfy the plant guarantee requirements, the plant shall:
  1. Exhibit healthy growth throughout the plant structure.
  2. Be free from significant die-back within branches or portions of the plant.
  3. Be reasonably free from insects or other infestations that would reduce the plant's long-term potential for survival.
  4. Be reasonably free from physical damage to the trunk, branches, or foliage that would reduce the plant's long term potential for survival.

END OF SECTION 32-96-00



**Pima County Natural Resources, Parks and Recreation Department  
Pima County Project Management Office**

# **Standard Details**

**Prepared by McGann & Associates Inc., Landscape Architects and Planners  
for Pima County Natural Resources, Parks and Recreation Department  
and Pima County Project Management Office**

Pima County Natural Resources, Parks and Recreation Department  
**Index - Standard Details for Park Development**

Field and Court Layouts – Baseball / Softball / Multi-Sport:

- P-001 Little League Baseball Field Layout
- P-002 Little League Baseball Field Fence Layout
- P-003 Pony League Field Layout
- P-004 Pony League Field Fence Layout
- P-005 Full-Size Baseball Field Layout
- P-006 Full-Size Baseball Field Fence Layout
- P-007 Fast-Pitch Softball Field Layout
- P-008 Fast-Pitch Softball Field Fence Layout
- P-009 Adult Slow-Pitch Softball Field Layout
- P-010 Adult Slow-Pitch Softball Field Fence Layout
- P-011 Home Plate, Base and Pitcher’s Rubber Layout
- P-012 Pitcher’s Mound Layout (Baseball)
- P-013 Home Plate (Baseball and Softball)
- P-014 Base Anchor (Baseball and Softball)
- P-014-A Double First Base
- P-015 Infield / Outfield - Base Path Interface
- P-016 Multi-Use Sports Field Layout
- P-017 Multi-Use Sports Field End Line Fence Layout

Field and Court Layouts – Basketball:

- P-020 Basketball Court Layout
- P-021 Basketball Key Striping Plan
- P-022 Basketball Post, Backboard and Goal

Field and Court Layouts – Volleyball and Pickleball:

- P-030 Sand Volleyball Court Layout
- P-031 Sand Volleyball Court Net Post
- P-032 Sand Volleyball Court Boundary Rope and Anchor
- P-033 Sand Volleyball Court Concrete Header
- P-034 Pickleball Court Layout

Planting / Salvaged Native Plants:

- P-100 Tree Planting - Boxed Salvaged Specimen
- P-101 Shrub Planting - Boxed Salvaged Specimen
- P-102 Ocotillo Planting - Salvaged Specimen
- P-103 Saguaro Planting - ( $\leq 8'$ ) - Salvaged Specimen
- P-104 Saguaro Planting - ( $> 8'$ ) Salvaged Specimen

Pima County Natural Resources, Parks, and Recreation Department  
**Index - Standard Details for Park Development**

- P-105 Barrel and Columnar Cactus Planting - Salvaged Specimen
- P-106 Stem Succulent Planting - Salvaged Specimen
- P-107 Prickly Pear and Cholla Planting - Salvaged Cutting

Planting / Nursery Stock:

- P-200 Tree Planting - 30" and Larger Box Size
- P-201 Tree Planting - 24" Box and 15 Gallon Size
- P-202 Tree Planting – Hard Soil Conditions - 24" Box and 15 Gallon Size
- P-203 Shrub / Ground Cover Planting - 1, 5 and 15 Gal. Size
- P-204 Shrub / Ground Cover Planting – Hard Soil Conditions - 1, 5 and 15 Gal. Size
- P-205 Barrel and Columnar Cactus Planting - Container Grown
- P-206 Stem Succulent Planting - Container Grown
- P-207 Prickly Pear and Cholla Planting - Container Grown
- P-208 Rodent Protection Cage for Trees
- P-209 Tree Planting on Slope

Irrigation Systems:

- P-300 Backflow Preventer in Security Enclosure
- P-301 Irrigation Controller in Freestanding Security Enclosure
- P-302 Irrigation Controller in Wall Mounted Security Enclosure
- P-303 Irrigation Controller Interior Wall Mounted
- P-304 Master Valve Assembly
- P-305 Flow Sensor Assembly
- P-306 Mainline Isolation (Ball) Valve Assembly - 2-1/2" to 4" Size
- P-307 Mainline Isolation (Ball) Valve Assembly - 1/2" to 2" Size
- P-308 Quick-Coupling Valve Assembly
- P-309 Remote Control Valve Assembly - Turf Zones
- P-310 Remote Control Valve Assembly - Drip Zones
- P-311 Pipe Trenching and Backfill - Mainlines, Laterals and Marking Tape
- P-312 Sleeve Under Street or Parking Lot
- P-313 Sleeve Under Walkway or Shared Use Path
- P-314 Multi-Outlet Emitter - Six Outlet
- P-315 Emitter Distribution Tubing Layout at Tree - Six Outlet
- P-316 Multi-Outlet Emitter - Eight Outlet
- P-317 Emitter Distribution Tubing Layout at Tree - Eight Outlet
- P-317-A Emitter / Polyethylene Tubing Layout at Tree – Six Emitters per Tree
- P-317-B Emitter / Polyethylene Tubing Layout at Shrubs
- P-318 Single-Outlet Emitter on PVC Riser
- P-318-A Single Outlet Emitter with Barbed Fitting on Polyethylene Tubing
- P-319 Emitter Distribution Tubing Layout at Shrubs

Pima County Natural Resources, Parks and Recreation Department  
**Index - Standard Details for Park Development**

P-320	Emitter Line Flush Cap in Access Box
P-321	Gear Drive Sprinkler
P-322	Pop-Up Spray Sprinkler
P-323	Pressure Reducing Valve
P-324	Blow-Off Valve Assembly
P-325	Combination Air and Vacuum Release Valve
P-326	System Filter and Automated Back-Flush System
P-327	Surge Protection and Ground Rod for Two-Wire Systems
P-328	Concrete Thrust Block
P-329	Pull-Box for Two-Wire Cable

Post-and-Cable Barrier and Bollards:

P-400	Post-and-Cable Barrier
P-401	Post-and-Cable Barrier End / Corner Panel
P-402	Maze Gate in Post-and-Cable Barrier
P-403	Post-and-Cable Barrier, End / Corner Panel, Plan View
P-404	Bollard / Post Barricade - Type "A"
P-405	Bollard / Post Barricade - Type "B"
P-406	Removable Bollard / Post Barricade
P-406-A	Removable Bollard / Post Barricade Cap and Hinge
P-406-B	Removable Bollard / Post Barricade Cap and Hinge

Entry Gates:

P-500	Park Entry Gate - Gate Panel
P-501	Park Entry Gate - Gate Post
P-502	Park Entry Gate - Tie-Back Post
P-503	Park Entry Gate - Tie-Back Anchor and Locking Mechanism
P-504	Equestrian Step-Over Gate
P-505	Equestrian Gate Details

Chain Link Fencing and Gates:

P-600	Chain Link Fence - Typical Framing Plan
P-601	Chain Link Fence - Up to 6'-0" Height
P-602	Chain Link Fence - >6'-0" to 10'-0" Height
P-603	Chain Link Gate - Single Swing - 6'-0" Max. Height / 5'-0" Max. Width
P-604	Chain Link Gate - Single Swing - 10'-0" Max. Height / 10'-0" Max. Width
P-605	Chain Link Gate - Single Swing - 6'-8" Height in 10'-0" Fence
P-606	Chain Link Gate - Double Swing - 6'-0" Max. Height / 24'-0" Max. Width
P-607	Chain Link Gate - Double Swing - 10'-0" Max. Height / 24'-0" Max. Width

Pima County Natural Resources, Parks, and Recreation Department  
**Index - Standard Details for Park Development**

- P-608 Chain Link Security Fence - 8'-0" Height
- P-609 Removable Outfield Fence Panels
- P-610 Dog Park Fence
- P-611 Woven Wire Fence
- P-612 Wire Game Fence
- P-612-B Wire Game Fence – End and Corner Post Assembly
- P-613 Multi-Sport Field End Line Fence

Backstops:

- P-700 Backstop Layout – Little League Baseball, Pony League Baseball, and Fast-Pitch Softball Fields
- P-701 Backstop Layout – Full-Size Baseball and Adult Slow-Pitch Softball Field
- P-702 Backstop Framing Plan - Little League Baseball, Pony League Baseball, and Fast-Pitch Softball Fields
- P-703 Backstop Framing Plan - Full-Size Baseball and Adult Slow-Pitch Softball Field
- P-704 Section through Backstop
- P-705 Backstop Cantilevered Panel Connection to Posts
- P-706 Backstop for Pitcher Warm-Up Area

Baseball / Softball Dugouts:

- P-800 Dugout - Plan
- P-801 Dugout - Closed End Elevation
- P-802 Dugout - Gate End Elevation
- P-803 Dugout - Front (Field Side) Elevation
- P-804 Dugout - Rear (Spectator Side) Elevation
- P-805 Dugout Gate
- P-806 Dugout Equipment Shelf
- P-807 Dugout Roof
- P-808 Dugout Electrical Outlet
- P-809 Water Cooler Shelf
- P-810-A Batting Cage Plan
- P-810-B Batting Cage Roof Plan
- P-810-C Batting Cage Elevations
- P-810-D Batting Cage – Intermediate Roof Frame Member

Playground Headers and Surfacing:

- P-900 Rubberized Resilient Surfacing
- P-901 Engineered Wood Fiber Surfacing

Pima County Natural Resources, Parks and Recreation Department  
**Index - Standard Details for Park Development**

- P-902 Playground Header
- P-903 Playground Equipment Use Zone Diagram

Site Furniture:

- P-1000 Boulder Detail
- P-1001 Accessible Drinking Fountain
- P-1002 Accessible Drinking Fountain with Pet Watering Fountain – Type 1
- P-1002-A Accessible Drinking Fountain with Dog Bowl – Type 2
- P-1003 Precast Concrete Picnic Table
- P-1004 Precast Concrete Bench
- P-1005 Standard Barbeque Grill
- P-1006 Group Barbeque Grill
- P-1007 Barbeque Grill Layout
- P-1008 3-Tier Bleacher
- P-1009 5-Tier Bleacher

Pathway and Trail Paving:

- P-1100 Decomposed Granite Path
- P-1101 Asphaltic Concrete Path
- P-1102 Asphaltic Concrete Path at Bank Protection

Miscellaneous Park Facilities:

- P-1200 Horseshoe Pit Layout
- P-1201 Horseshoe Pit – Section through Pit and Backstop
- P-1202 Horseshoe Pit Backstop Elevation

Ecosystem Restoration and Preservation:

- P-1300 Drought Tolerant Tree Planting with Watering Gel (No Permanent Irrigation)
- P-1301 Drought Tolerant Shrub Planting with Watering Gel (No Permanent Irrigation)
- P-1302 Cactus and Succulent Planting with Watering Gel (No Permanent Irrigation)
- P-1303 Tall Pot Planting
- P-1304 Tree Pot Planting
- P-1305 Rodent Protection Cage for Trees
- P-1306 Rodent Protection Cage for Shrubs
- P-1307 Water Harvesting Basin
- P-1308 Preservation Fencing – Type 1 – Orange Mesh
- P-1309 Preservation Fencing – Type 2 – Orange Pennant (String with Flagging)

Pima County Natural Resources, Parks, and Recreation Department  
**Index - Standard Details for Park Development**

Signs and Pavement Markings:

- P-1400 Multi-Use Path Sign Location Detail
- P-1401 Sign Mounted on Barricade Railing
- P-1402 Pavement Striping at Bollard in Multi-Use Path
- P-1403 Multi-Use Path Striping Details

Erosion Control and Retaining Walls:

- P-1500 Rip-Rap Bank Protection
- P-1501 Gravity Retaining Wall
- P-1502 Aggregate Paving with Reinforcement Grid

Park Buildings - Maintenance:

- P-2000 Maintenance Yard
- P-2001 Maintenance Building

Park Buildings – Restrooms:

- P-2100 Restroom Building – Type 1
- P-2101 Restroom Building – Type 2
- P-2102 Restroom Building – Type 3
- P-2103 Restroom Building – Type 4 (with Snack Bar)
- P-2104 Restroom Building – Type 5 (with Maintenance Shop)
- P-2105 Restroom Building – Type 6
- P-2106 Restroom Building – Type 7

Park Buildings – Ramadas:

- P-2200 Ramada – Type 1 (16' x 16')
- P-2201 Ramada – Type 2 (20' x 24')
- P-2202 Ramada – Type 3 (20' x 34')

Park Buildings – Shade Canopies:

- P-2300 Typical Shade Canopy above Play Equipment
- P-2301 Typical Shade canopy above Bleachers
- P-2302 Tensioned Fabric Shade Structure above Play Equipment

Pima County Natural Resources, Parks and Recreation Department  
**Index - Standard Details for Park Development**

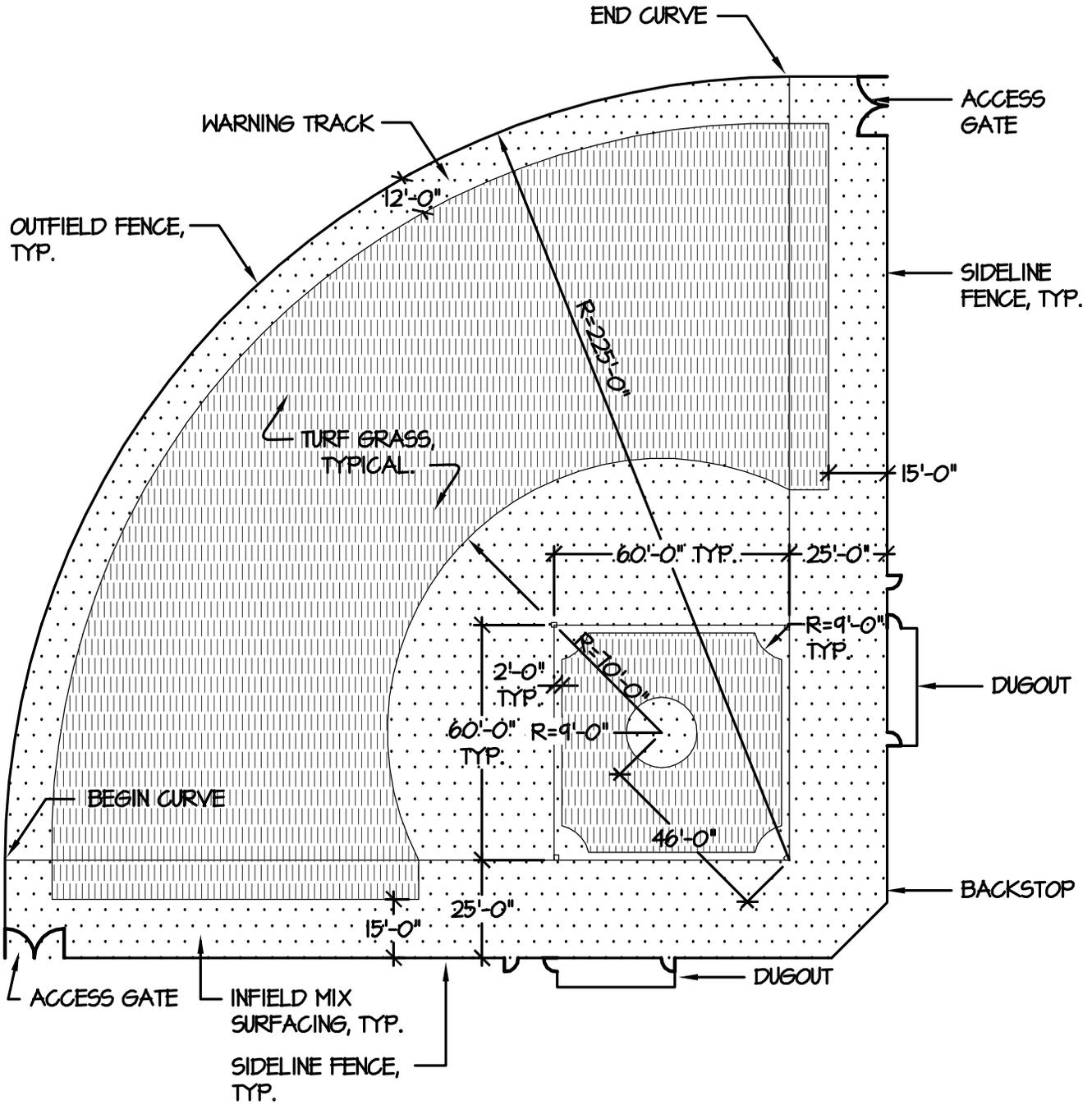
Stormwater Pollution Prevention:

- P-2400 Sediment Log
- P-2401 Sediment Log on Slope
- P-2402 Sediment Log at Drainage Inlet
- P-2403 Straw Bale
- P-2404 Silt Fence (with Wire Fence Backing)
- P-2405 Construction Entrance / Exit Gravel Pad

Electrical:

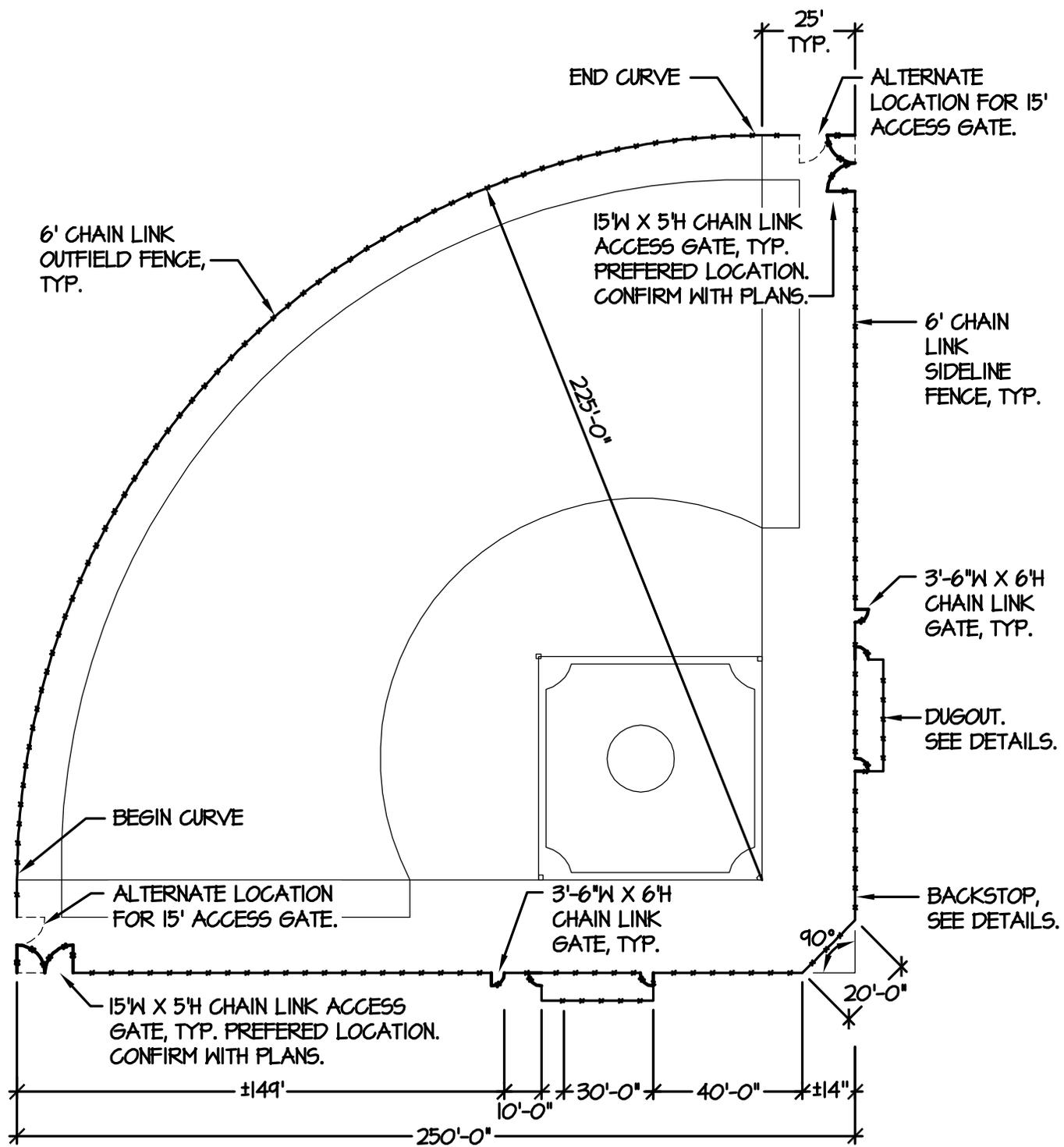
- P-3000 Underground Pull-Box
- P-3001 Conduit in Trench
- P-3002 Underground Pull-Box and Pole / Luminaire
- P-3003 Transformer Enclosure
- P-3004 Control Cabinet Vent
- P-3005 Receptacle Pedestal
- P-3006 Cabinet Locking Bar
- P-3007 Field Lighting Control Switch
- P-3008 Court Lighting Control Panel
- P-3009 Court Lighting Control Switch
- P-3010 Court Lighting – Sequence of Control

**NOTE:** DELETE WARNING TRACK WHERE OUTFIELD IS ALSO USED AS PART OF OTHER ATHLETIC FIELD OR RECREATIONAL PLAYFIELD.



SCALE: N.T.S.

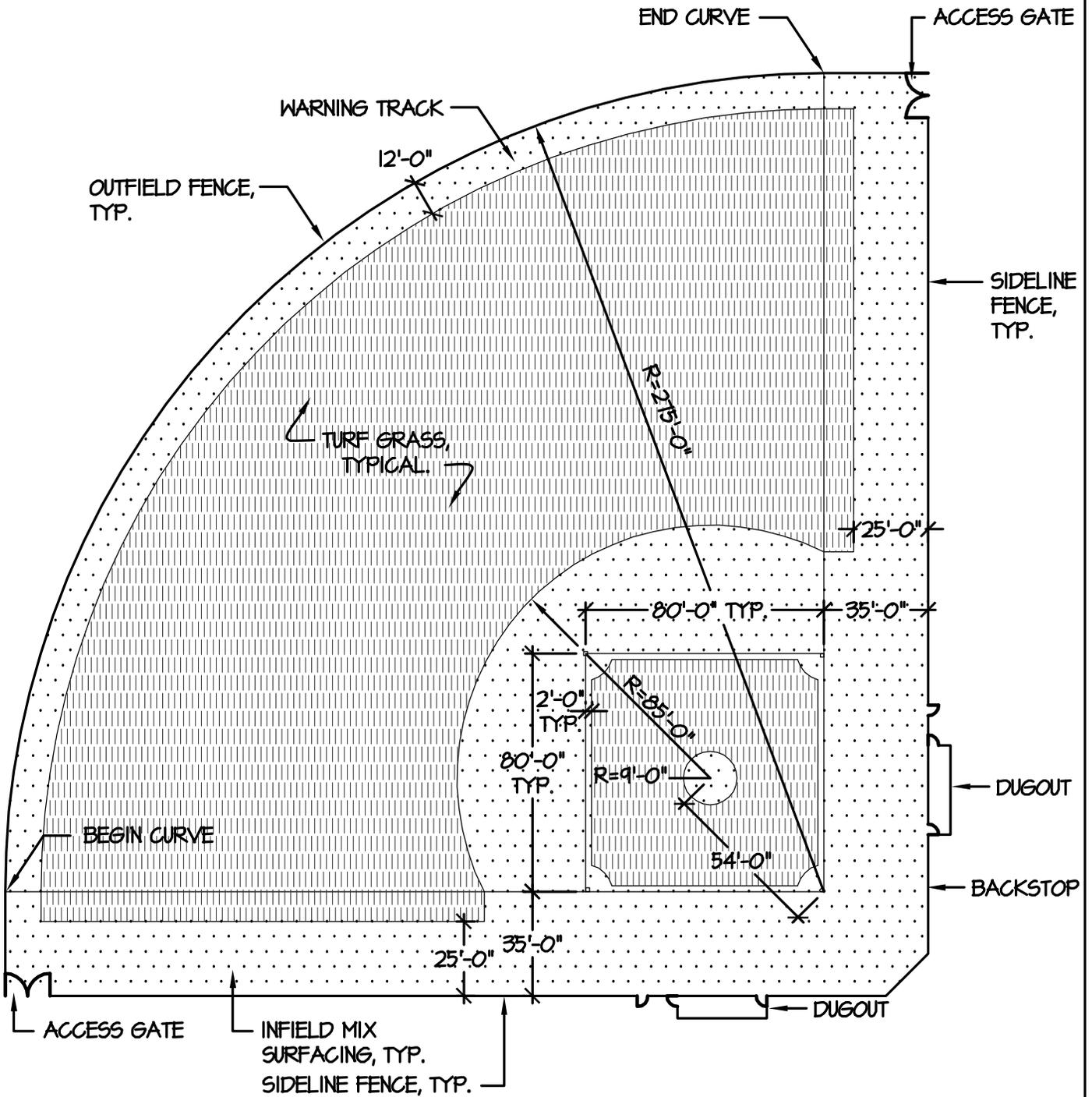
ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL FIELD & COURT LAYOUTS:	DETAIL NO.  <b>P-001</b>
REVISED:		LITTLE LEAGUE BASEBALL FIELD LAYOUT	SHEET 1 OF 1



SCALE: N.T.S.

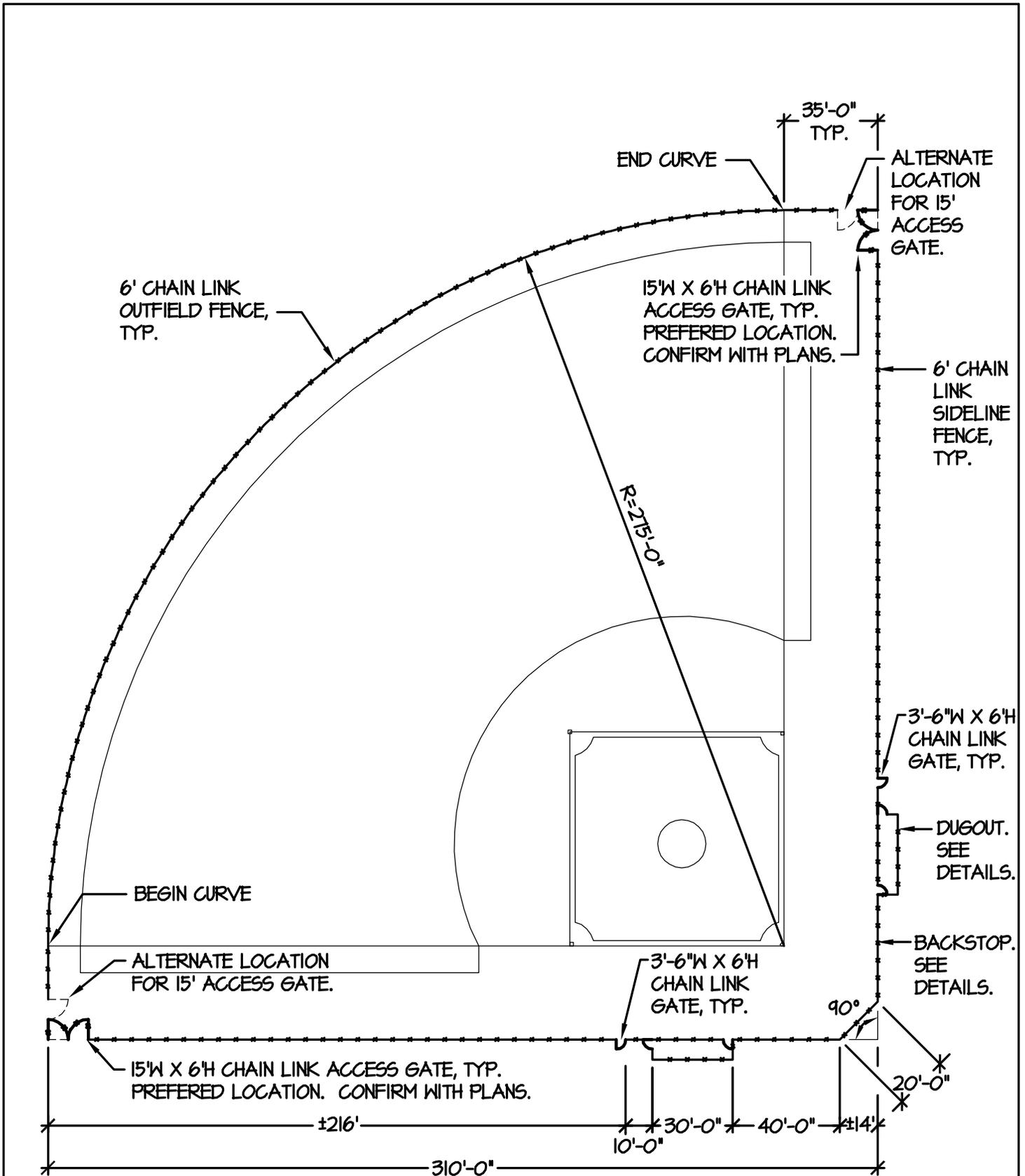
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-002</b>
REVISED:		LITTLE LEAGUE BASEBALL FIELD FENCE LAYOUT	
			SHEET 1 OF 1

**NOTE:** DELETE WARNING TRACK WHERE OUTFIELD IS ALSO USED AS PART OF OTHER ATHLETIC FIELD OR RECREATIONAL PLAYFIELD.



SCALE: N.T.S.

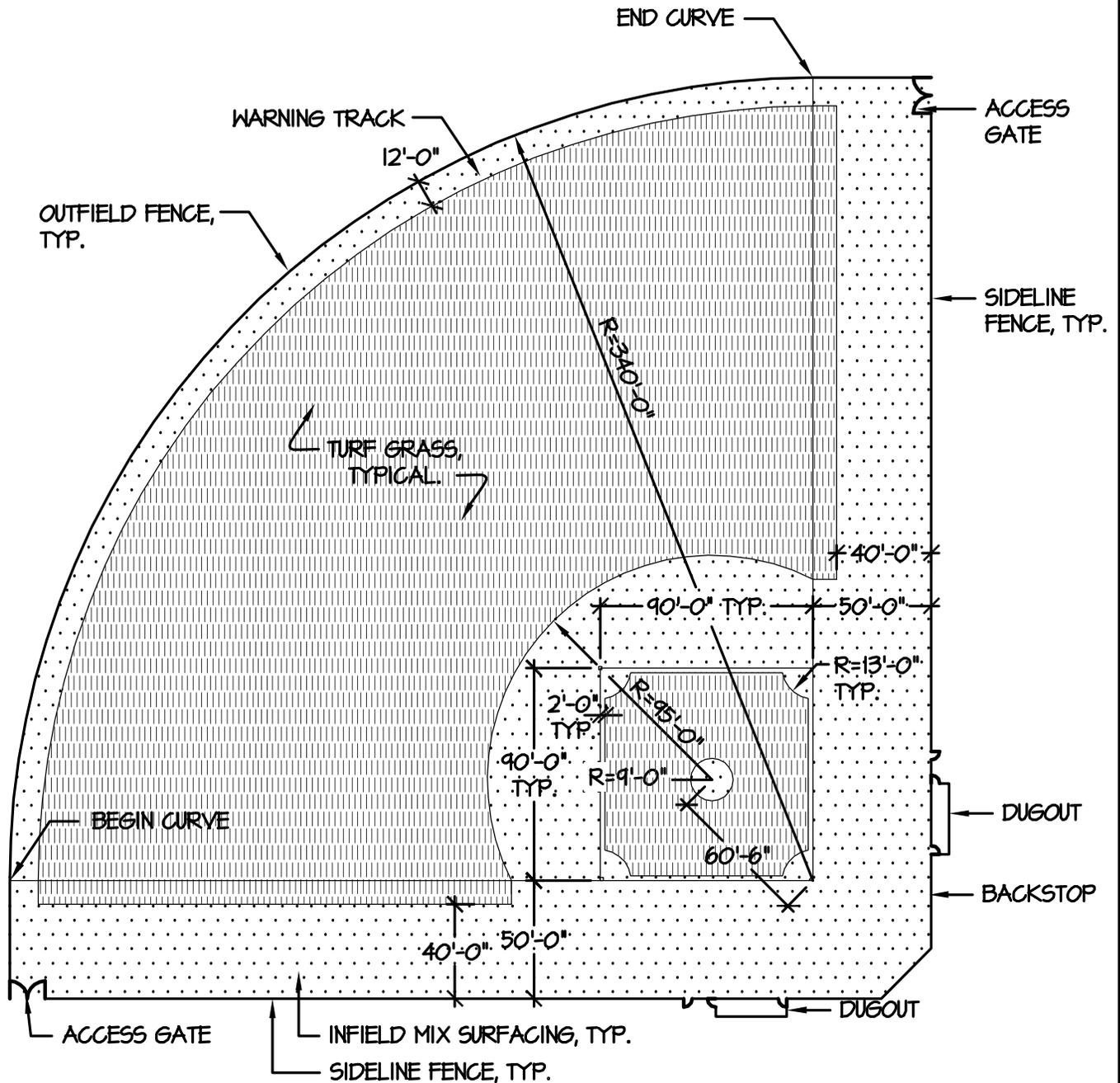
ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL FIELD & COURT LAYOUTS:	DETAIL NO.
REVISED:		PONY LEAGUE BASEBALL FIELD LAYOUT	<b>P-003</b>
		SHEET 1 OF 1	



SCALE: N.T.S.

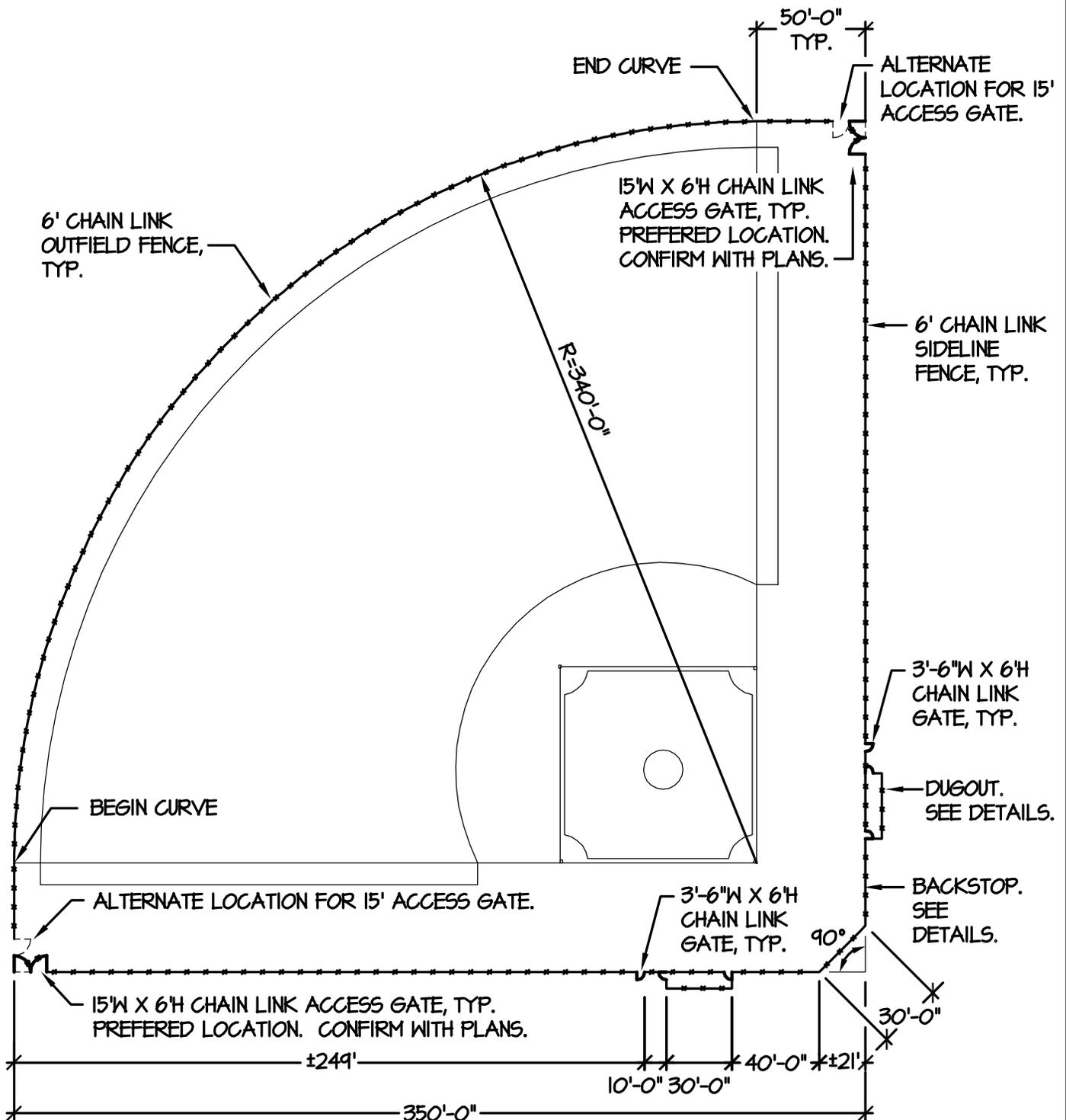
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-004
REVISED:		PONY LEAGUE BASEBALL FIELD	
		NATURAL RESOURCES PARKS • RECREATION	FENCE LAYOUT

**NOTE:** DELETE WARNING TRACK WHERE OUTFIELD IS ALSO USED AS PART OF OTHER ATHLETIC FIELD OR RECREATIONAL PLAYFIELD.



SCALE: N.T.S.

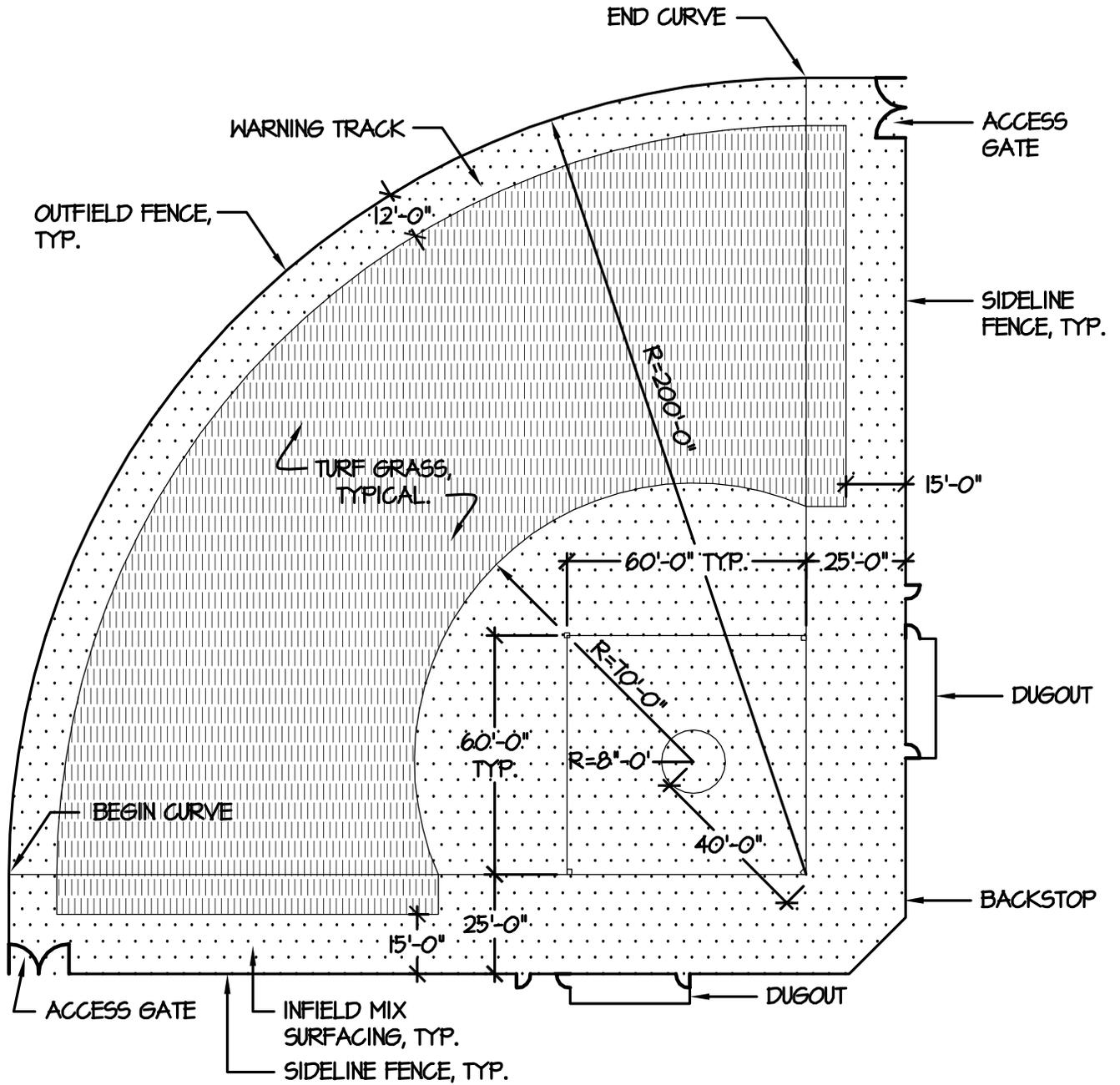
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-005
REVISED:		FULL-SIZE BASEBALL FIELD LAYOUT	



SCALE: N.T.S.

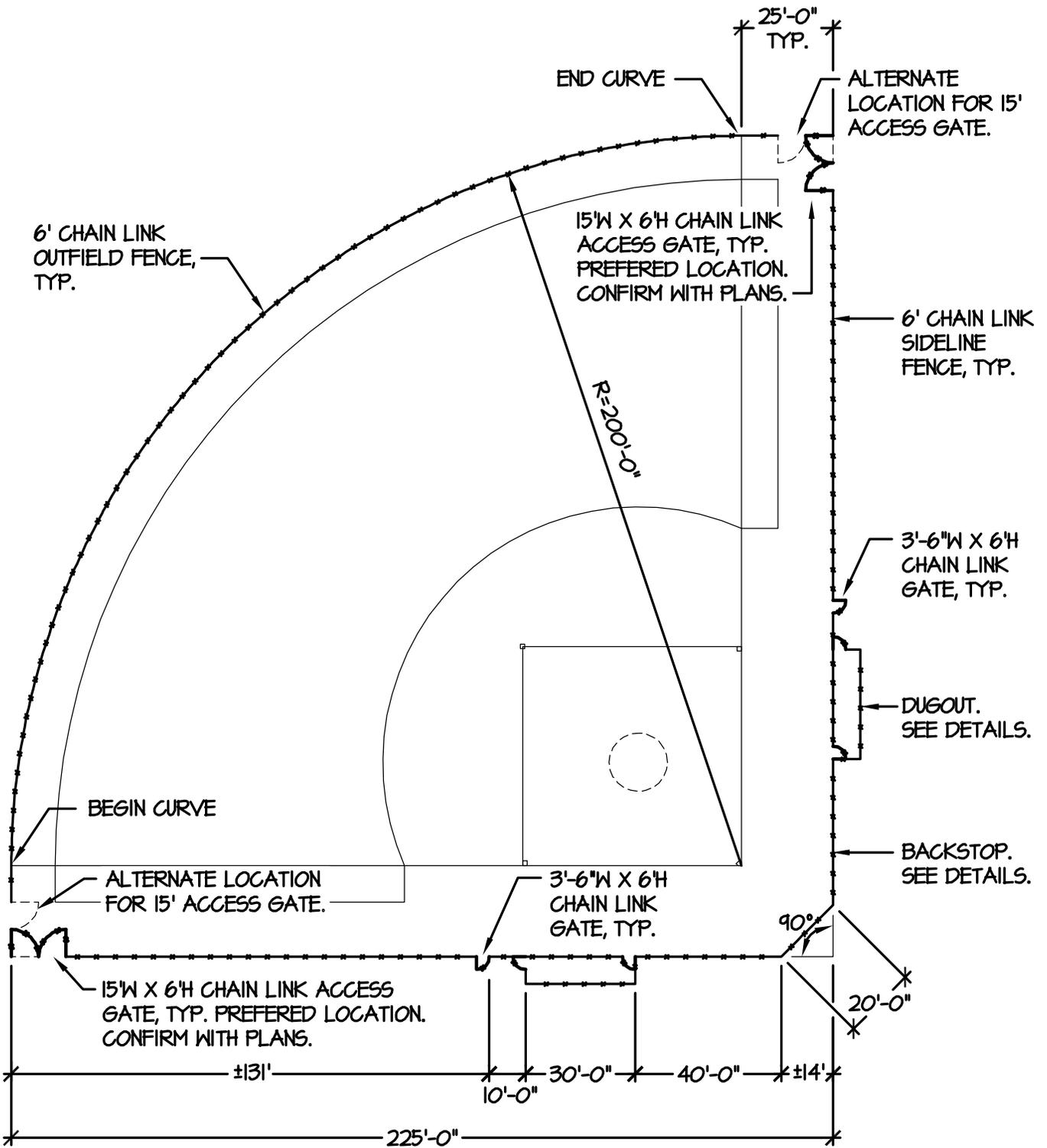
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-006
REVISED:		FULL-SIZE BASEBALL FIELD FENCE LAYOUT	
			SHEET 1 OF 1

**NOTE:** DELETE WARNING TRACK WHERE OUTFIELD IS ALSO USED AS PART OF OTHER ATHLETIC FIELD OR RECREATIONAL PLAYFIELD.



SCALE: N.T.S.

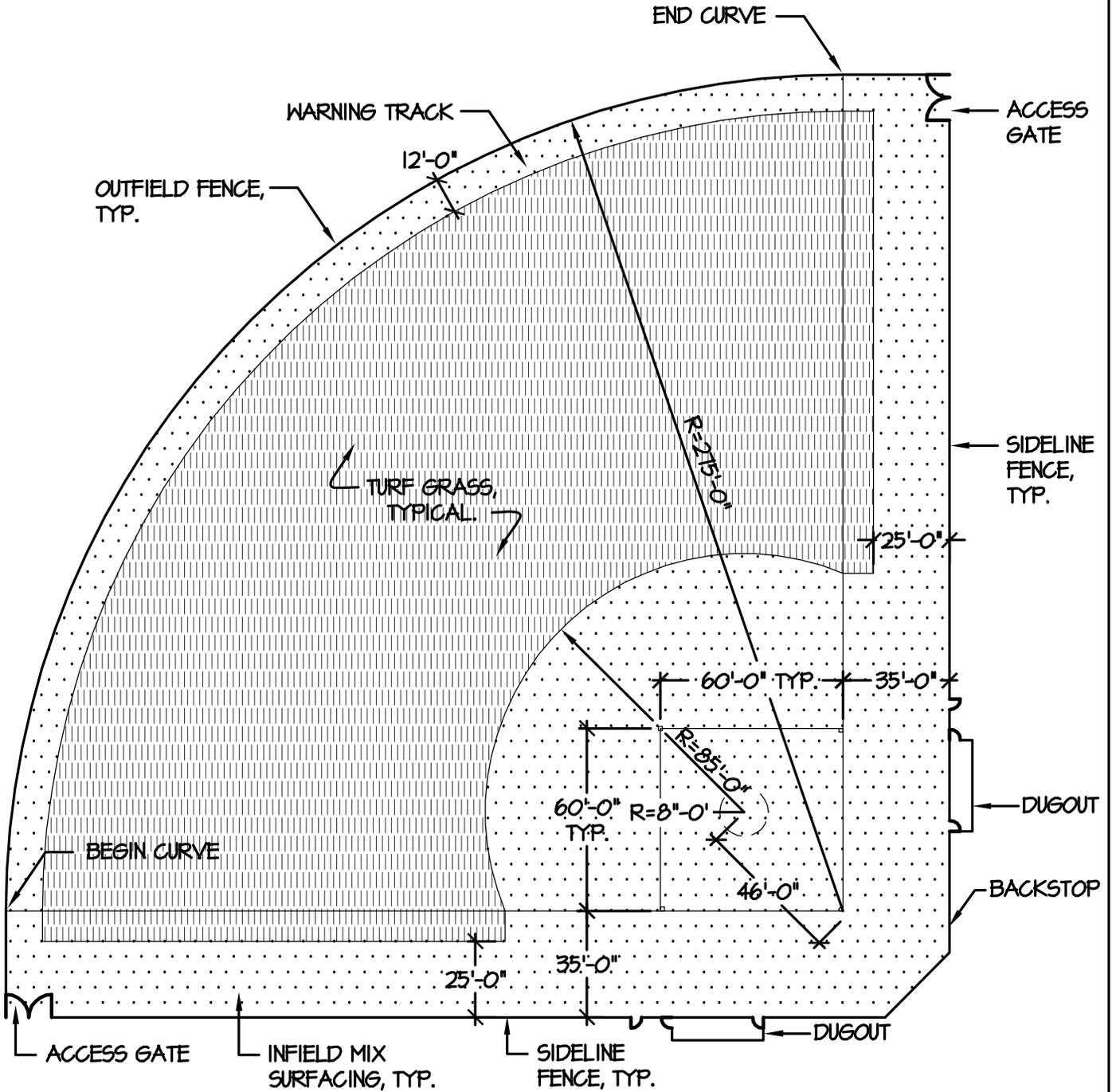
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-007
REVISED:		FAST-PITCH SOFTBALL FIELD LAYOUT	
			SHEET 1 OF 1



SCALE: N.T.S.

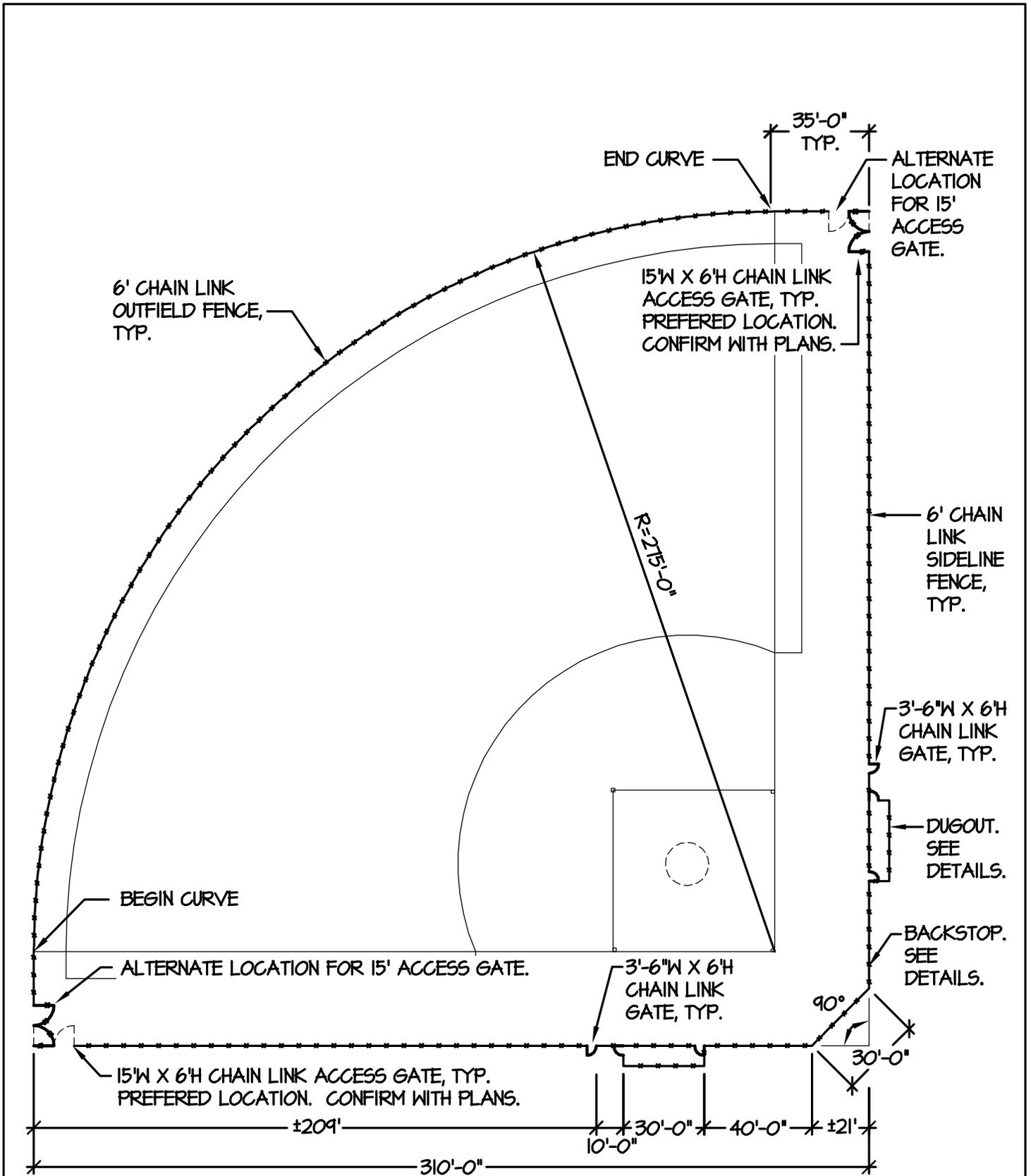
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-008</b>
REVISED:		FAST-PITCH SOFTBALL FIELD FENCE LAYOUT	
			SHEET 1 OF 1

**NOTE:** DELETE WARNING TRACK WHERE OUTFIELD IS ALSO USED AS PART OF OTHER ATHLETIC FIELD OR RECREATIONAL PLAYFIELD.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-009</b>
REVISED:		ADULT SLOW PITCH SOFTBALL FIELD LAYOUT	

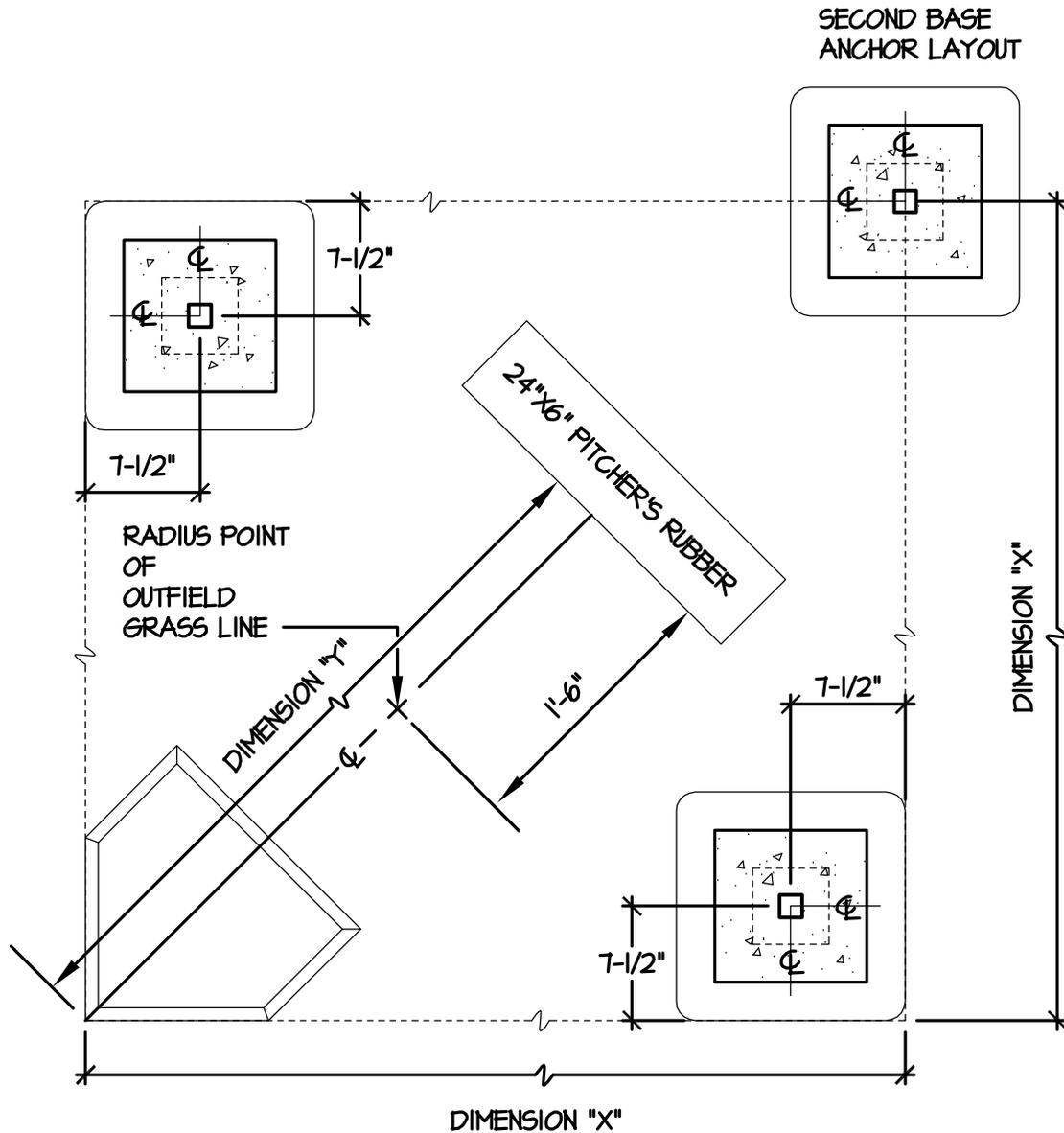


SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
REVISED:		FIELD & COURT LAYOUTS:	<b>P-010</b>
		ADULT SLOW PITCH SOFTBALL FIELD FENCE LAYOUT	

**FIELD LAYOUT DIMENSIONS**

	X	Y
LITTLE LEAGUE	60'-0"	46'-0"
PONY LEAGUE	80'-0"	54'-0"
BASEBALL	90'-0"	60'-6"
STD. SOFTBALL	60'-0"	40'-0"
ADULT REC. SOFTBALL	60'-0"	46'-0"



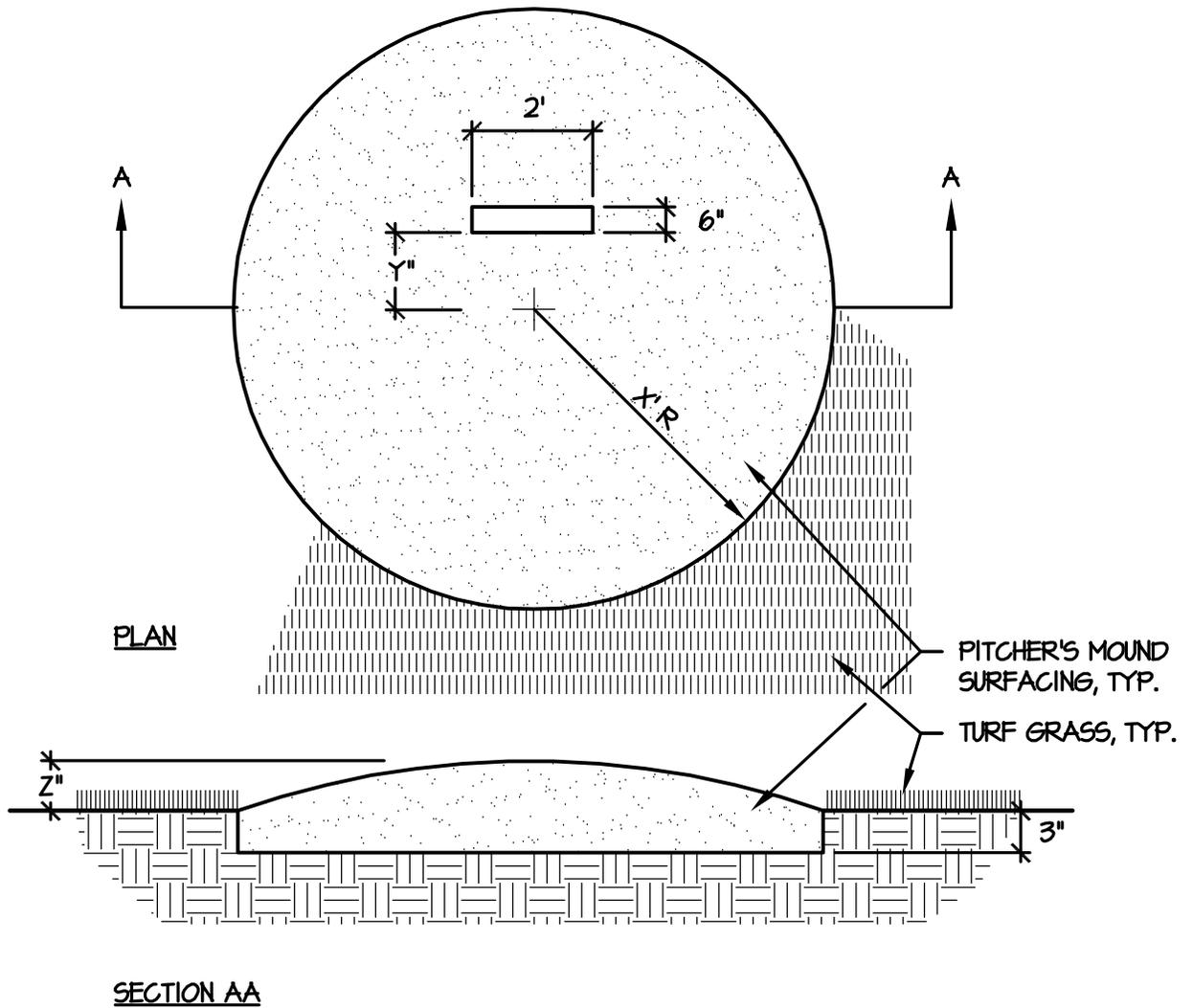
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-011
REVISED:		HOME PLATE, BASE, AND PITCHER'S RUBBER LAYOUT	

**PITCHER'S MOUND DIMENSIONS**

	X	Y	Z
LITTLE LEAGUE	5'-0"	1'-6"	0'-6"
PONY LEAGUE	9'-0"	1'-6"	0'-8"
BASEBALL	9'-0"	1'-6"	0'-10"

**NOTE:** Z DIMENSION IS ELEVATION ABOVE HOME PLATE.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-012</b>
REVISED:		PITCHER'S MOUND LAYOUT (BASEBALL)	

PERMANENT MARKER  
SEE BELOW

BEVELED EDGE  
OF HOME PLATE

INFIELD SOIL MIX

ATTACH SPIKES TO HOME PLATE AND  
SET IN CONCRETE BASE. TOP SURFACE  
OF HOME PLATE TO BE LEVEL AND AT  
ELEVATION SHOWN ON PLANS.

PLAN

CAST-IN-PLACE  
CONCRETE BASE

FINISHED GRADE

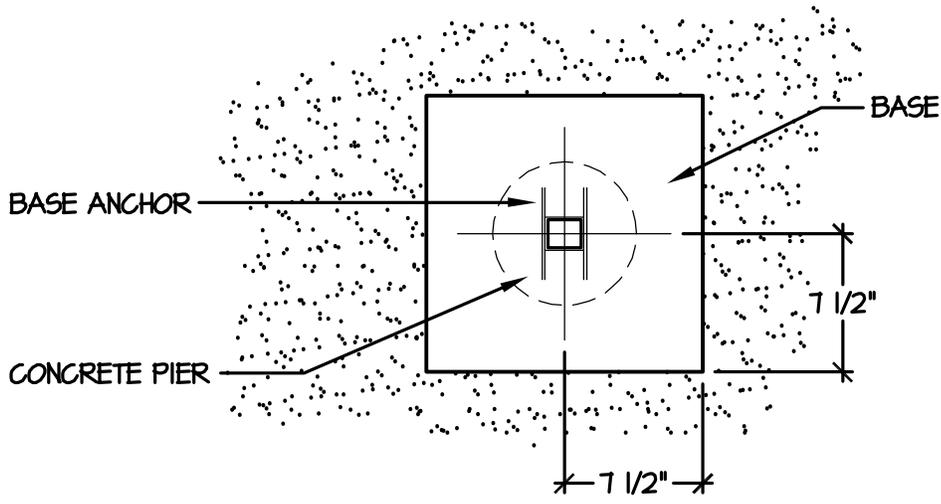
8" DIA. CONCRETE PIER,  
12" DEEP

1"  $\phi$  STEEL ROD AS PERMENANT  
MARKER FOR FIELD LAYOUT.

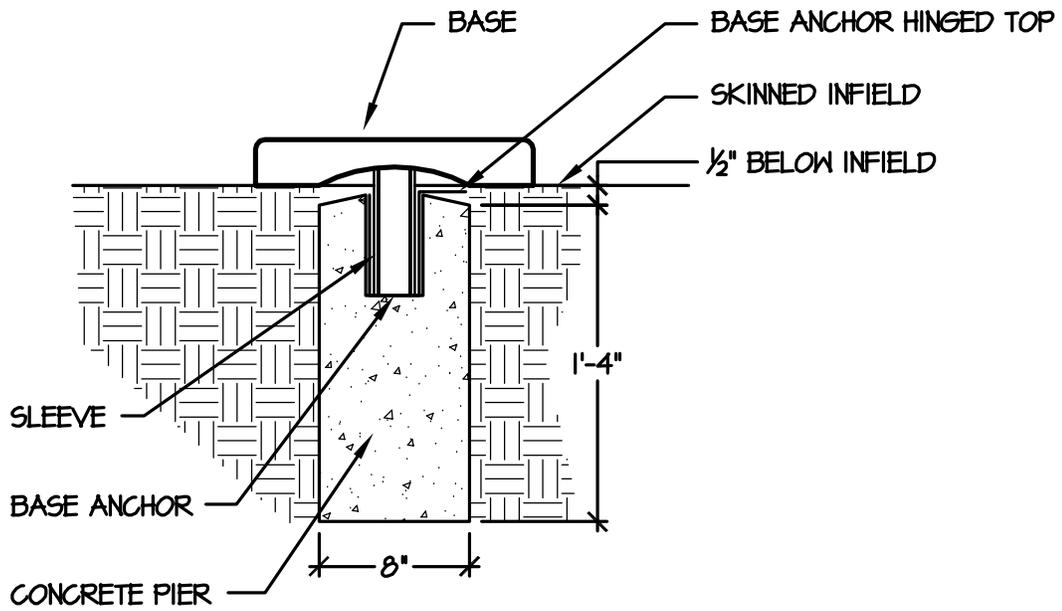
SECTION

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-013</b>
REVISED:		HOME PLATE (BASEBALL AND SOFTBALL)	



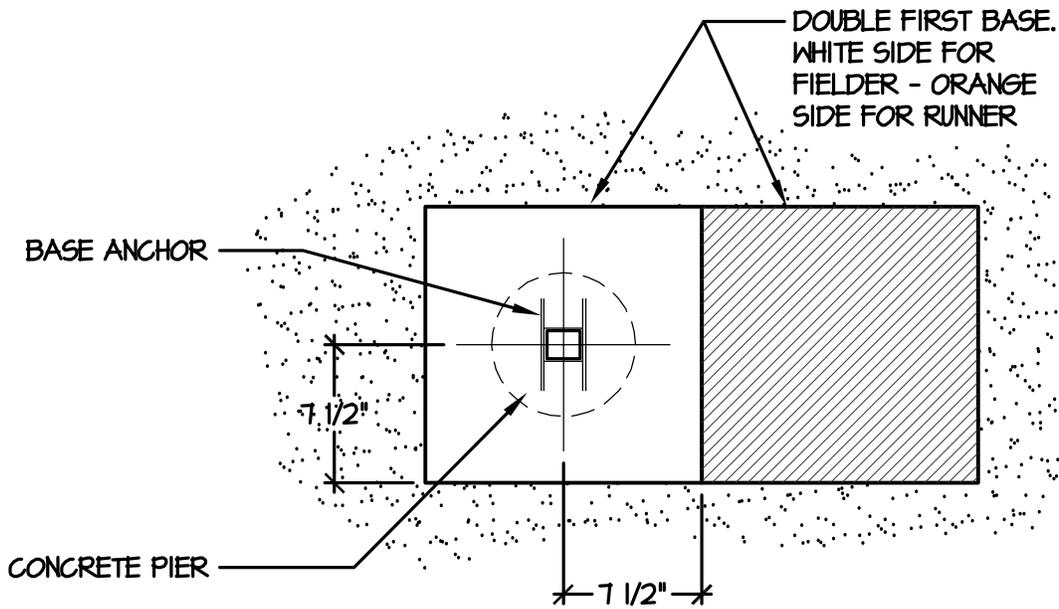
PLAN



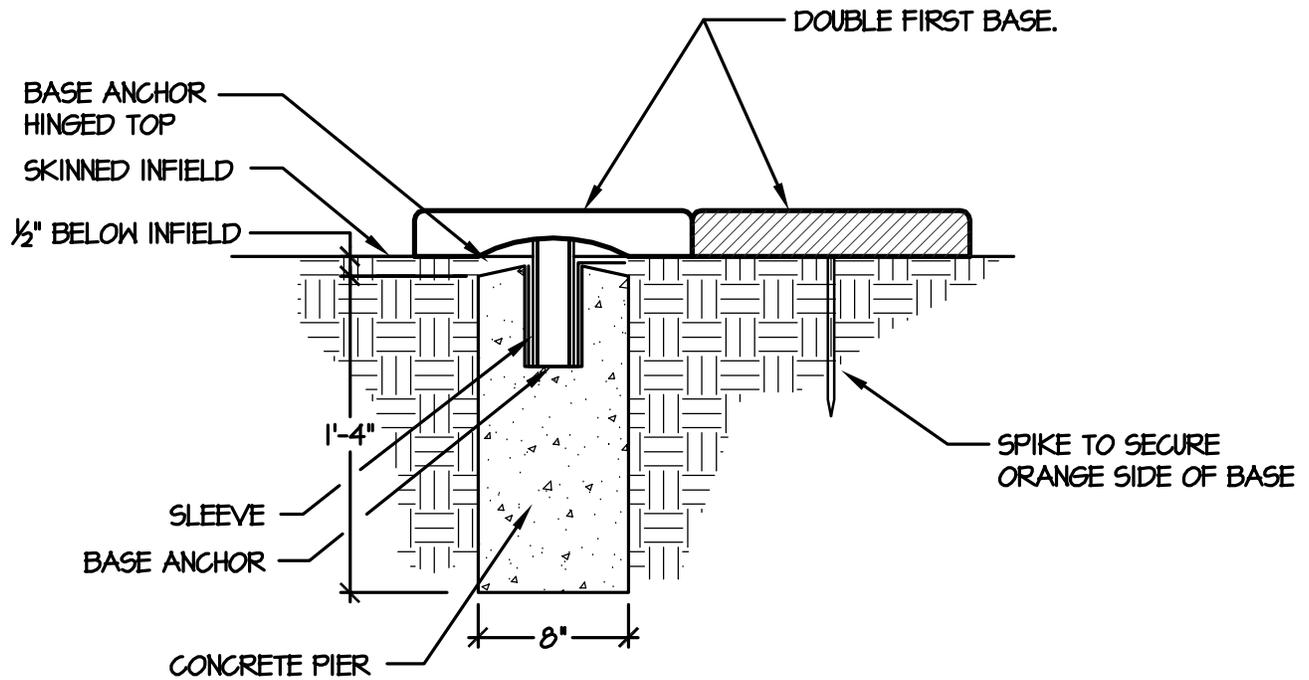
SECTION

SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-014
REVISED:		BASE ANCHOR (BASEBALL AND SOFTBALL)	



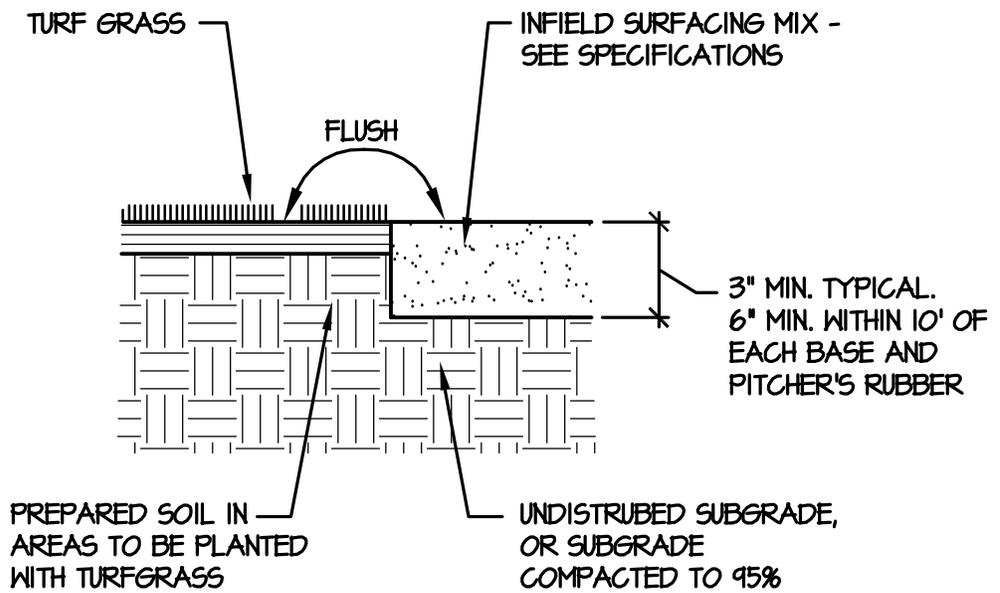
PLAN



SECTION

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-014A
REVISED:		DOUBLE FIRST BASE	

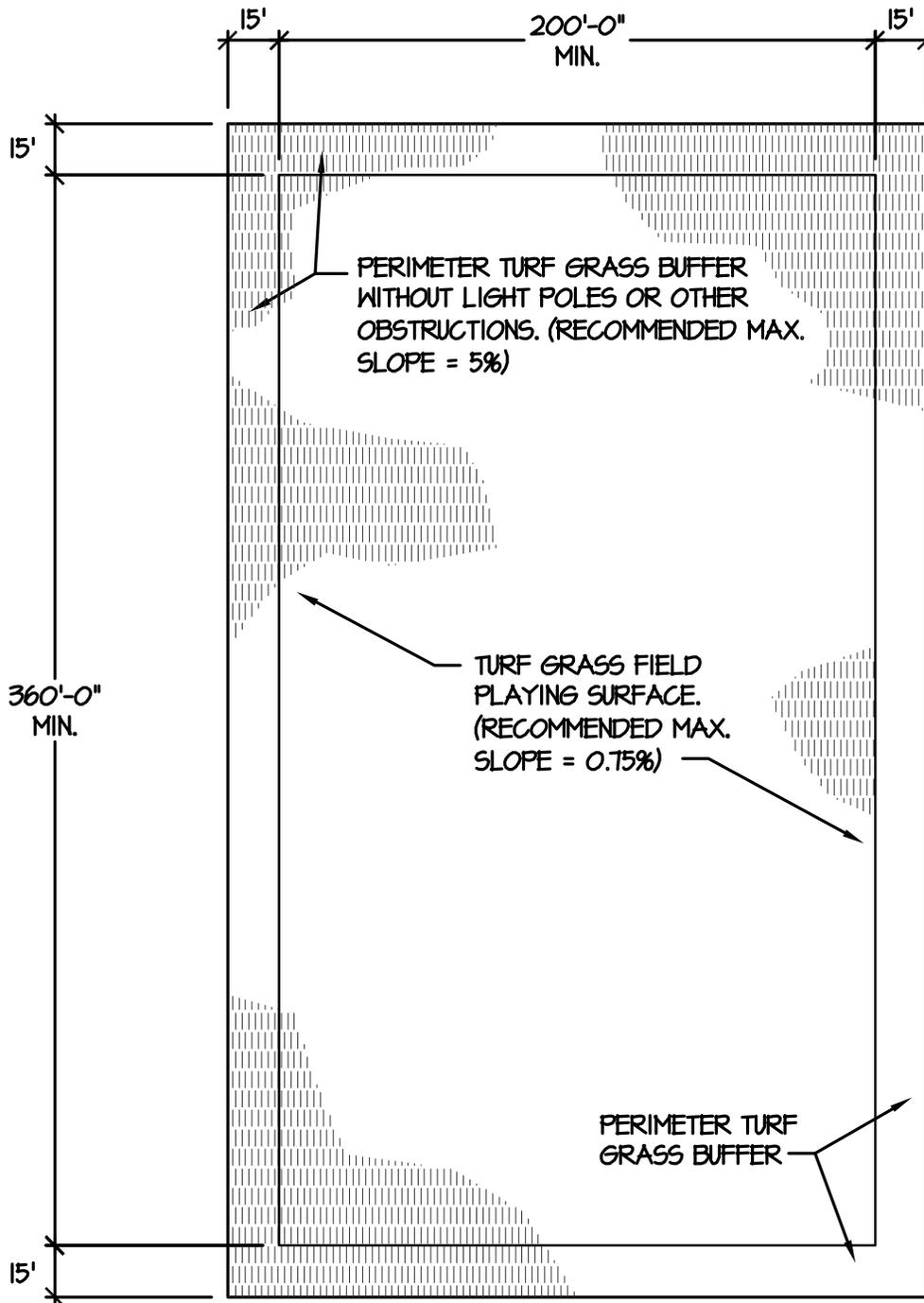


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.	
01/16		FIELD & COURT LAYOUTS:	<b>P-015</b>	
REVISED:		INFIELD / OUTFIELD - BASE PATH INTERFACE (BASEBALL AND SOFTBALL)		SHEET

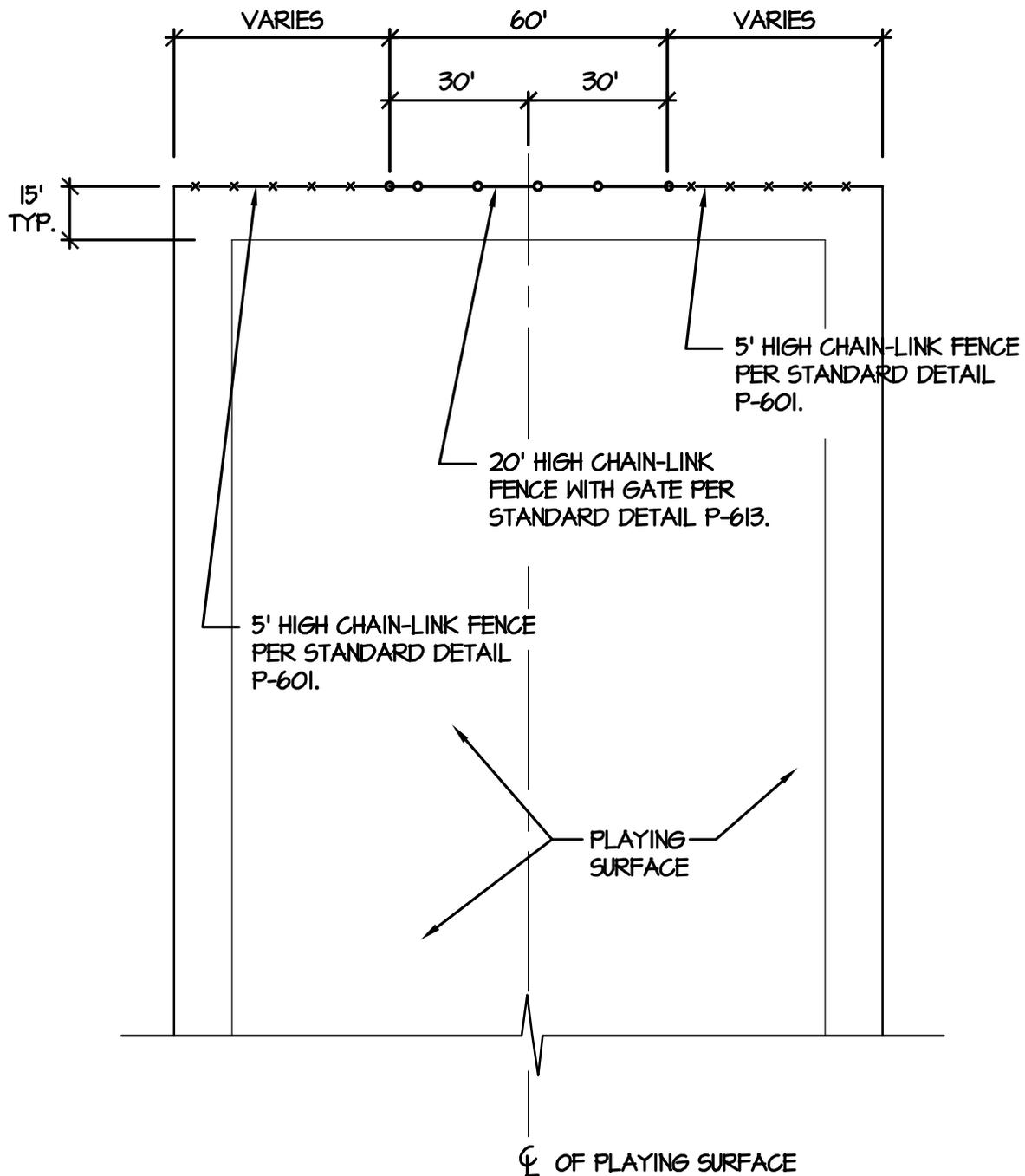
PLAYING SURFACE DIMENSIONS:

	LENGTH	WIDTH
SOCCER	VARIES - 330' TO 360'	VARIES - 200' TO 240'
LACROSSE	330'	180'
FOOTBALL	360'	160'
MULTI-SPORT	360'	200'



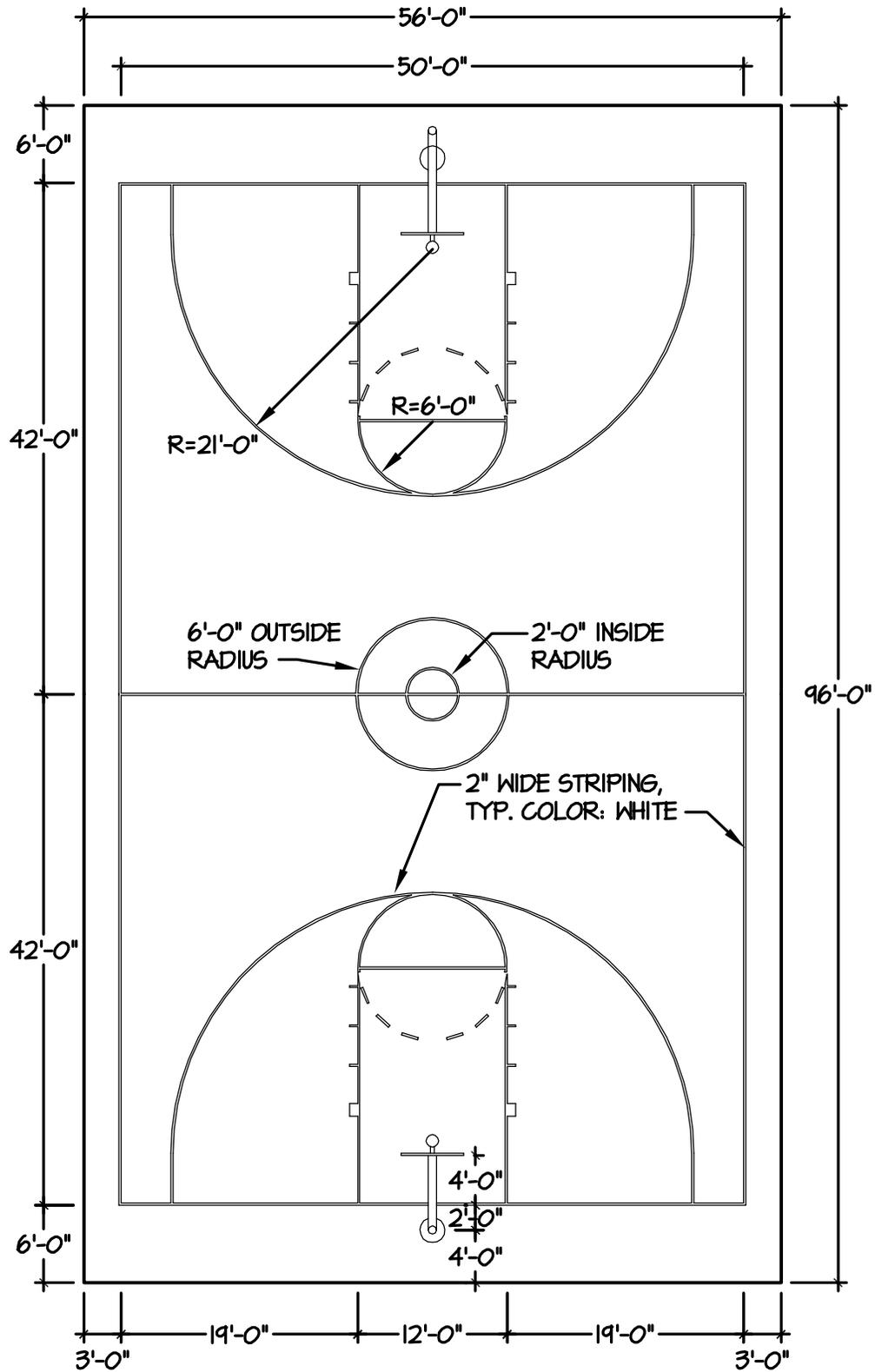
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ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-016
REVISED:		MULTI-SPORT FIELD TYPICAL LAYOUT	



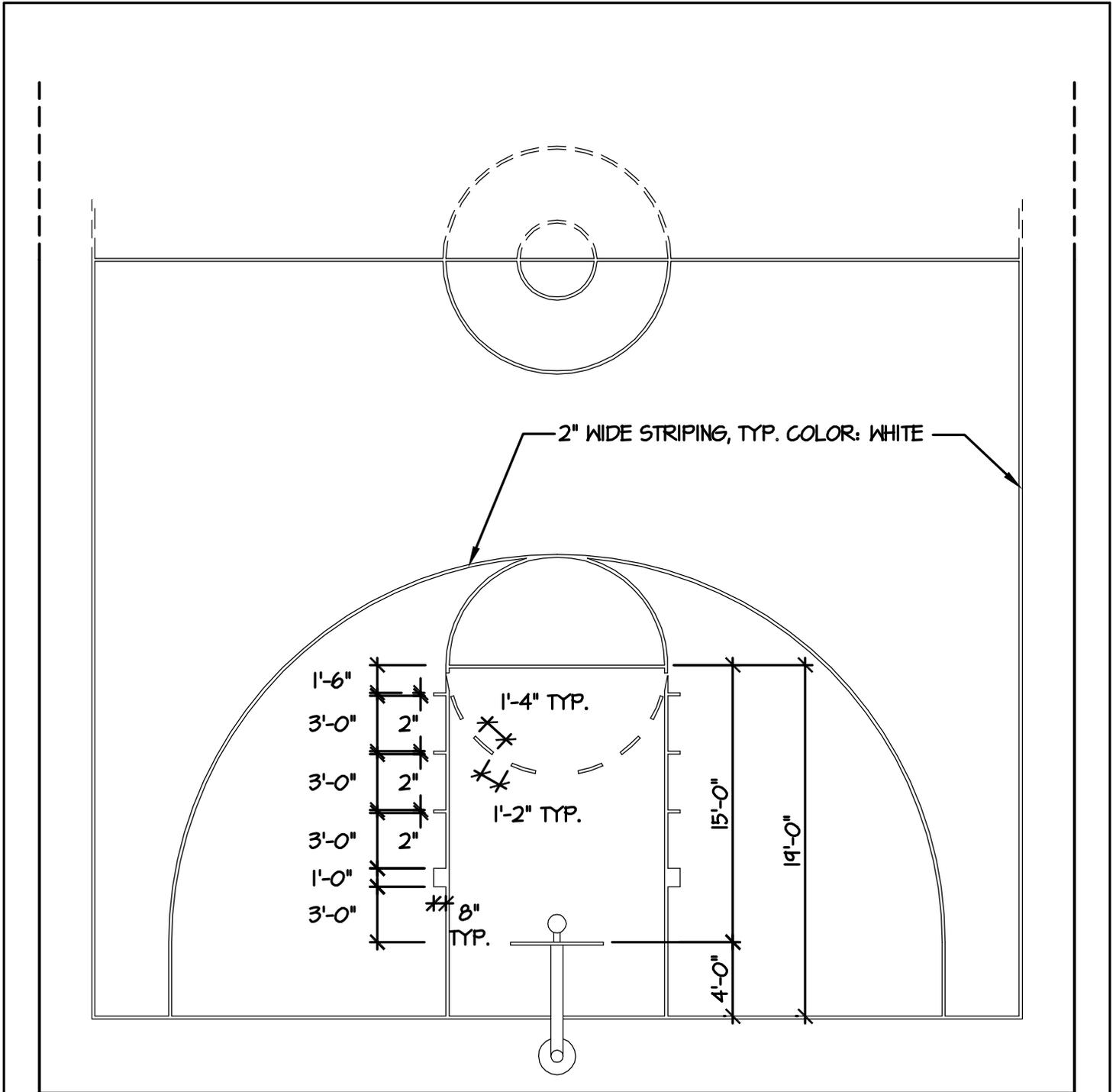
SCALE: N.T.S.

ISSUED: 01/16		STANDARD DETAIL FIELD & COURT LAYOUTS:	DETAIL NO.
REVISED:		MULTI-SPORT FIELD END LINE FENCE LAYOUT	<b>P-017</b>
		SHEET 1 OF 1	



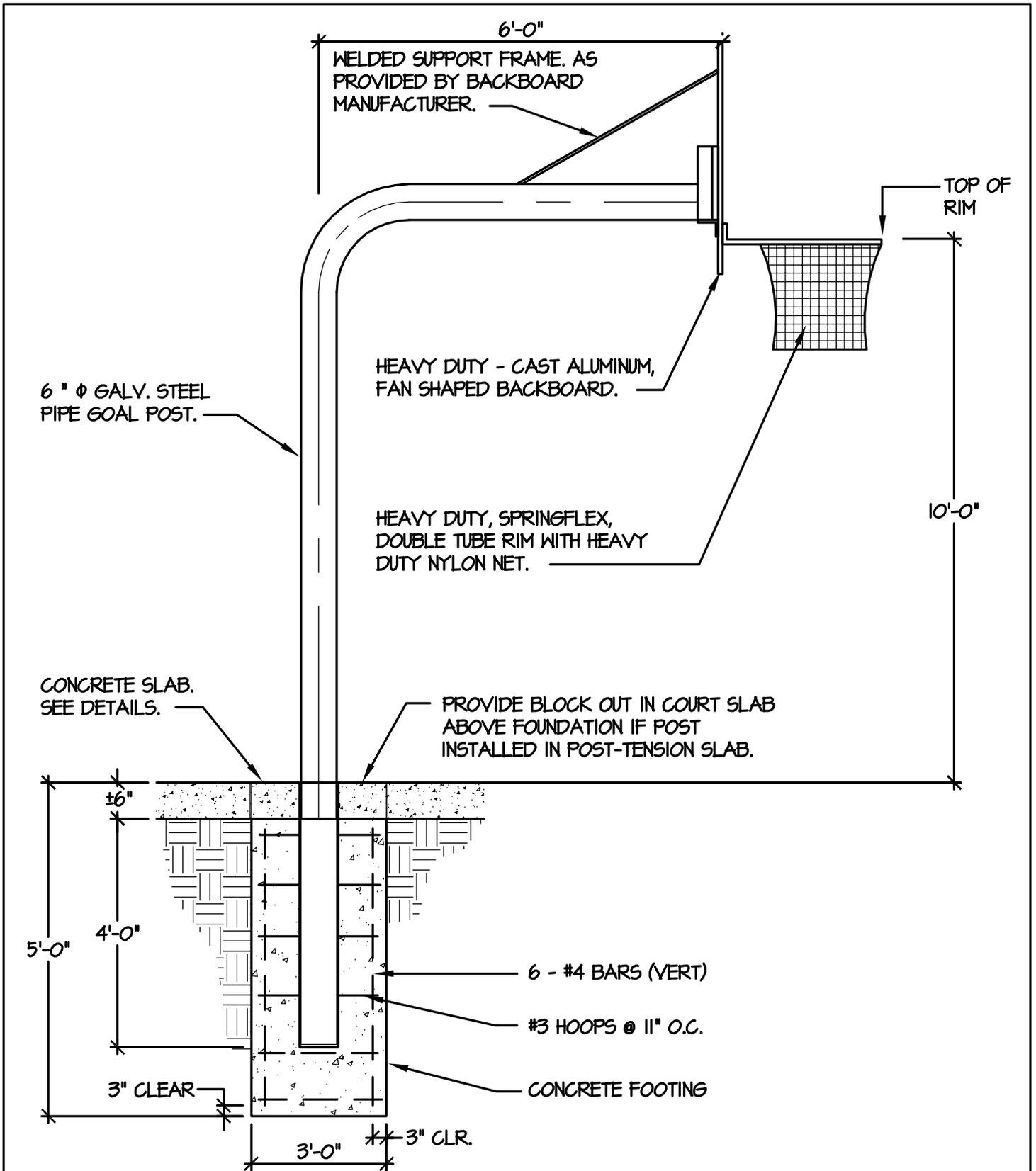
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-020
REVISED:		BASKETBALL COURT LAYOUT	



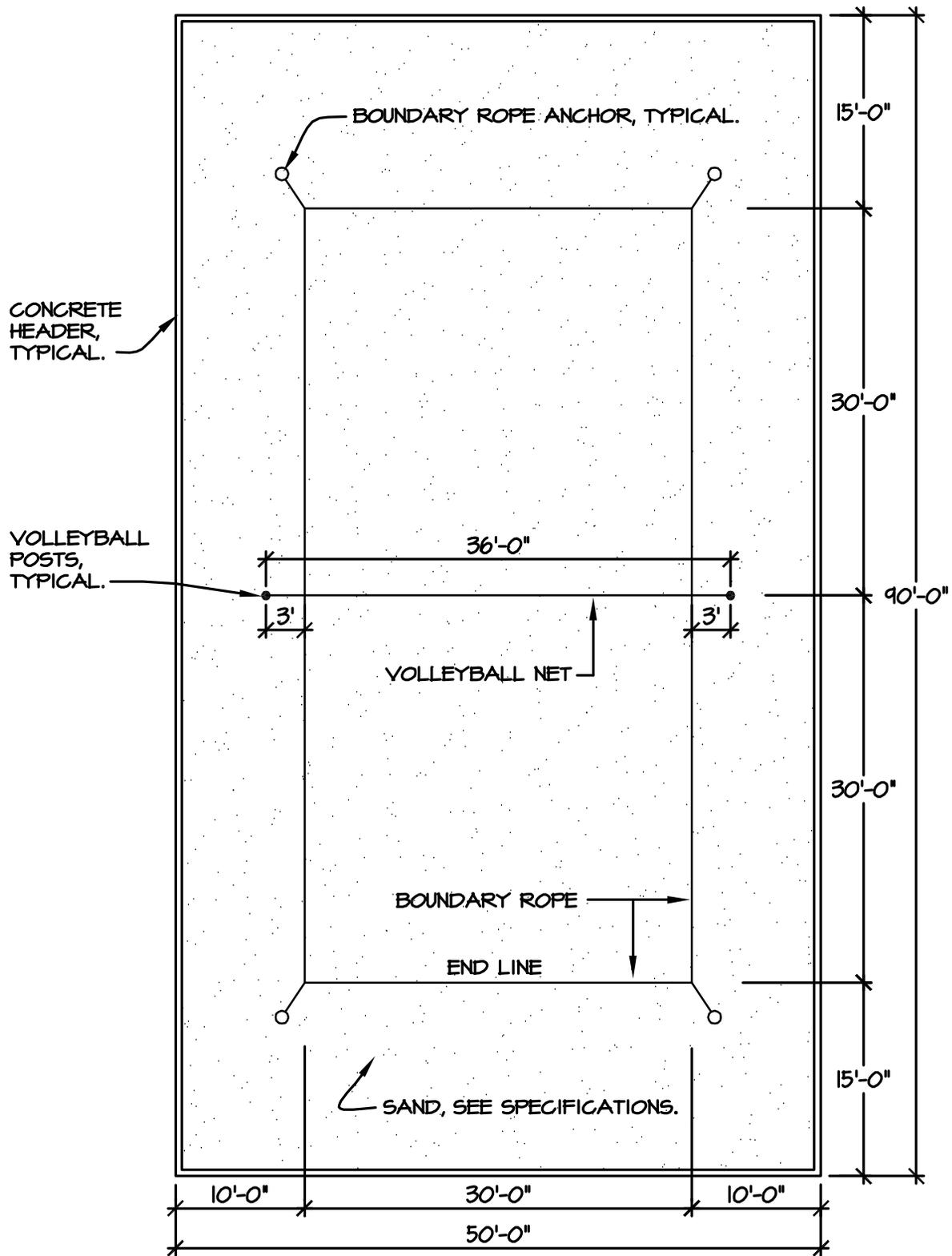
SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL FIELD & COURT LAYOUTS:	DETAIL NO.
REVISED:		BASKETBALL KEY STRIPING PLAN	<b>P-021</b>
			SHEET 1 OF 1



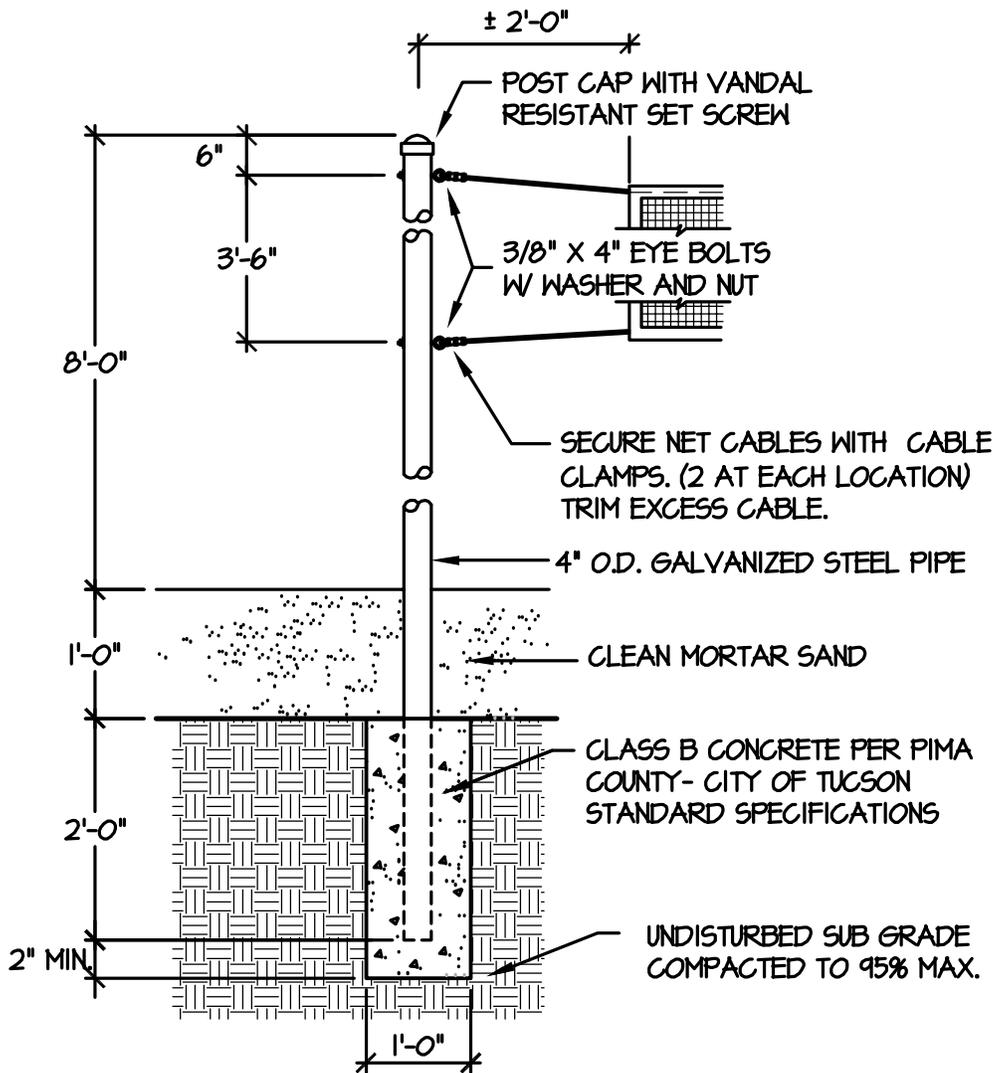
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	P-022
REVISED:		BASKETBALL POST, BACKBOARD & GOAL	
			SHEET 1 OF 1



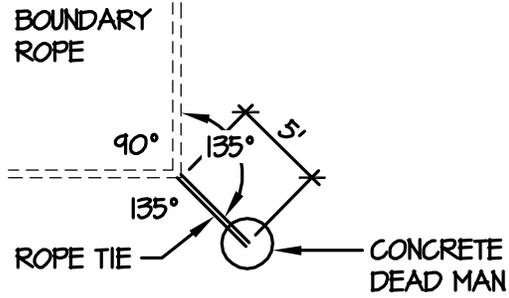
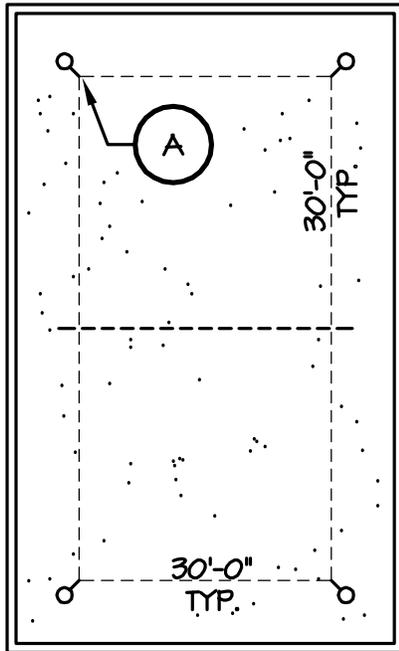
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-030</b>
REVISED:		SAND VOLLEYBALL COURT LAYOUT	

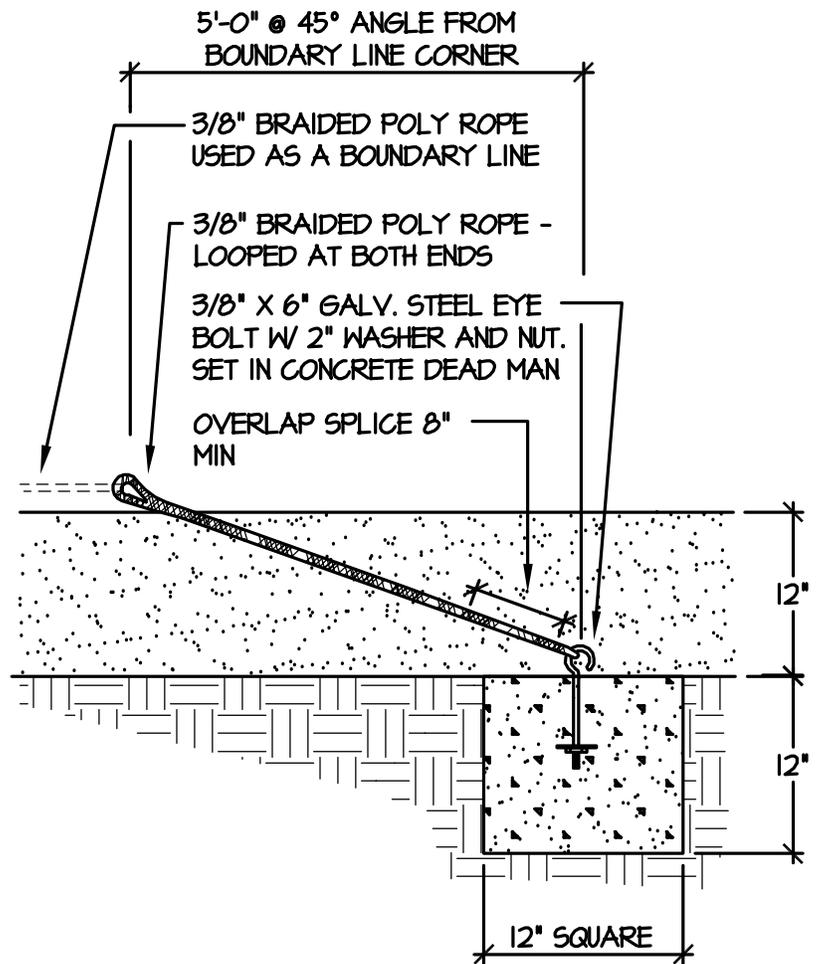


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-031</b>
REVISED:		SAND VOLLEYBALL NET POSTS	

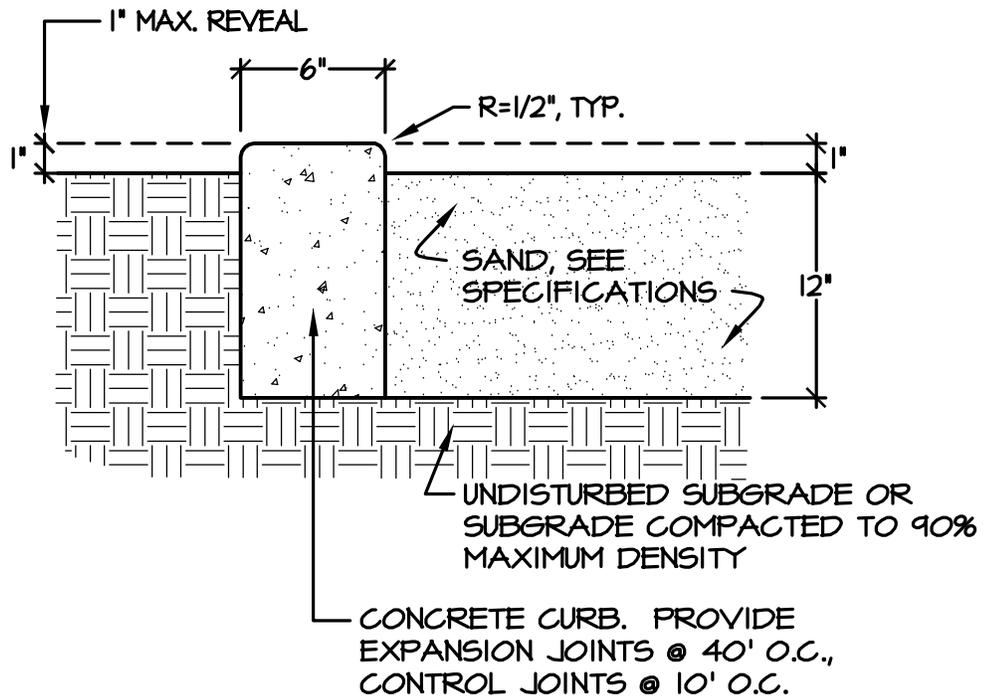


**A** ROPE CORNER FOOTING



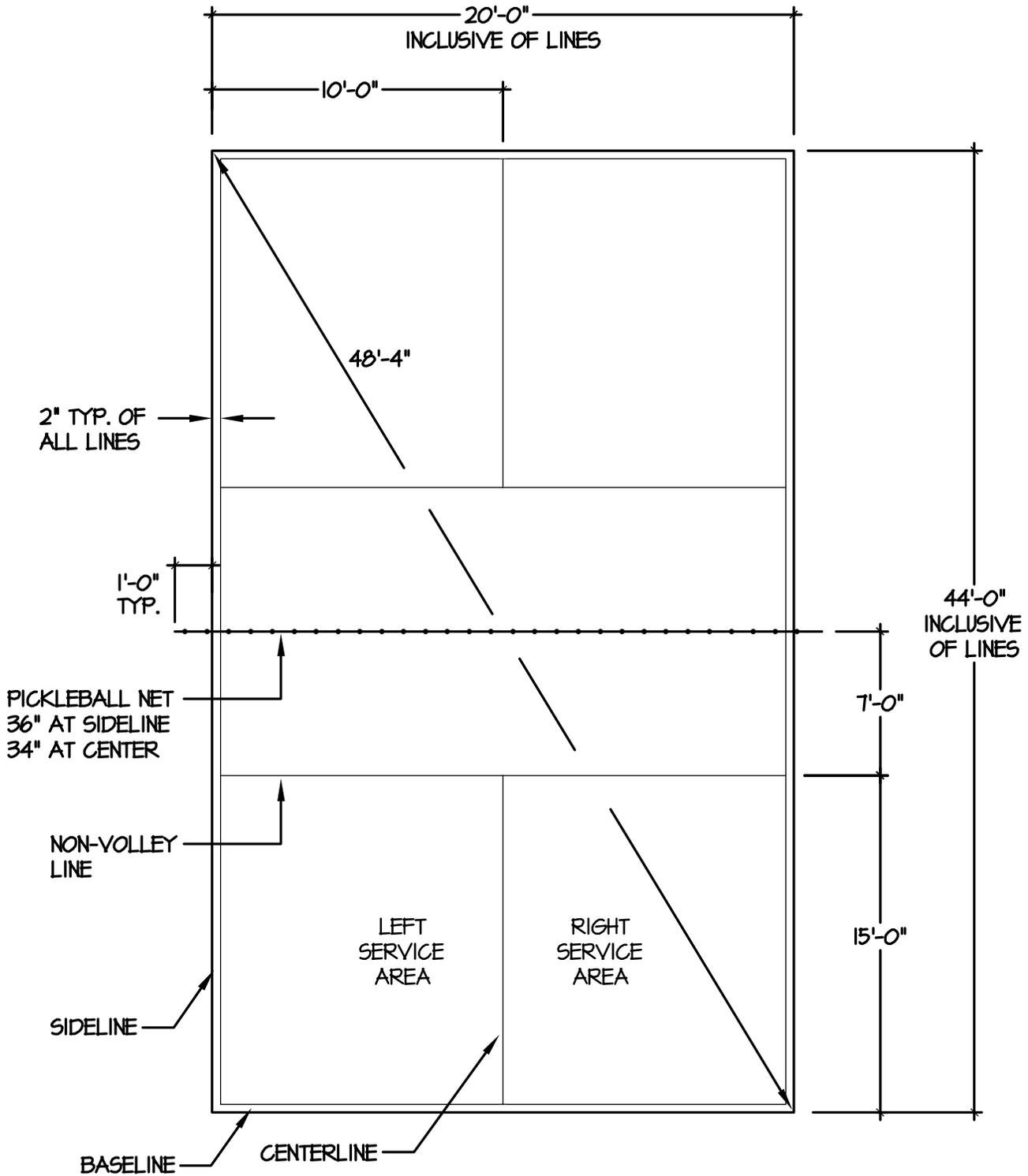
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-032</b>
REVISED:		SAND VOLLEYBALL BOUNDARY ROPE AND ANCHOR	
			SHEET 1 OF 1



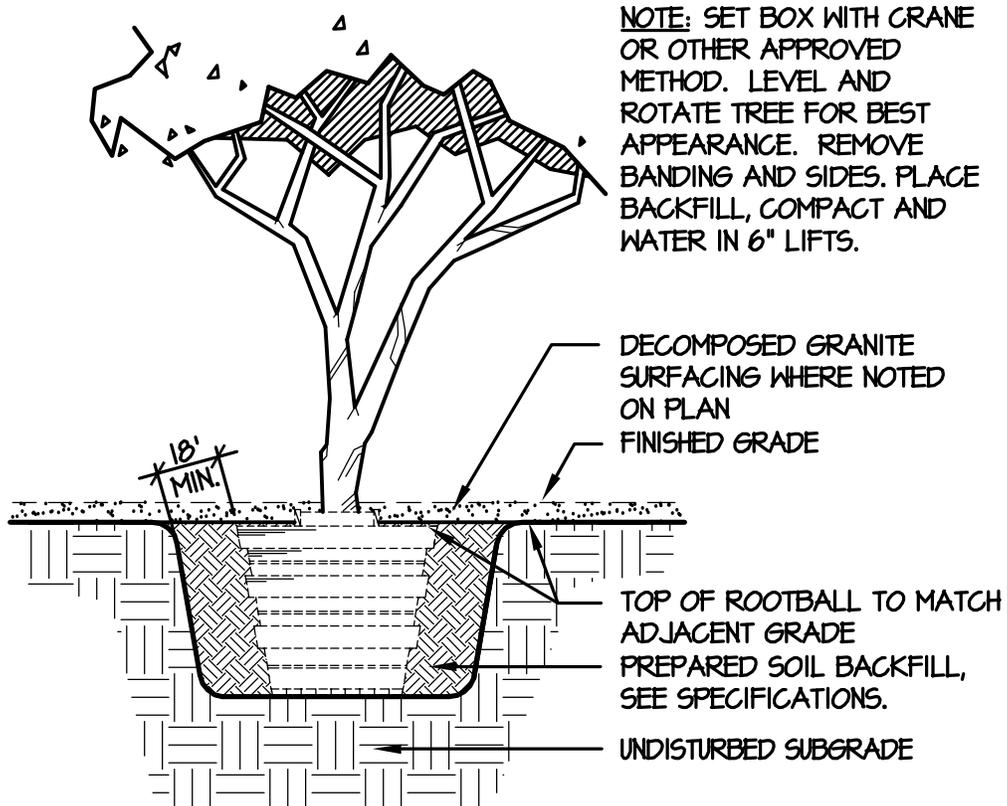
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-033</b>
REVISED:		SAND VOLLEY BALL COURT CONCRETE HEADER	



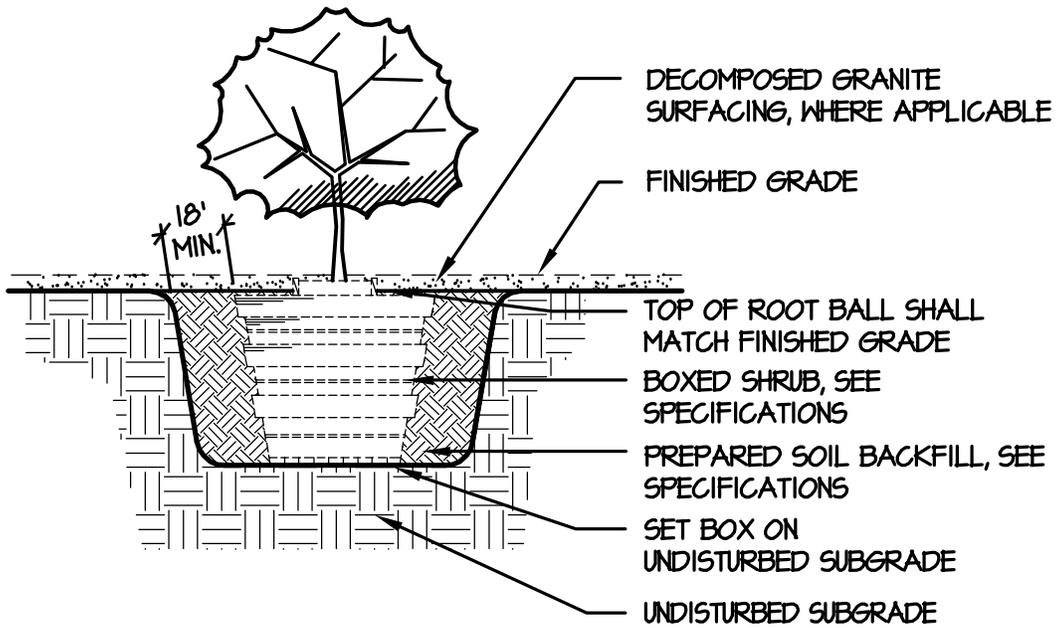
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-034</b>
REVISED:		PICKLEBALL COURT LAYOUT	
			SHEET 1 OF 1



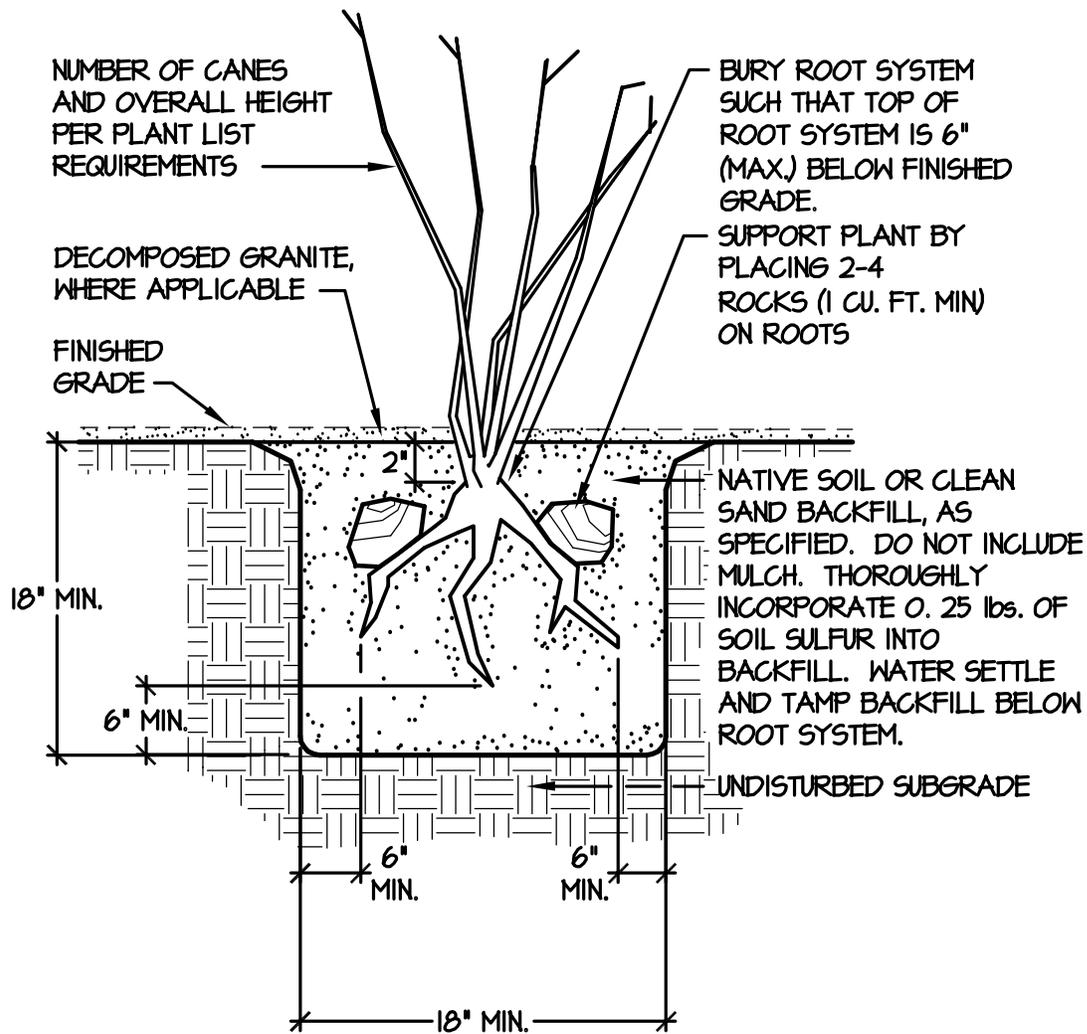
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-100
REVISED:		TREE PLANTING - BOXED SALVAGED SPECIMEN	



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-101
REVISED:		SHRUB PLANTING - BOXED SALVAGED SPECIMEN	

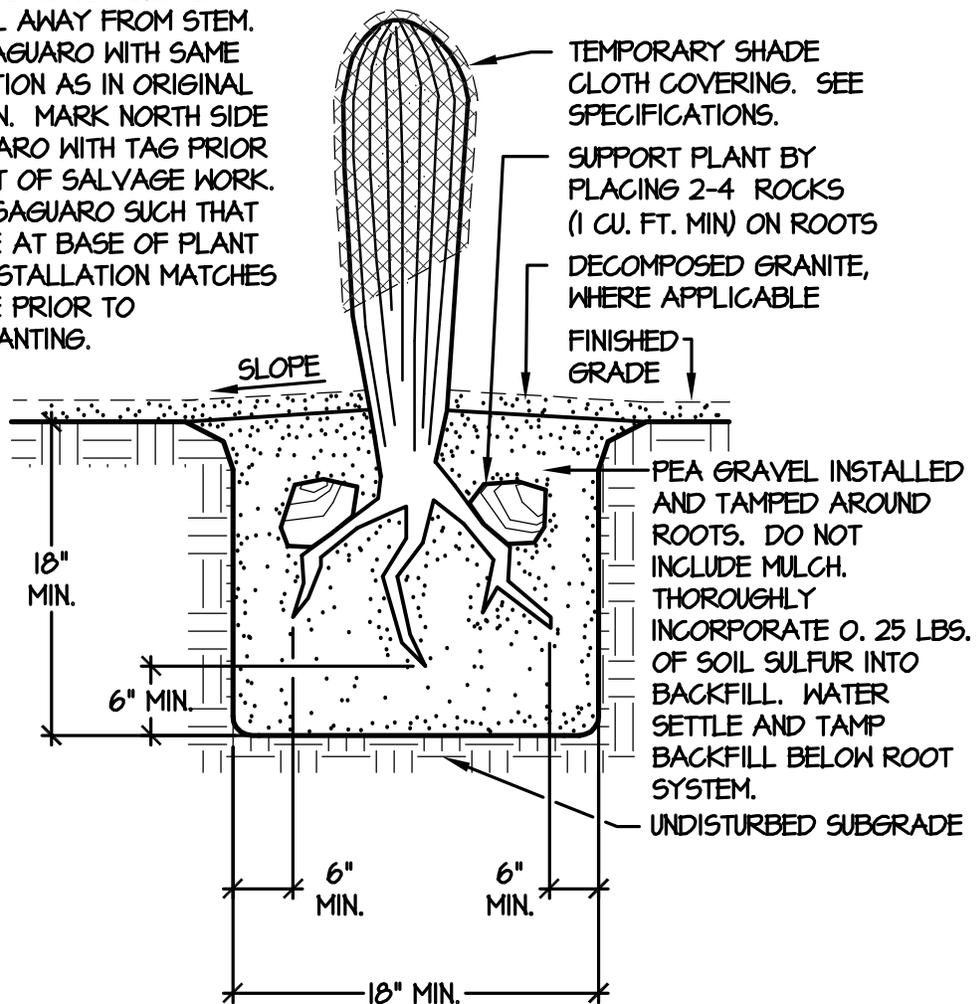


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-102
REVISED:		OCOTILLO PLANTING - SALVAGED SPECIMEN	

**NOTES:**

1. SET MAIN STEM OF CACTUS PLUMB AS VIEWED FROM ALL SIDES.
2. DO NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
3. PLANT SAGUARO WITH SAME ORIENTATION AS IN ORIGINAL LOCATION. MARK NORTH SIDE OF SAGUARO WITH TAG PRIOR TO START OF SALVAGE WORK.
4. INSTALL SAGUARO SUCH THAT SOIL LINE AT BASE OF PLANT AFTER INSTALLATION MATCHES SOIL LINE PRIOR TO TRANSPLANTING.

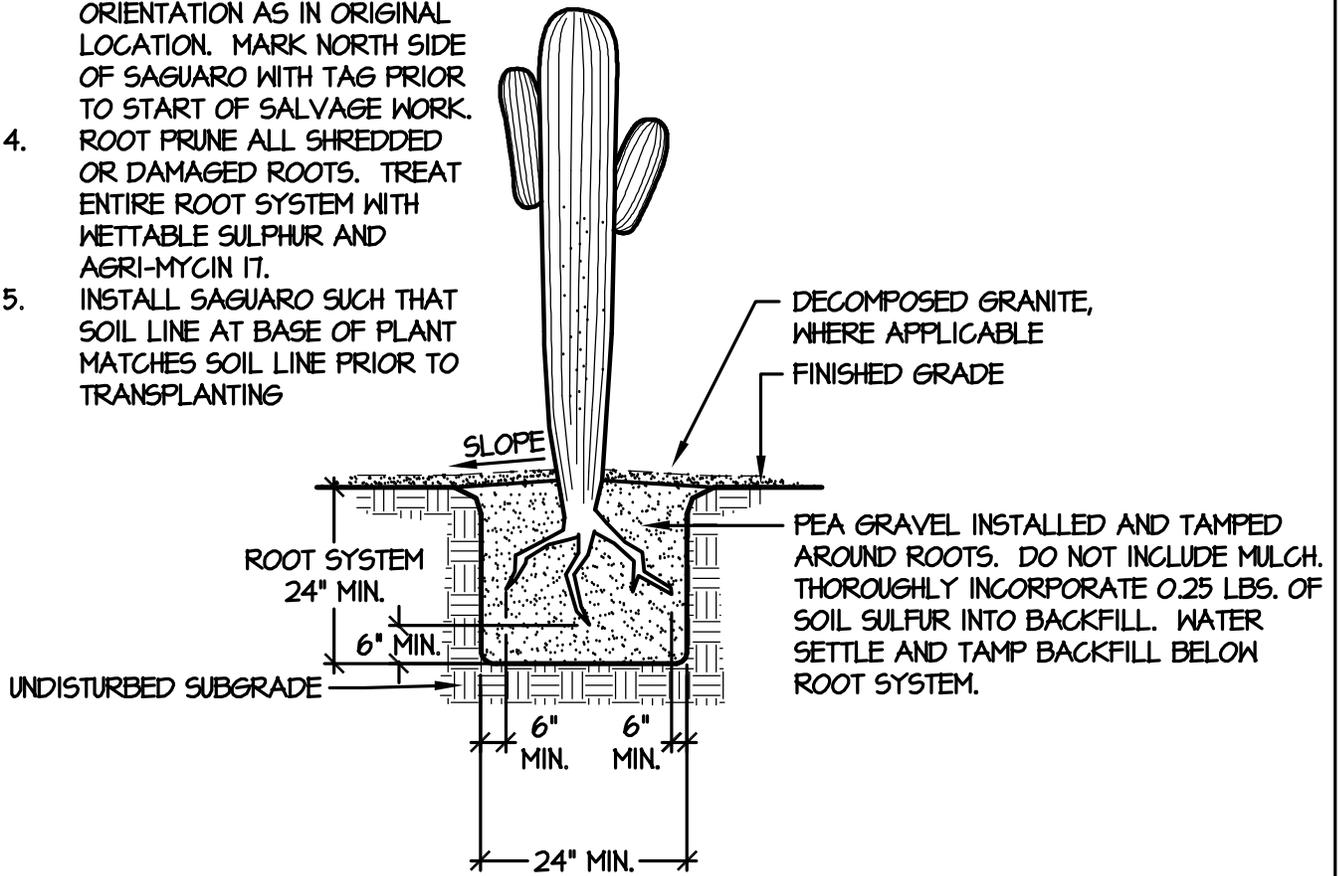


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-103
REVISED:		SAGUARO PLANTING - SALVAGED SPECIMEN (≤8')	

**NOTE:**

1. SET MAIN STEM OF CACTUS PLUMB AS VIEWED FROM ALL SIDES.
2. DO NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
3. PLANT SAGUARO WITH SAME ORIENTATION AS IN ORIGINAL LOCATION. MARK NORTH SIDE OF SAGUARO WITH TAG PRIOR TO START OF SALVAGE WORK.
4. ROOT PRUNE ALL SHREDDED OR DAMAGED ROOTS. TREAT ENTIRE ROOT SYSTEM WITH WETTABLE SULPHUR AND AGRI-MYCIN 17.
5. INSTALL SAGUARO SUCH THAT SOIL LINE AT BASE OF PLANT MATCHES SOIL LINE PRIOR TO TRANSPLANTING

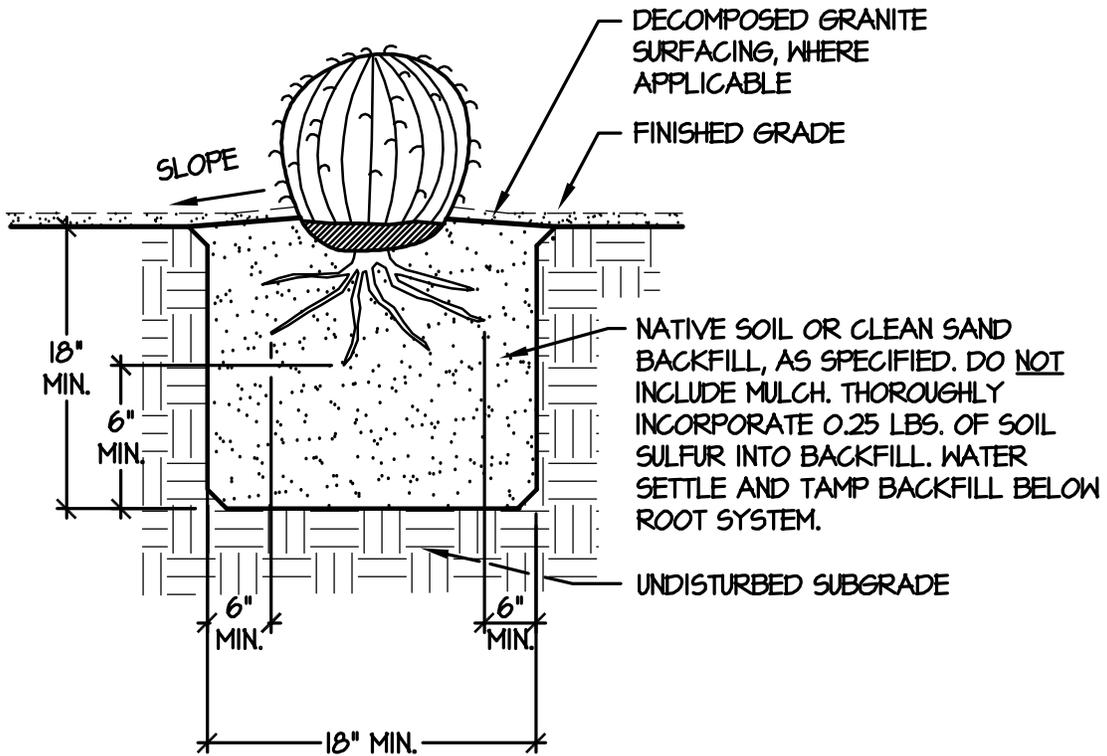


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-104
REVISED:		SAGUARO PLANTING - SALVAGED SPECIMEN (≤8')	

**NOTES:**

1. DOT NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
2. HARDENED PORTION OF CACTUS SHALL NOT SHOW ABOVE FINISHED GRADE.
3. THIS DETAIL APPLIES TO SALVAGED STOCK OF THE GENERA CEREUS, FERROCACTUS AND STENOCEREUS.

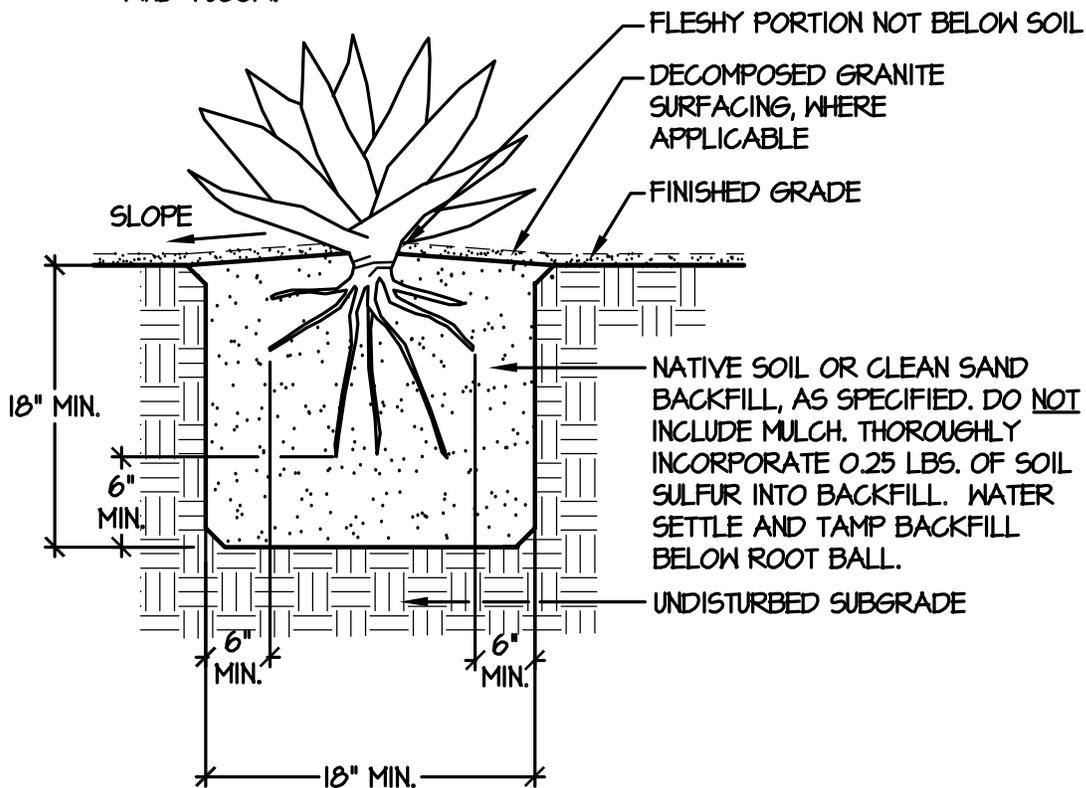


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	<p><b>P-105</b></p>
REVISED:		BARREL AND COLUMNAR CACTUS PLANTING - SALVAGED SPECIMEN	

**NOTES:**

1. DO NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
2. HARDENED PORTION OF AGAVE SHALL NOT SHOW ABOVE FINISHED GRADE. FLESHY PORTION NOT BELOW SOIL.
3. THIS DETAIL APPLIES TO SALVAGED STOCK OF THE GENERA AGAVE, ALOE, DASYLIRION, HESPERALOE, NOLINA AND YUCCA.

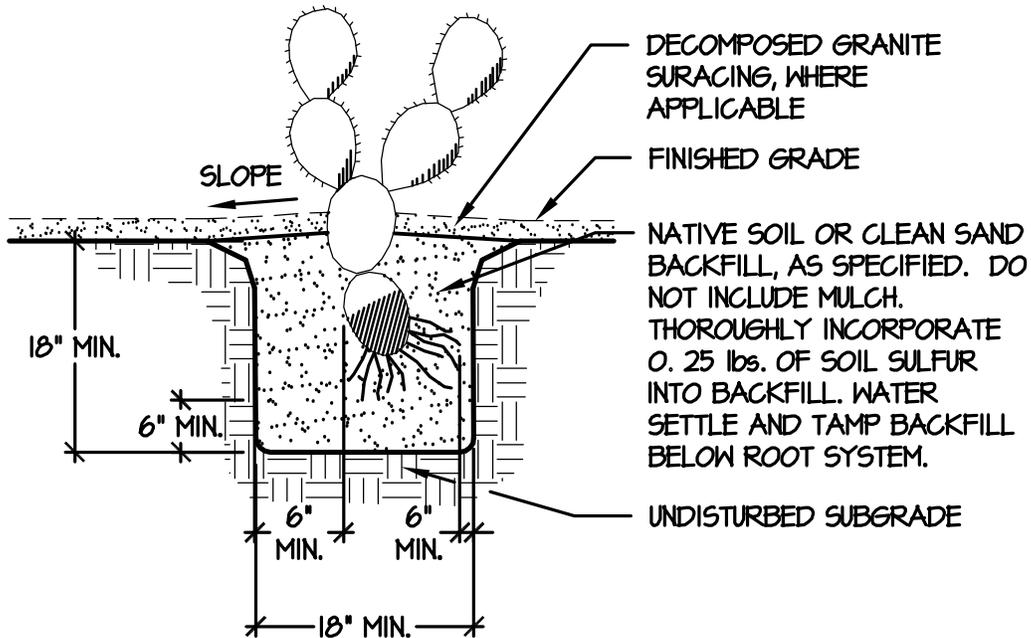


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-106
REVISED:		STEM SUCCULENT PLANTING - SALVAGED SPECIMEN	

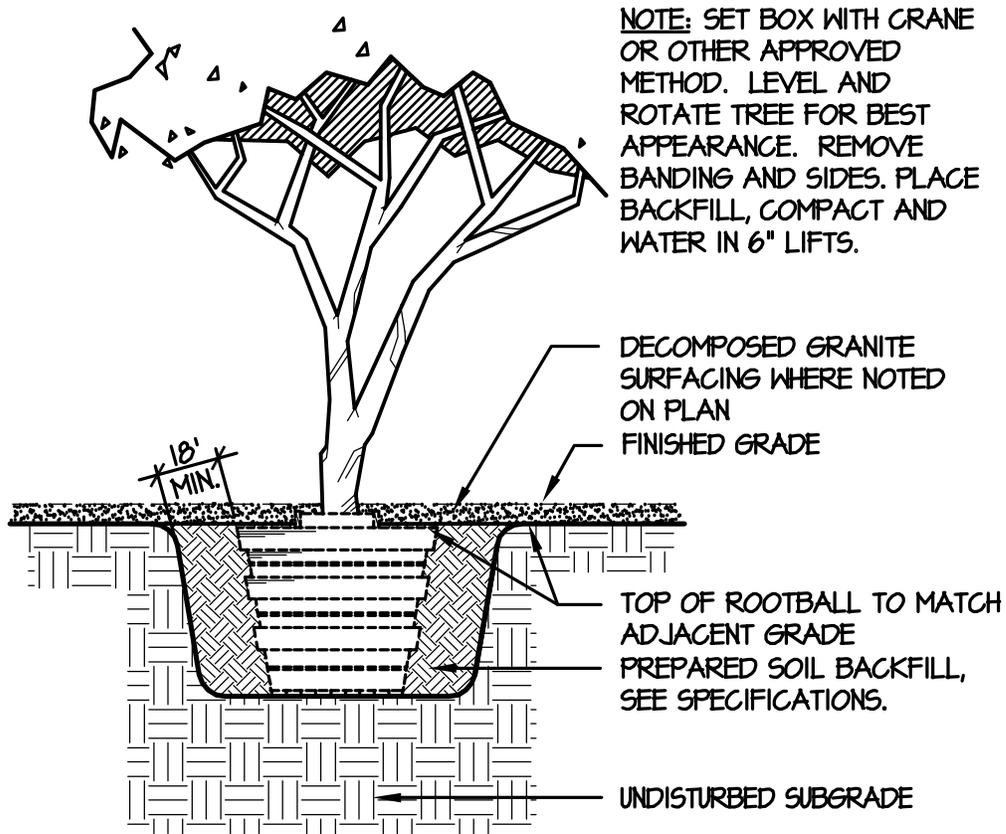
**NOTES:**

1. DO NOT CREATE BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM PLANT.
2. BURY ONE FULL PAD, MINIMUM.
3. THIS DETAIL APPLIES TO SALVAGED STOCK OF THE GENUS OPUNTIA.



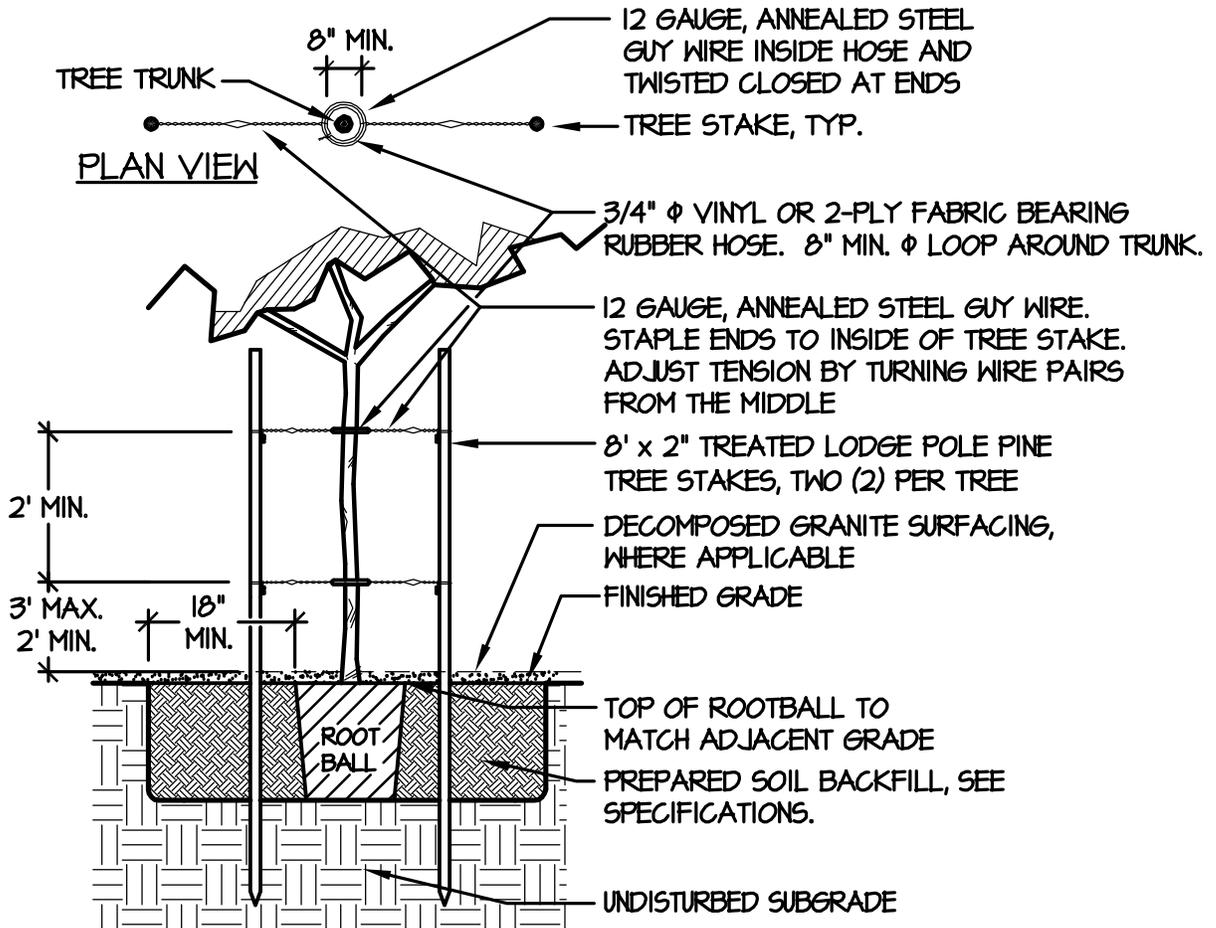
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / SALVAGED NATIVE PLANTS:	P-107
REVISED:		PRICKLY PEAR AND CHOLLA CACTUS PLANTING - SALVAGED CUTTING	



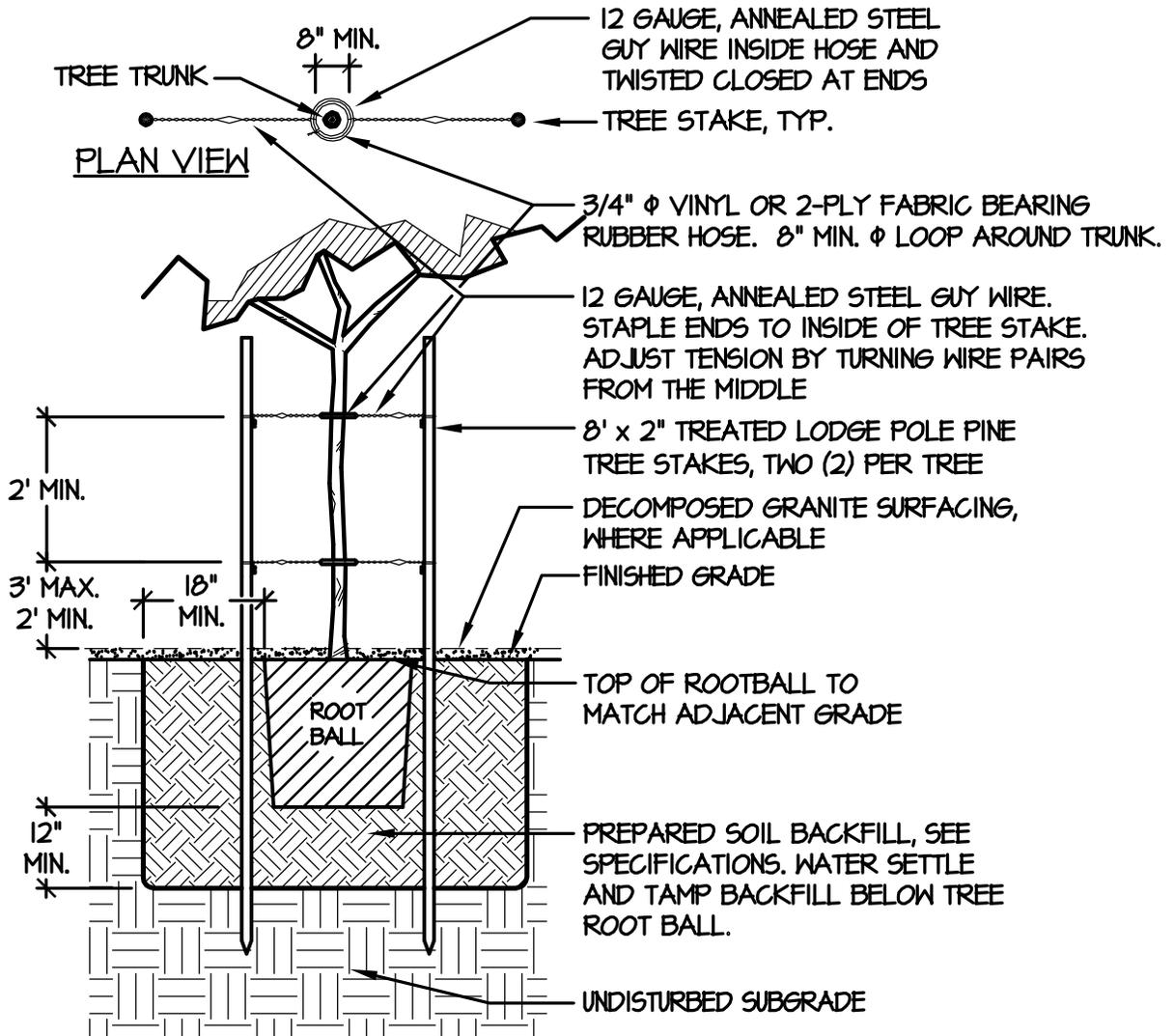
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-200
REVISED:		TREE PLANTING - 30" & LARGER BOX SIZE	



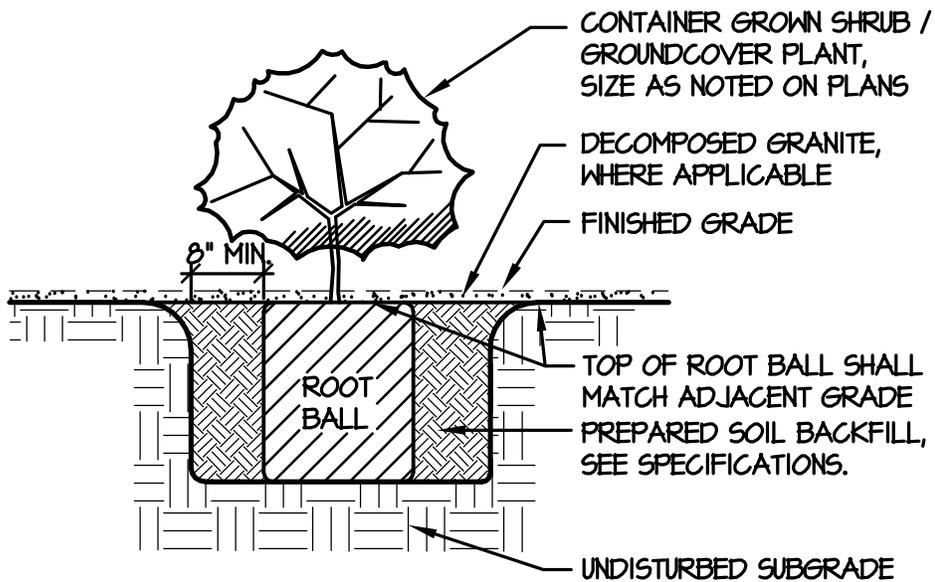
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-201
REVISED:		TREE PLANTING - 24" BOX & 15 GAL. SIZE	



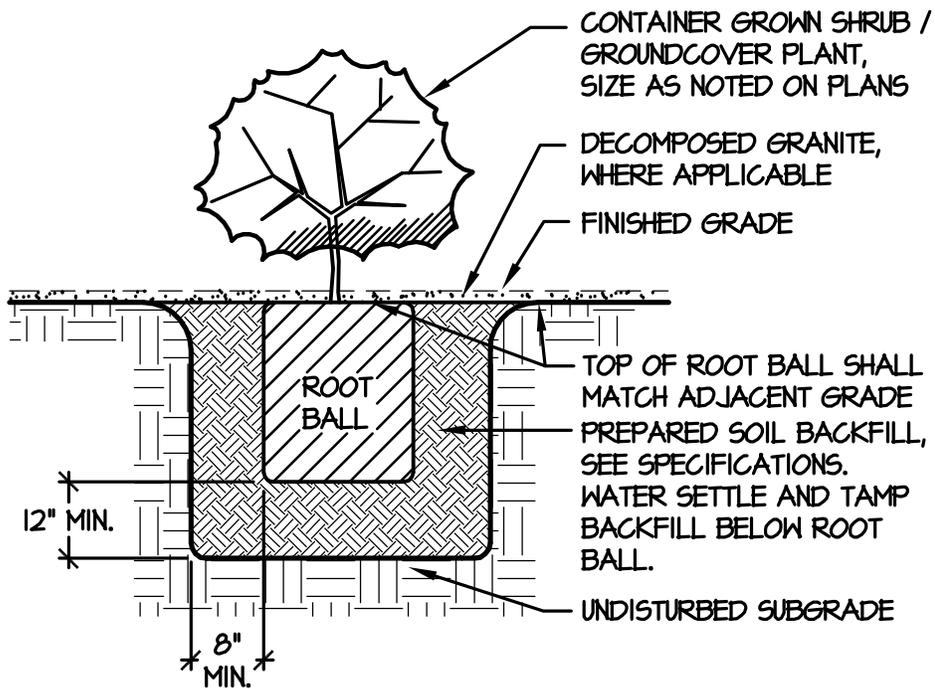
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-202
REVISED:		TREE PLANTING - HARD SOIL CONDITIONS 24" BOX & 15 GAL. SIZE	



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	<b>P-203</b>
REVISED:		SHRUB / GROUND COVER PLANTING - 1, 5 & 15 GAL. SIZE	
			SHEET 1 OF 1

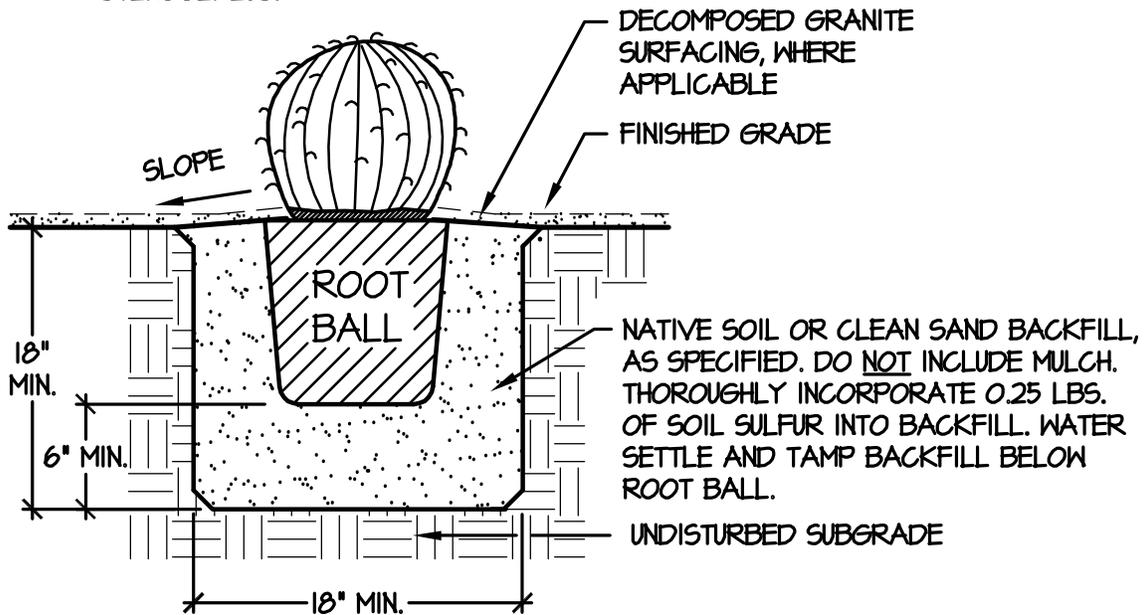


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	<b>P-204</b>
REVISED:		SHRUB / GROUND COVER - HARD SOIL CONDITIONS	
		PLANTING - 1, 5 & 15 GAL. SIZE	SHEET 1 OF 1

**NOTES:**

1. DO NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
2. SET CACTUS SO THAT TOP OF ROOT BALL MATCHES ADJACENT GRADE.
3. THIS DETAIL APPLIES TO NURSERY GROWN STOCK OF THE GENERA CARNEGIEA, CEREUS, FERROCACTUS AND STENOCEREUS.

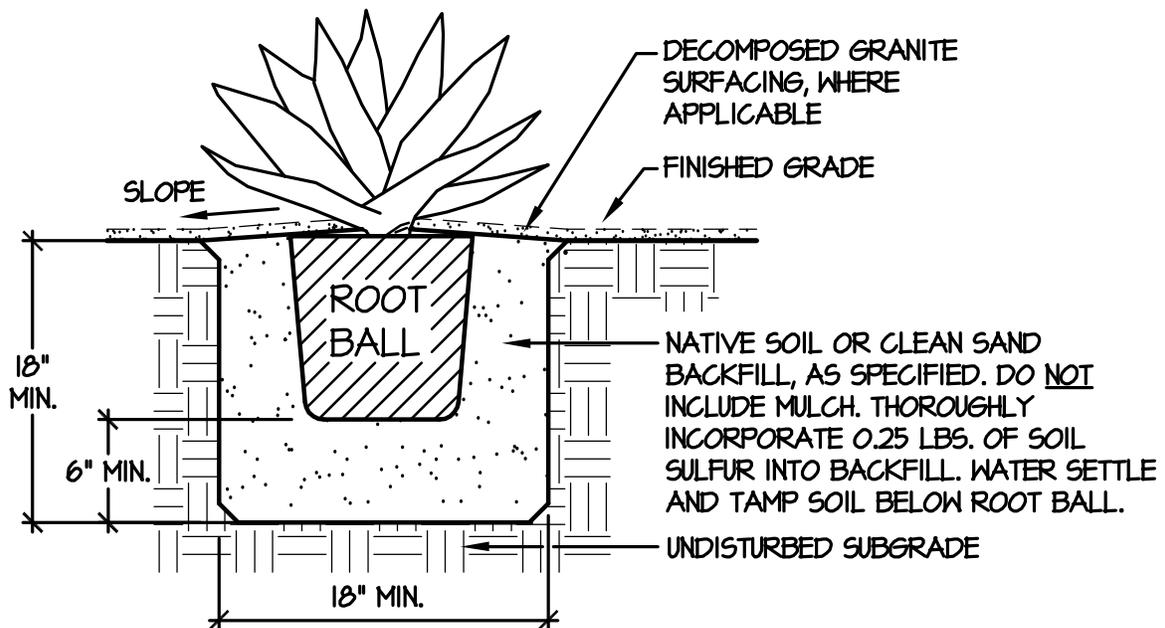


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-205
REVISED:		BARREL AND COLUMNAR CACTUS PLANTING - CONTAINER GROWN	

**NOTES:**

1. DO NOT CREATE A BASIN AT BASE OF AGAVE. SLOPE BACKFILL AWAY FROM STEM.
2. SET STEM SUCCULENT SO THAT TOP OF ROOT BALL MATCHES ADJACENT GRADE.
3. THIS DETAIL APPLIES TO NURSERY GROWN STOCK OF THE GENERA AGAVE, ALOE, DASYLIRION, HESPERALOE, NOLINA AND YUCCA.

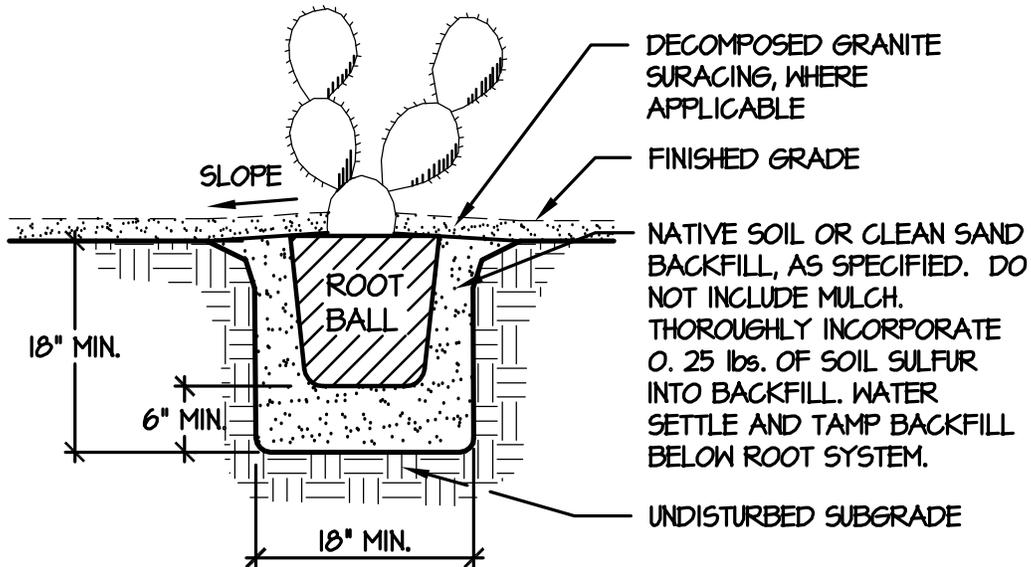


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-206
REVISED:		STEM SUCCULENT PLANTING - CONTAINER GROWN	

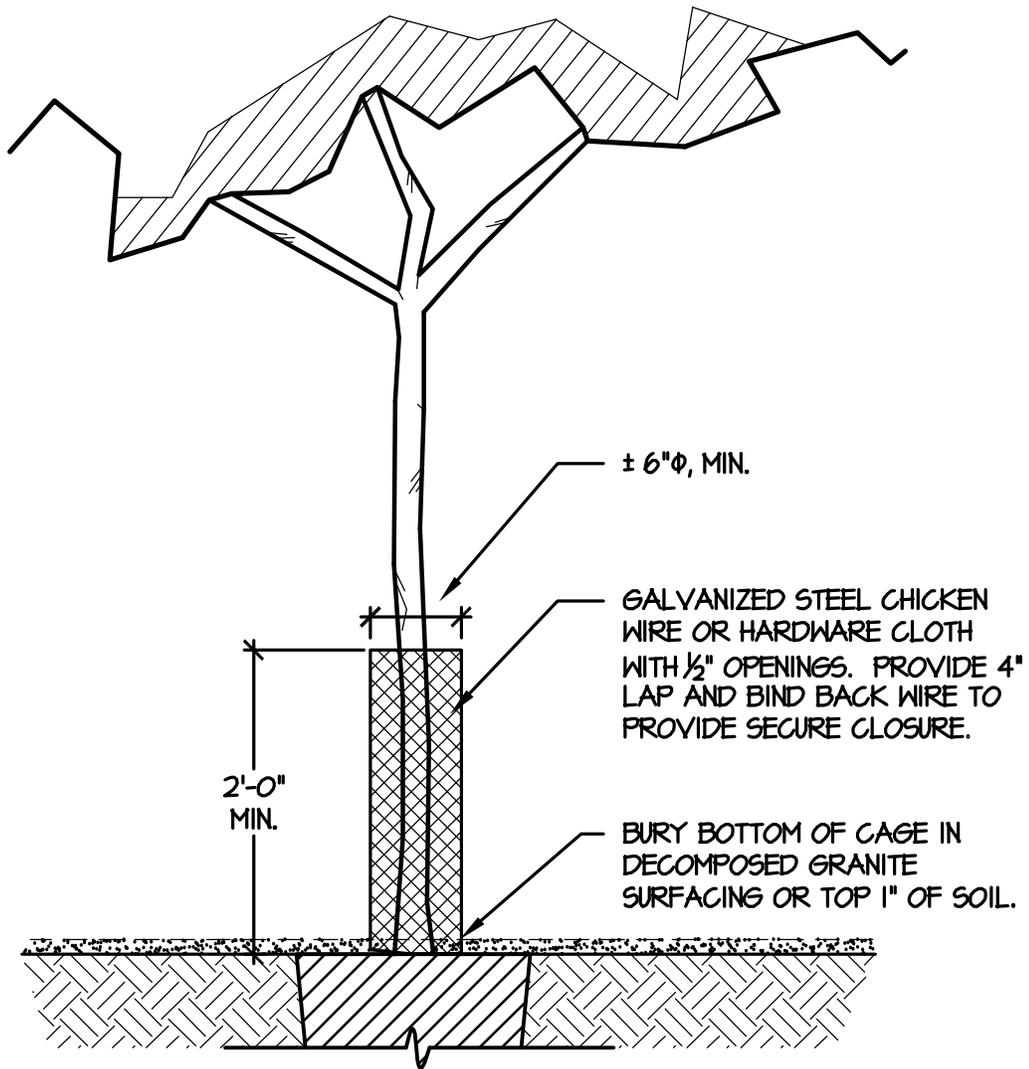
**NOTES:**

1. DO NOT CREATE BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM PLANT.
2. SET CACTUS SO THAT TOP OF ROOT BALL MATCHES ADJACENT GRADE.
3. THIS DETAIL APPLIES TO NURSERY GROWN STOCK OF THE GENUS OPUNTIA.



SCALE: N.T.S.

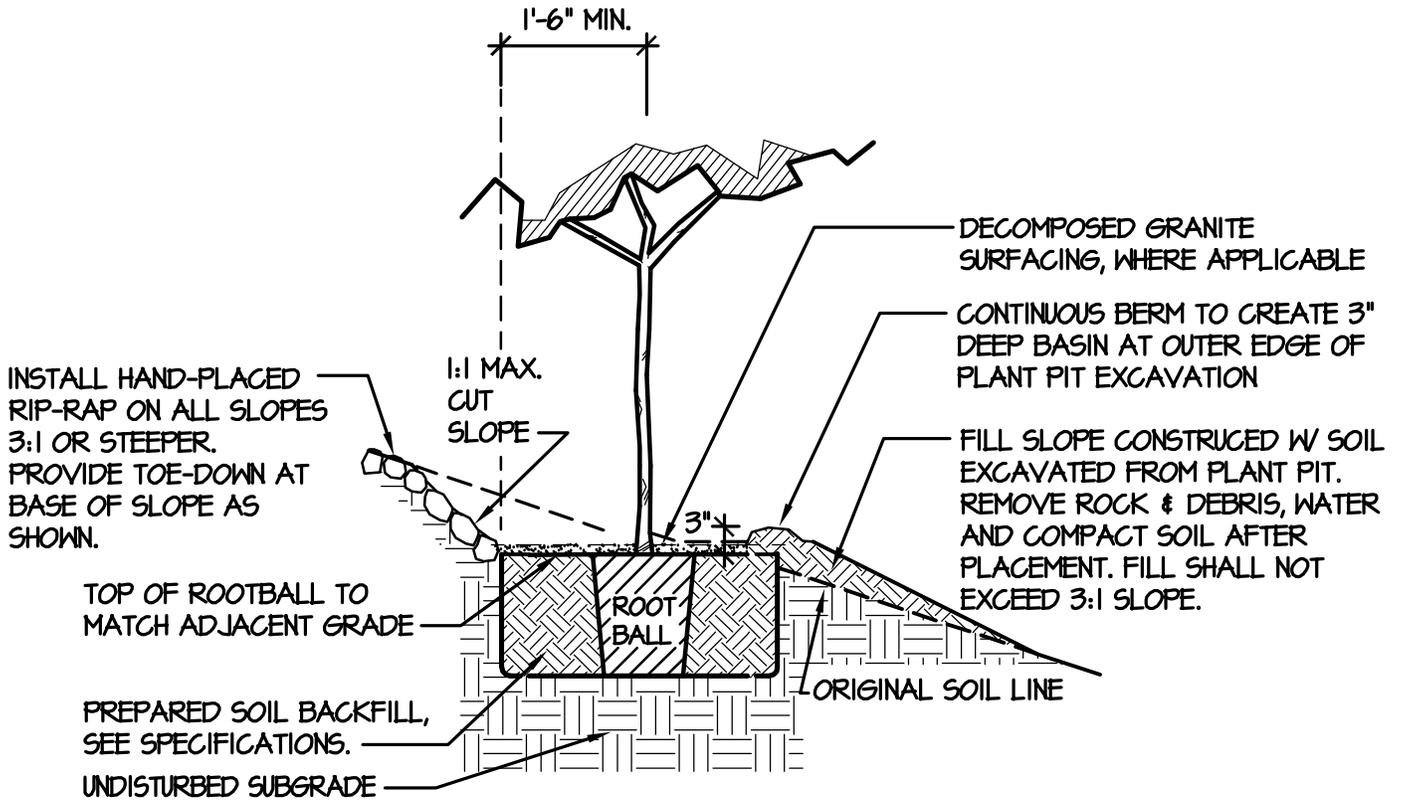
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-207
REVISED:		PRICKLY PEAR & CHOLLA CACTUS PLANTING (CONTAINER GROWN)	



SCALE: N.T.S.

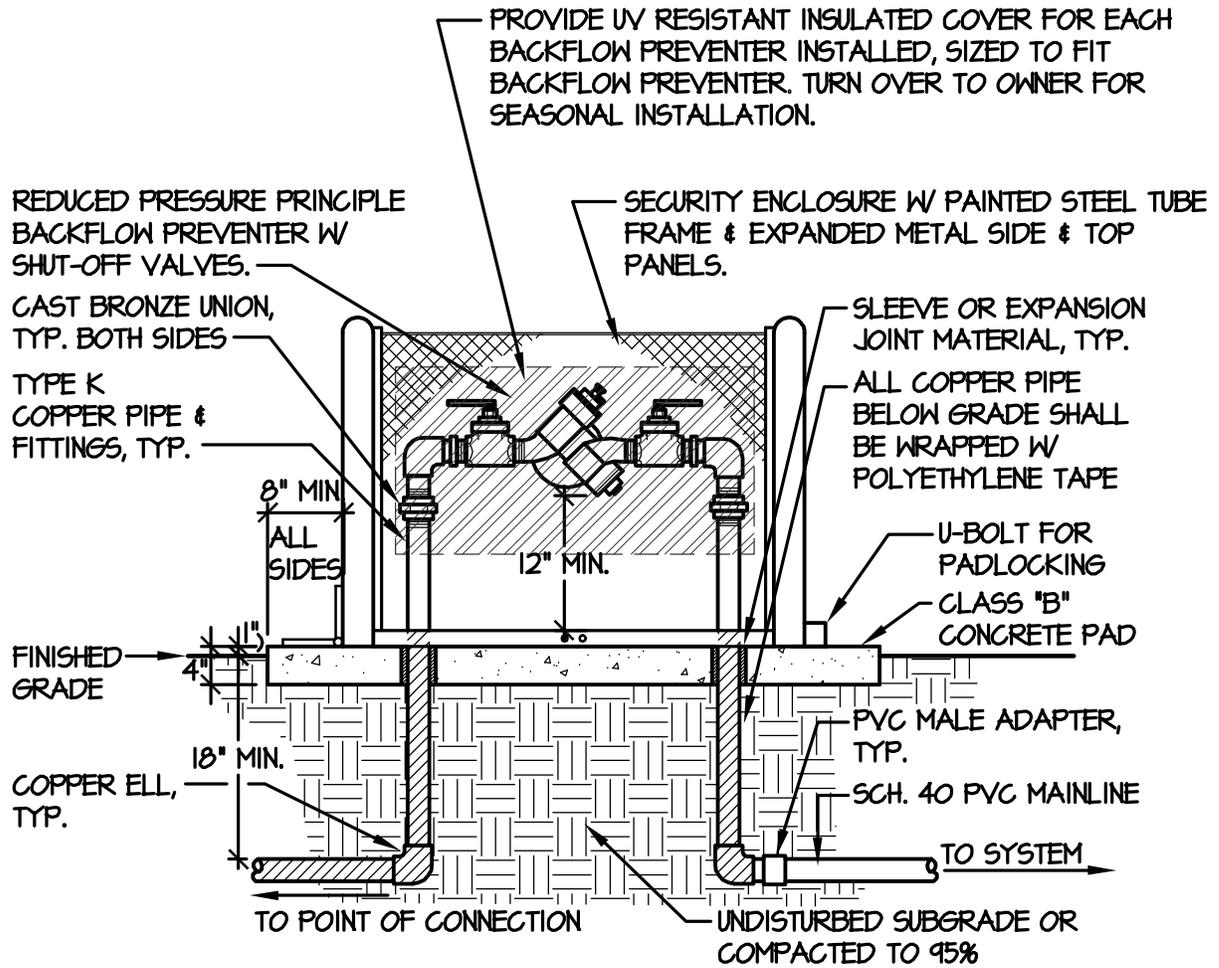
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	P-208
REVISED:		RODENT PROTECTION CAGE FOR TREES	

**NOTE:** SEE DETAIL P-201 FOR TREE STAKE AND GUYING INSTALLATION, IF REQUIRED.



SCALE: N.T.S.

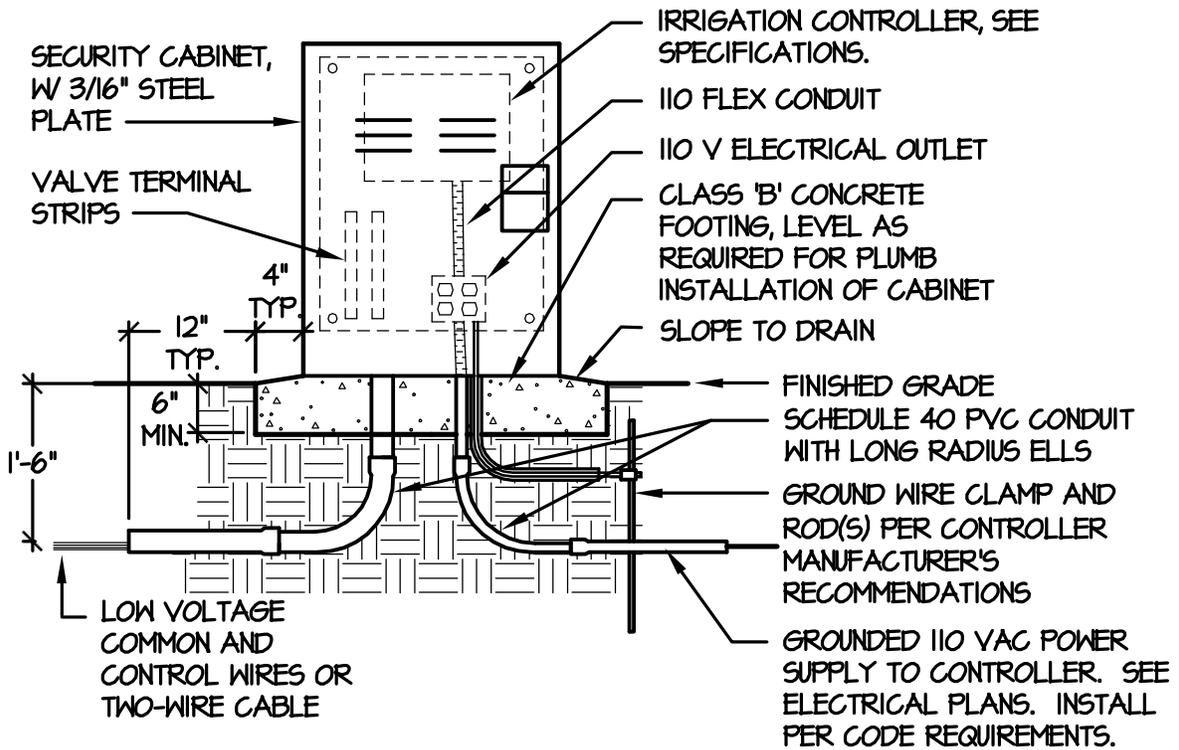
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	<b>P-209</b>
REVISED:		TREE PLANTING ON SLOPE	



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-300
REVISED:		BACKFLOW PREVENTER IN SECURITY ENCLOSURE	

**NOTE:** COORDINATE INSTALLATION OF IRRIGATION CONTROLLER WITH OWNER'S REPRESENTATIVE. BEFORE INSTALLATION, OBTAIN APPROVAL FOR CONTROLLER LOCATION, WIRE ROUTING AND PROPOSED CONNECTION TO ELECTRICAL SERVICE.

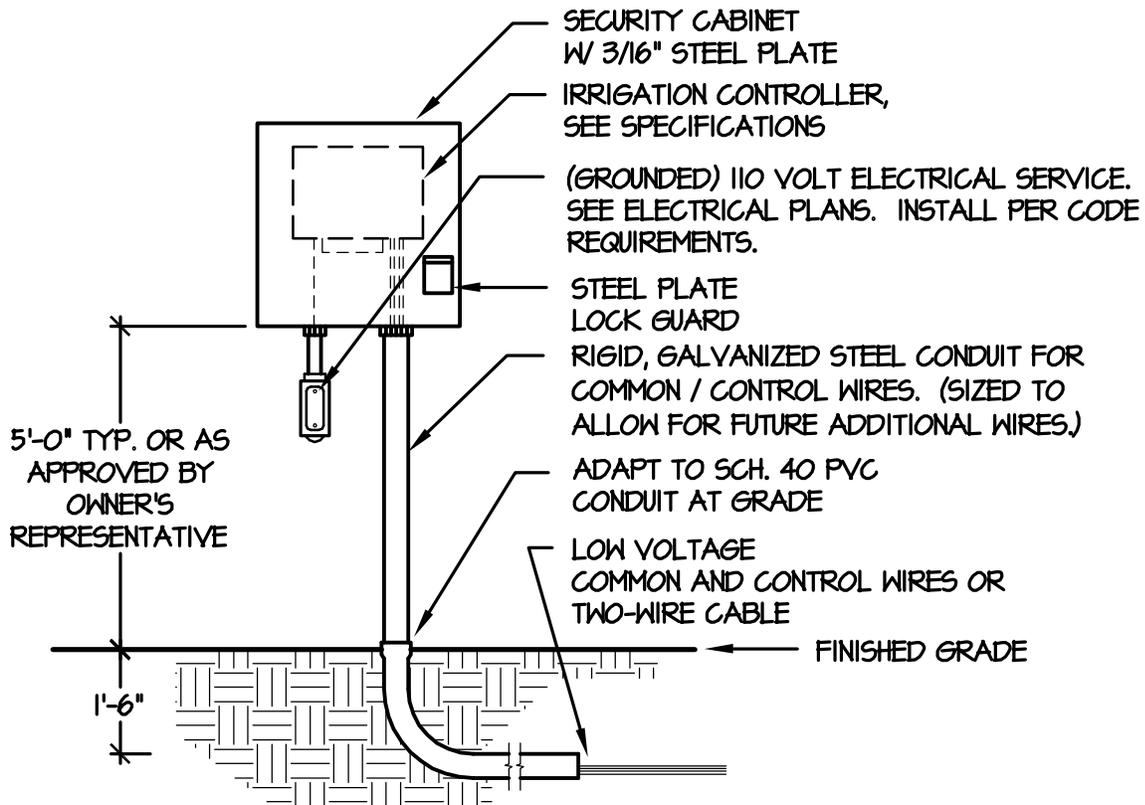


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-301
REVISED:		IRRIGATION CONTROLLER IN FREE STANDING SECURITY ENCLOSURE	
			SHEET 1 OF 1

**NOTES:**

1. COORDINATE INSTALLATION OF IRRIGATION CONTROLLER WITH OWNER'S REPRESENTATIVE. BEFORE INSTALLATION, OBTAIN APPROVAL FOR CONTROLLER LOCATION, WIRE ROUTING AND PROPOSED CONNECTION TO ELECTRICAL SERVICE.
2. SECURE CABINET TO WALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS OR PER APPROVED SHOP DRAWINGS.

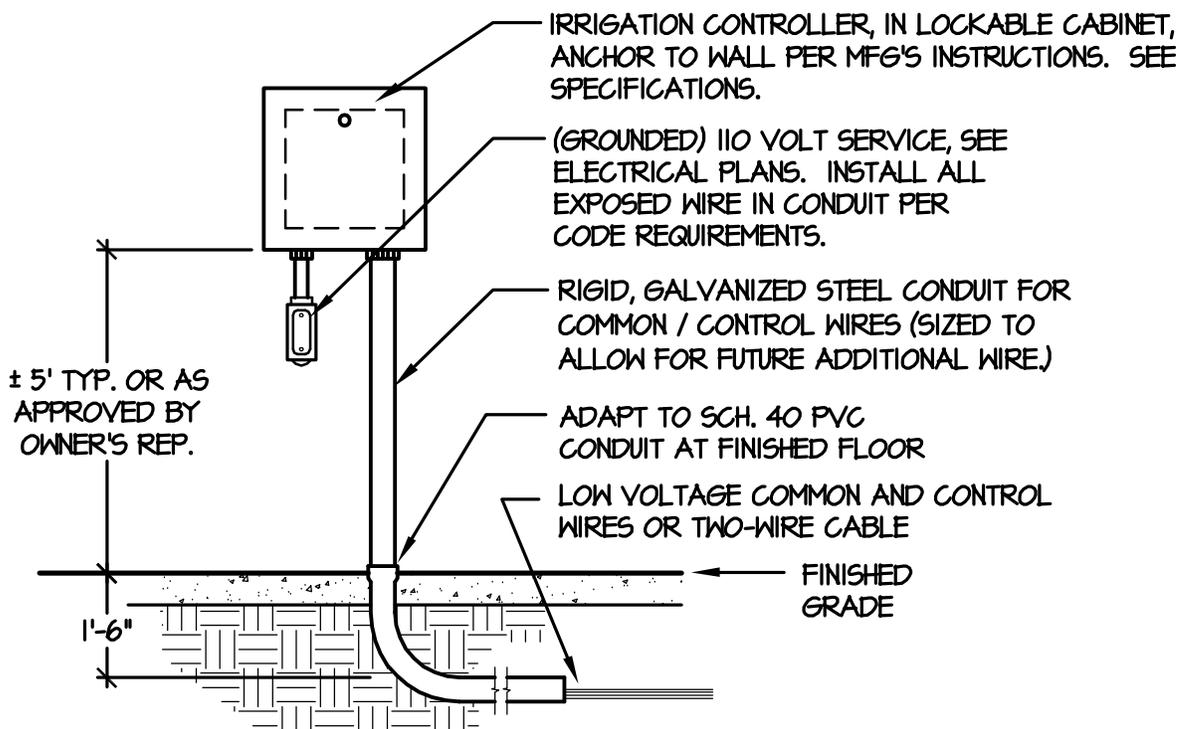


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-302
REVISED:		IRRIGATION CONTROLLER IN WALL MOUNTED SECURITY ENCLOSURE	

**NOTES:**

1. COORDINATE INSTALLATION OF IRRIGATION CONTROLLER WITH OWNER'S REPRESENTATIVE. BEFORE INSTALLATION, OBTAIN APPROVAL FOR CONTROLLER LOCATION, WIRE ROUTING, AND PROPOSED CONNECTION TO ELECTRICAL SERVICE.
2. SECURE CABINET TO WALL PER MANUFACTURER'S WRITTEN INSTRUCTIONS OR PER APPROVED SHOP DRAWINGS.

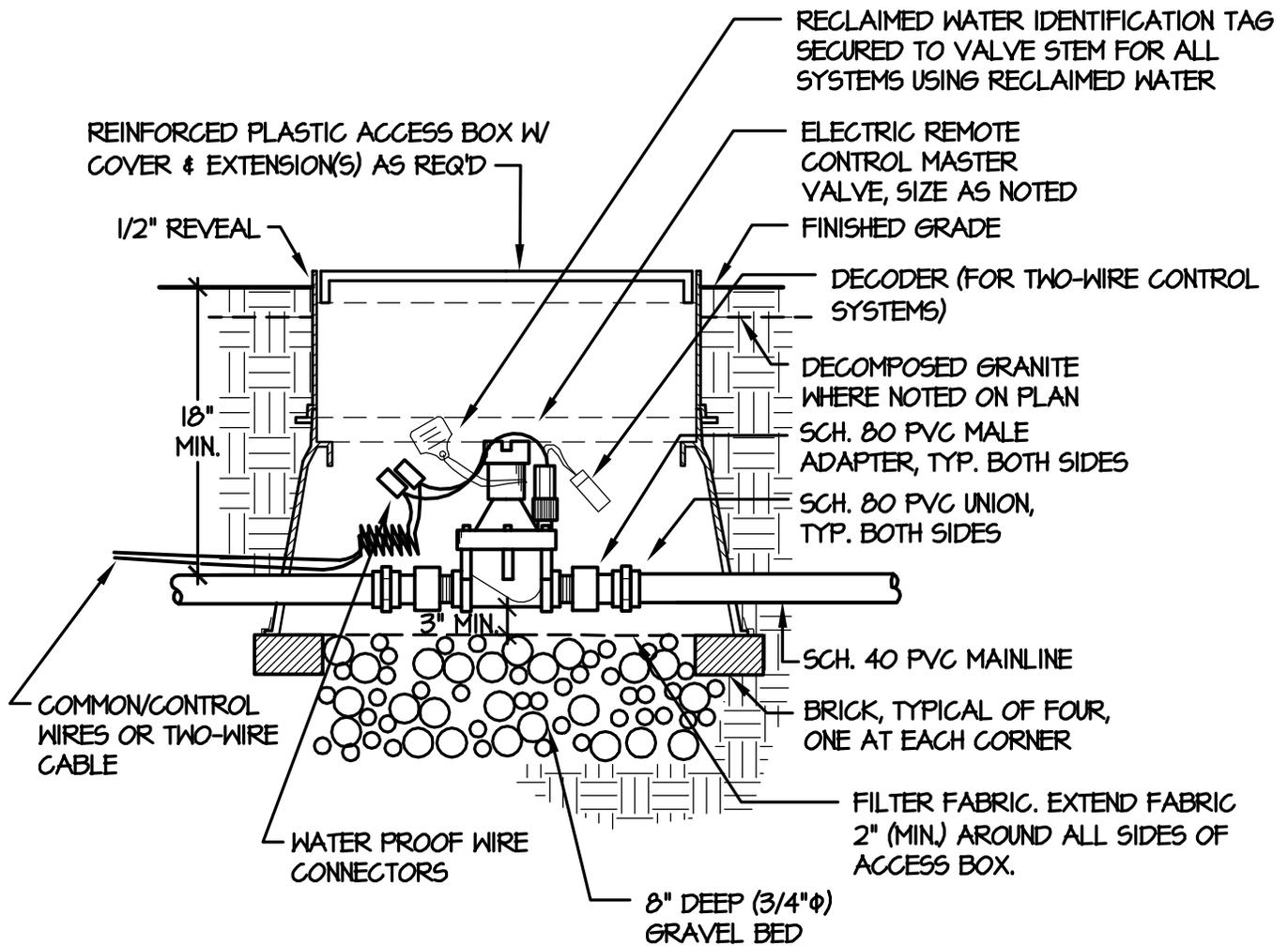


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-303
REVISED:		IRRIGATION CONTROLLER INTERIOR WALL MOUNTED	

**NOTES:**

1. ALL WIRES TO BE INSTALLED PER LOCAL CODE. TAPE AND BUNDLE WIRES EVERY 20'. PROVIDE EXPANSION COIL AT EACH WIRE CONNECTION IN VALVE BOX (WRAP AROUND 1/2"  $\phi$  PIPE 15 TIMES).
2. COMPACT SOIL AROUND VALVE BOX TO SAME DENSITY AS ADJACENT UNDISTURBED SOIL.
3. ALL THREADED PVC JOINTS SHALL BE WRAPPED WITH TEFLON TAPE.

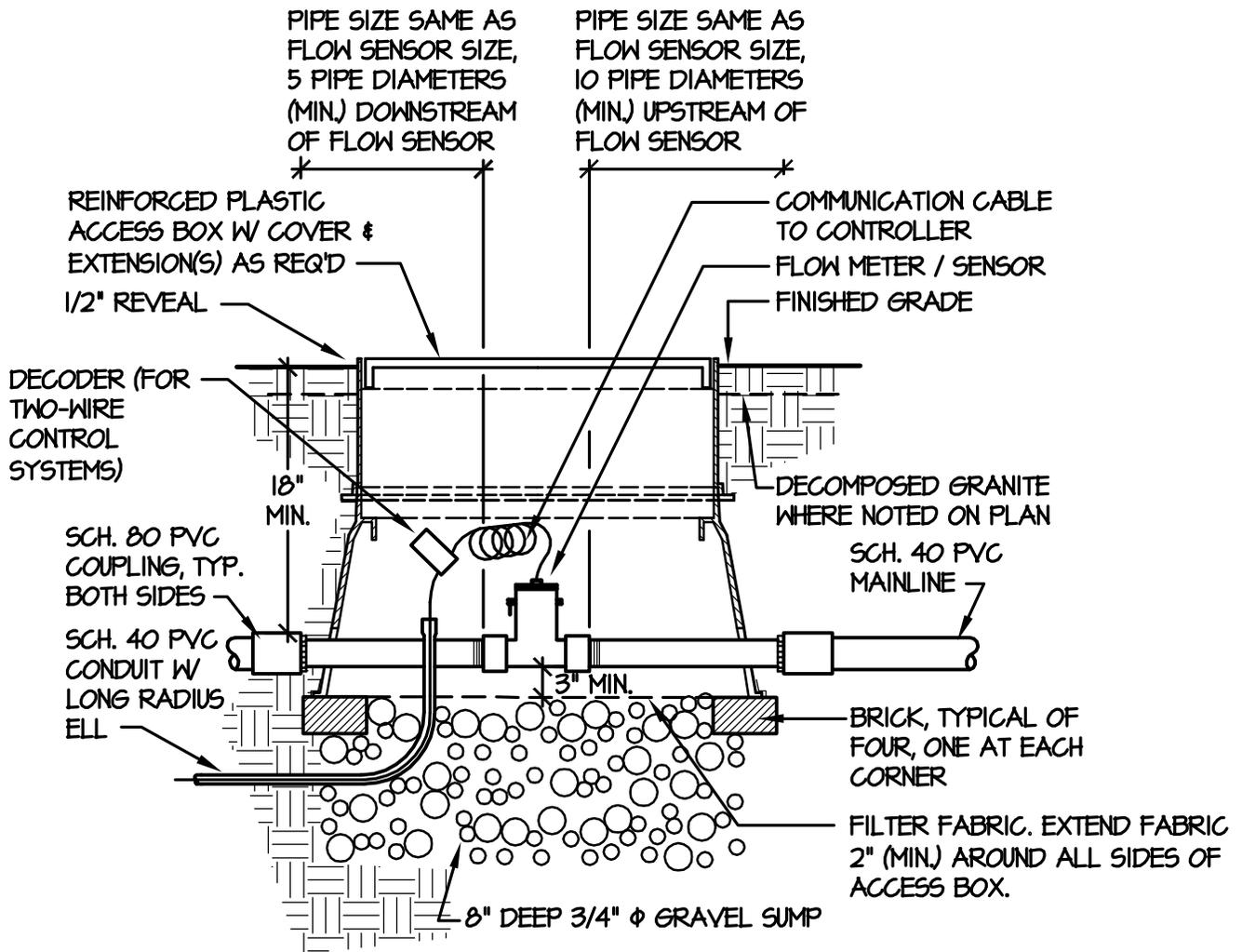


NOTE: RECLAIMED WATER IDENTIFICATION TAGS AVAILABLE FROM TUCSON WATER

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-304</b>
REVISED:		MASTER VALVE ASSEMBLY	

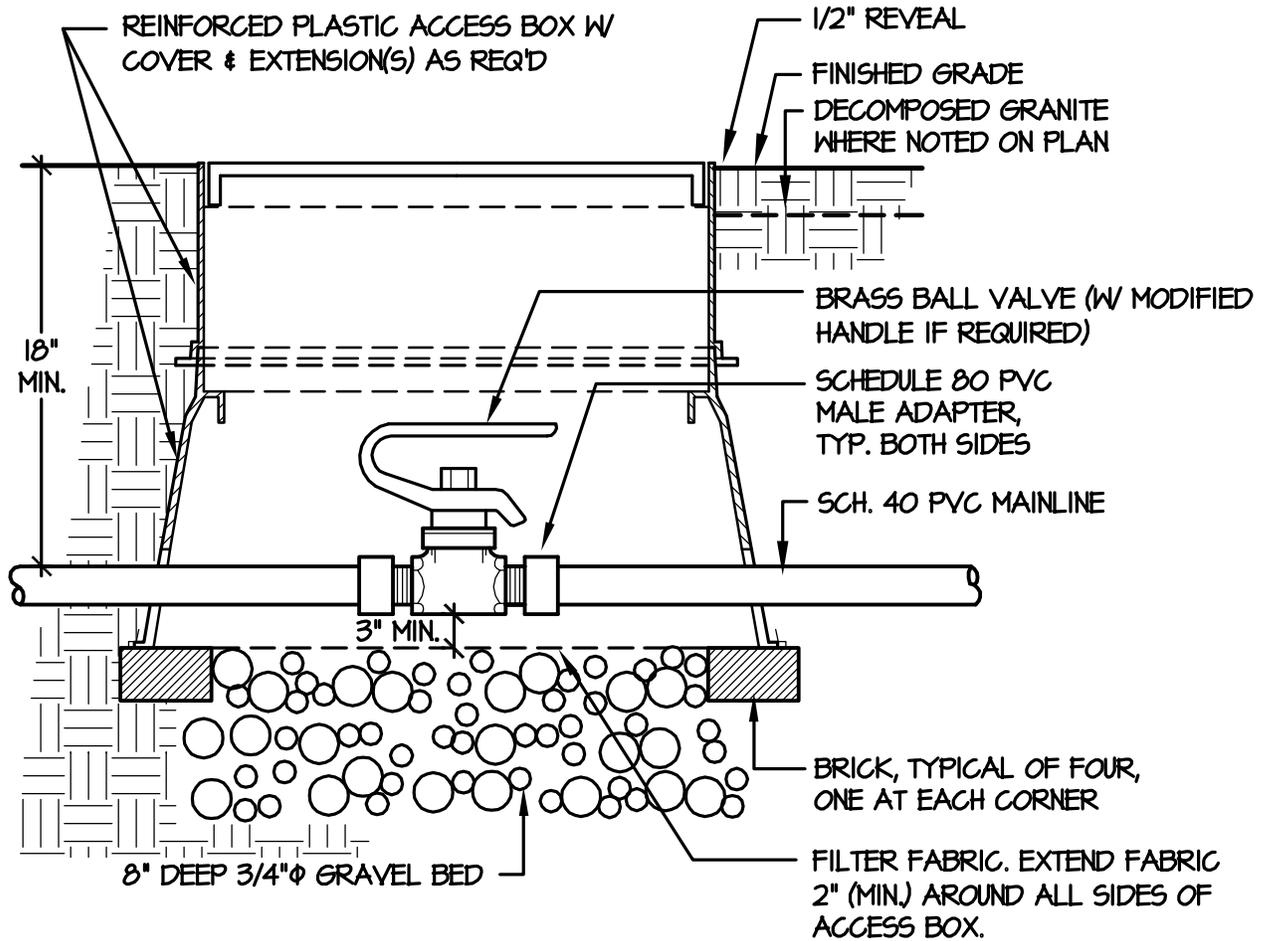
**NOTE:** PROVIDE PULSE DECODER, PULSE TRANSMITTER, PULSE TRANSMITTER POWER SUPPLY, AND SURGE PROTECTOR IN ACCORDANCE WITH FLOW SENSOR / CONTROL SYSTEM MANUFACTURER'S RECOMMENDATIONS.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-305</b>
REVISED:		FLOW SENSOR ASSEMBLY	

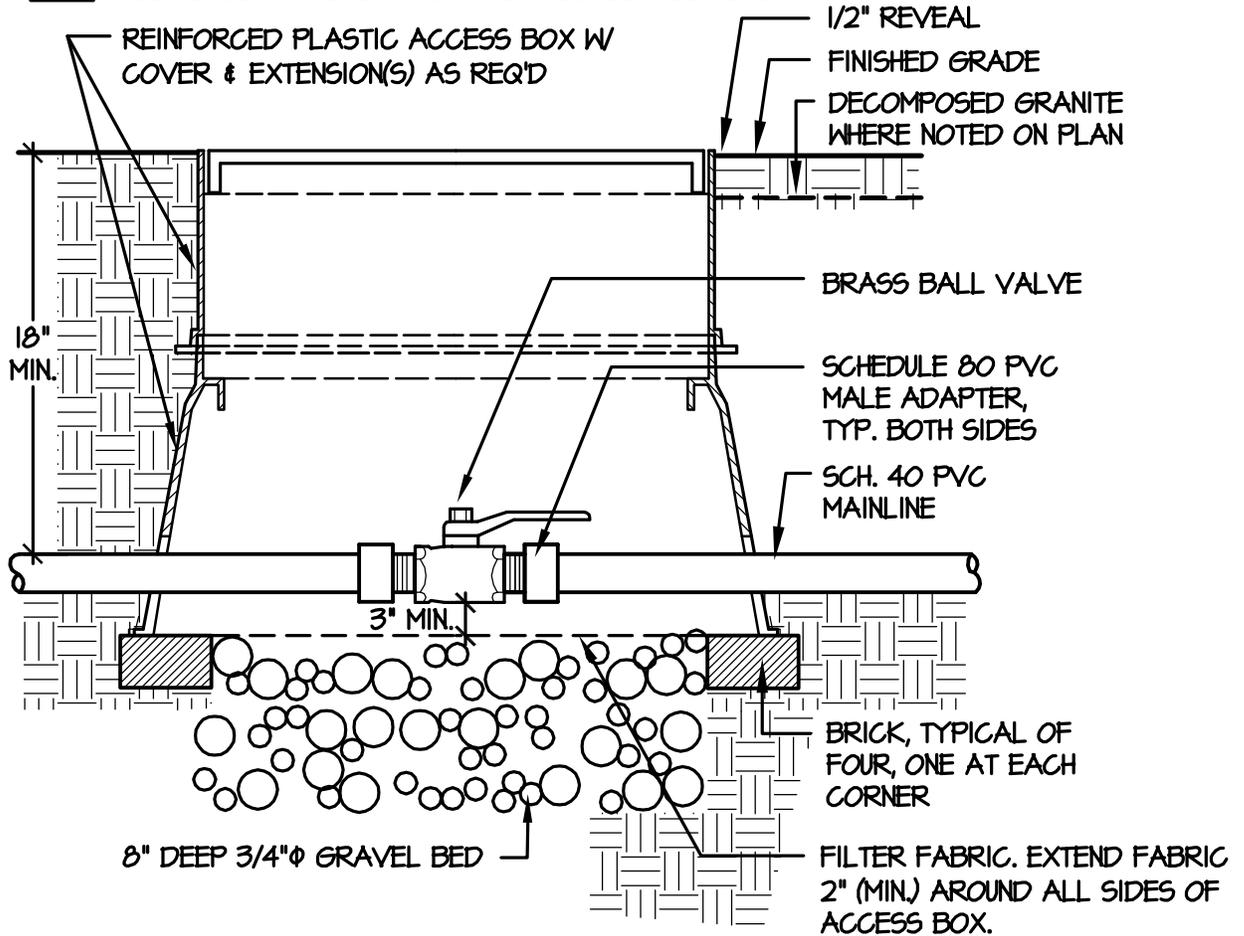
**NOTE:** USE TEFLON TAPE ON ALL THREADED CONNECTIONS.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-306</b>
REVISED:		MAINLINE ISOLATION (BALL) VALVE (2½" TO 4" SIZE)	

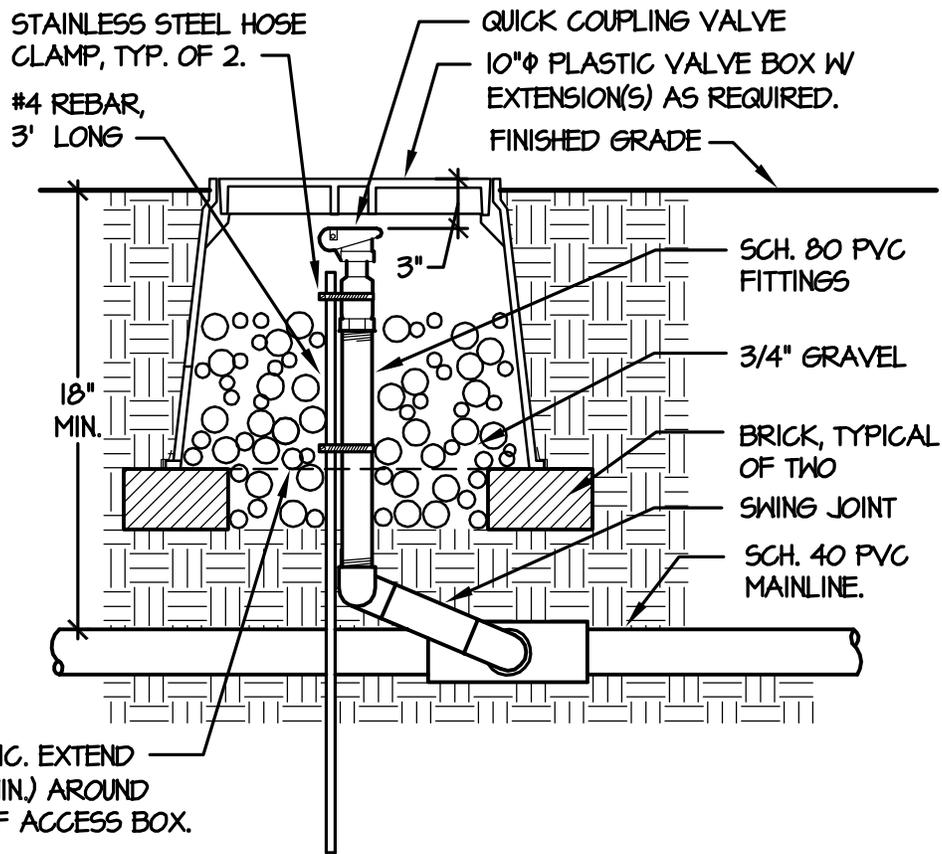
**NOTE:** USE TEFLON TAPE ON ALL THREADED CONNECTIONS.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-307</b>
REVISED:		MAINLINE ISOLATION (BALL) VALVE (1/2" TO 2" SIZE)	

**NOTE:** USE TEFLON TAPE ON ALL THREADED CONNECTIONS.

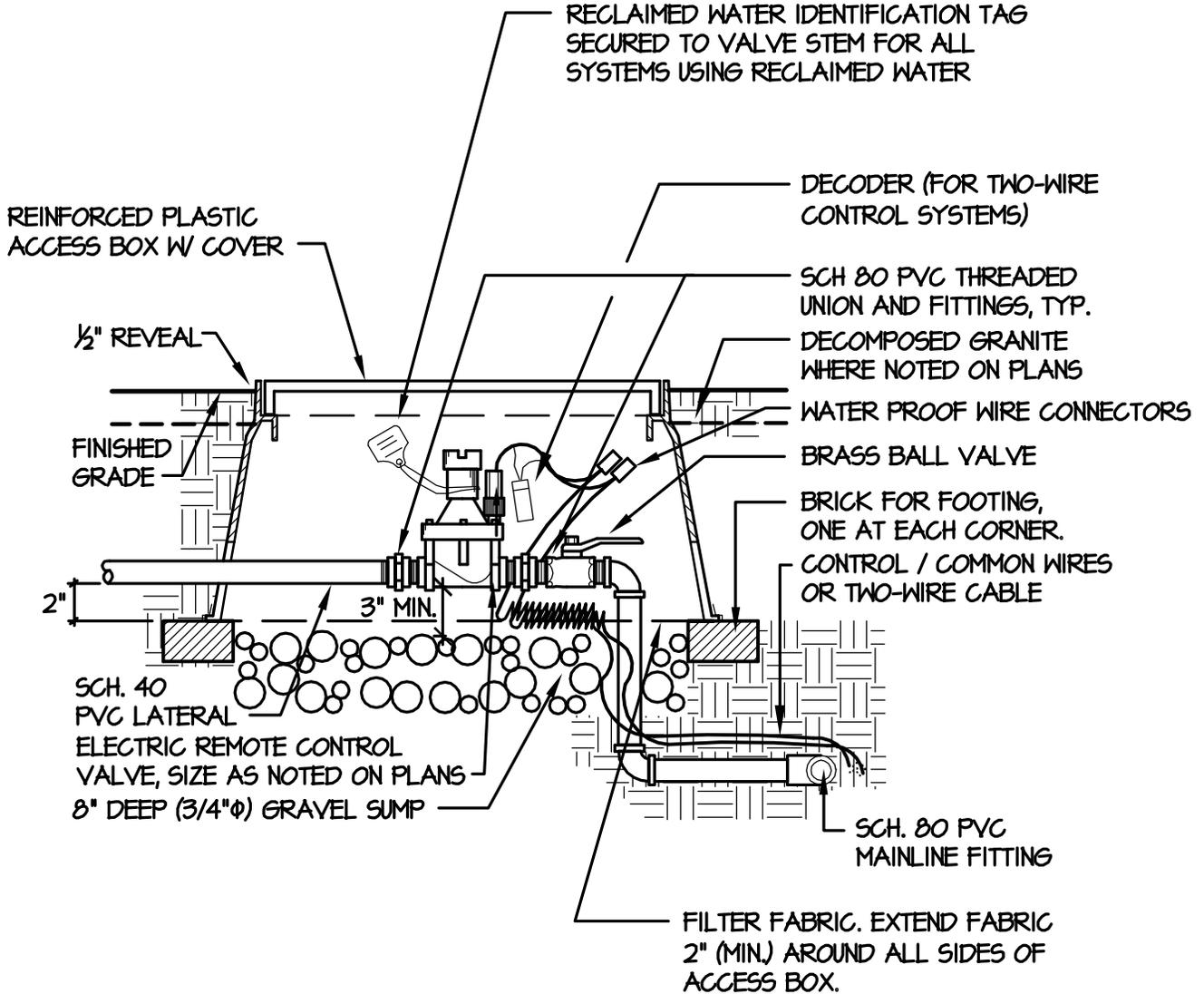


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-308</b>
REVISED:		QUICK COUPLING VALVE ASSEMBLY	

**NOTES:**

1. ALL WIRES TO BE INSTALLED PER LOCAL CODE. TAPE AND BUNDLE WIRES EVERY 20'. PROVIDE EXPANSION COIL AT EACH WIRE CONNECTION IN VALVE BOX (WRAP AROUND 1/2"  $\phi$  PIPE 15 TIMES).
2. COMPACT SOIL AROUND VALVE BOX TO SAME DENSITY AS ADJACENT UNDISTURBED SOIL.
3. ALL THREADED PVC JOINTS SHALL BE WRAPPED WITH TEFLON TAPE.



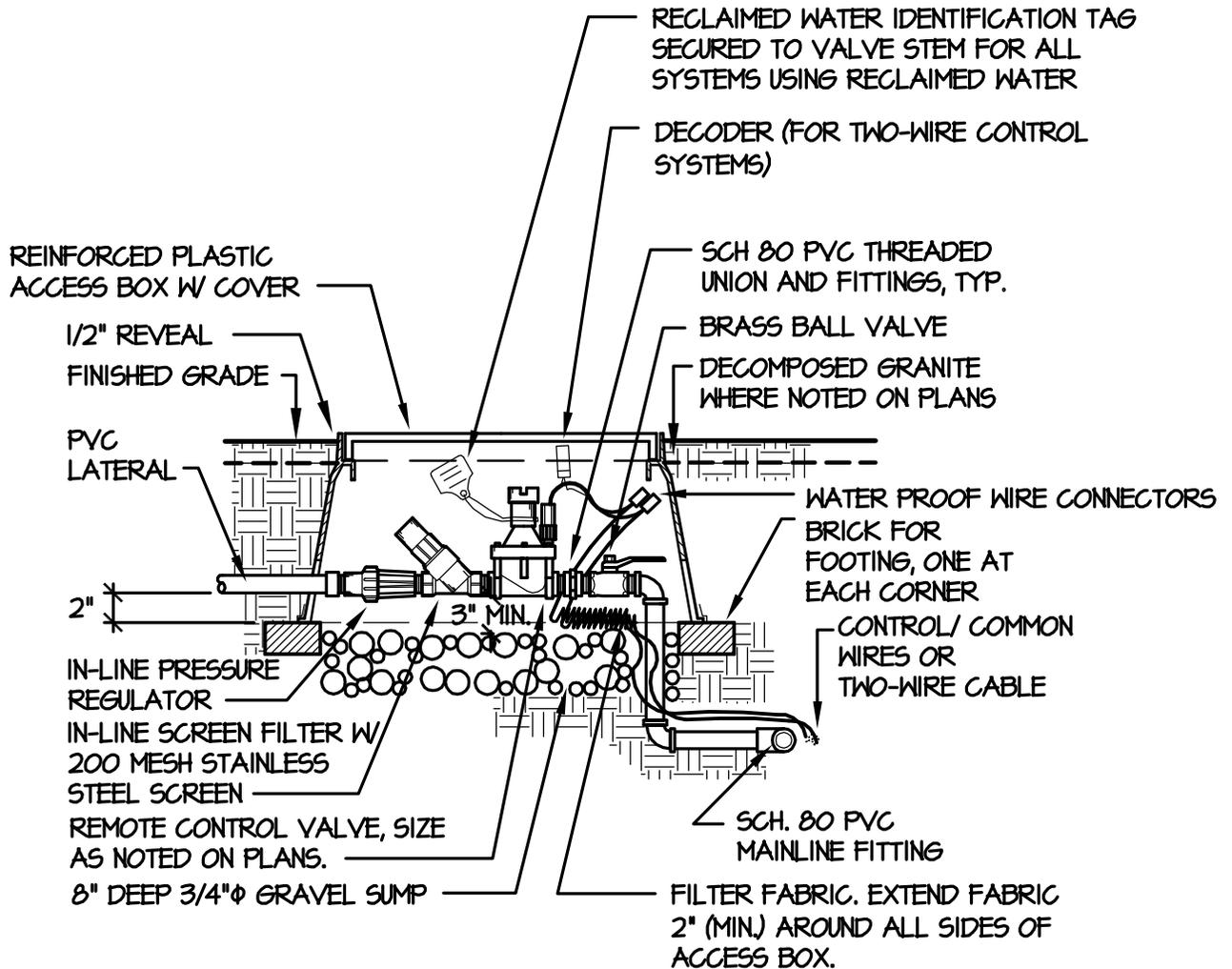
NOTE: RECLAIMED WATER IDENTIFICATION TAGS AVAILABLE FROM TUCSON WATER

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-309
REVISED:		REMOTE CONTROL VALVE ASSEMBLY - TURF ZONES	
			SHEET 1 OF 1

**NOTES:**

1. ALL WIRES TO BE INSTALLED PER LOCAL CODE. TAPE AND BUNDLE WIRES EVERY 20'. PROVIDE EXPANSION COIL AT EACH WIRE CONNECTION IN VALVE BOX (WRAP AROUND 1/2"  $\phi$  PIPE 15 TIMES).
2. COMPACT SOIL AROUND VALVE BOX TO SAME DENSITY AS ADJACENT UNDISTURBED SOIL.
3. ALL THREADED PVC JOINTS SHALL BE WRAPPED WITH TEFLON TAPE.



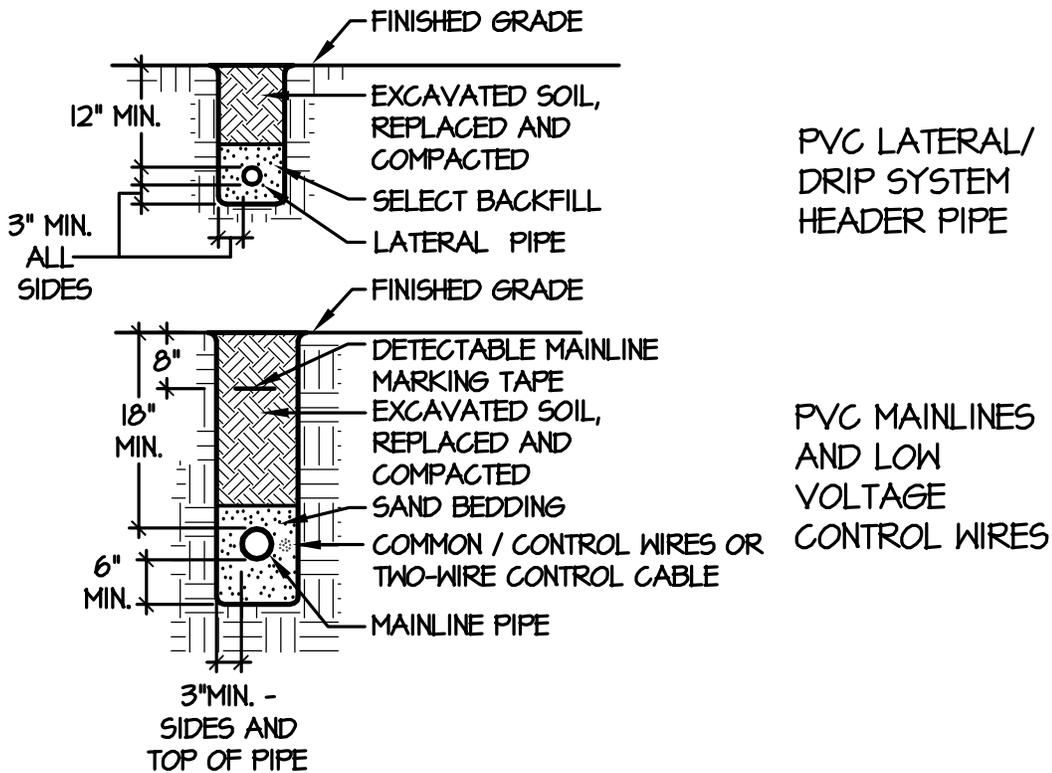
NOTE: RECLAIMED WATER IDENTIFICATION TAGS AVAILABLE FROM TUCSON WATER

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-310
REVISED:		REMOTE CONTROL VALVE ASSEMBLY - DRIP ZONES	

**NOTES:**

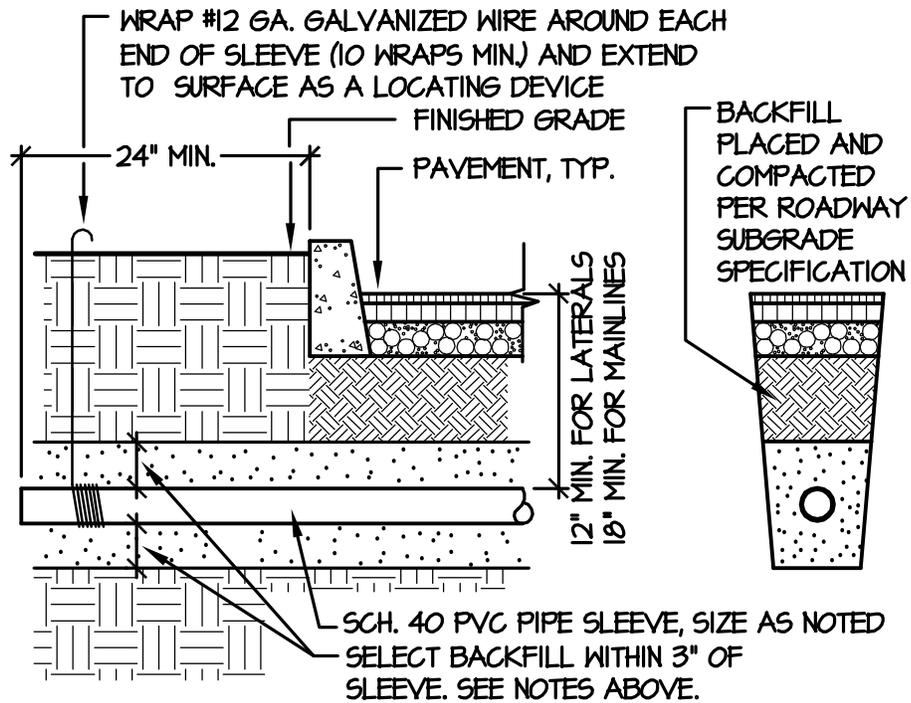
1. SELECT BACKFILL SHALL BE SAND OR SOIL FREE OF ROCKS AND STONES LARGER THAN 1/4" DIA.
2. BACKFILL MATERIAL SHALL BE WATERED IN AND COMPACTED TO DENSITY OF ADJACENT UNDISTURBED SOIL.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-311</b>
REVISED:		PIPE TRENCHING AND BACKFILL - MAINLINES, LATERALS, & MARKING TAPE	

**NOTE:** BACKFILL WITHIN 3" OF SLEEVE SHALL BE FREE OF ROCKS AND STONES LARGER THAN 1/4"φ. IF ROCK CANNOT BE REMOVED FROM EXCAVATED SOIL, PROVIDE CLEAN SAND BEDDING.



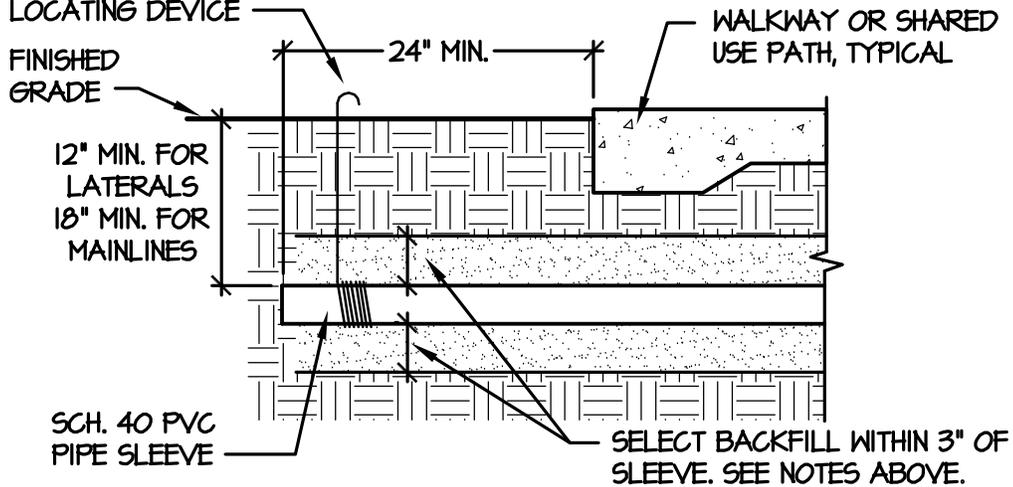
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-312
REVISED:		SLEEVE UNDER STREET OR PARKING LOT	

**NOTES:**

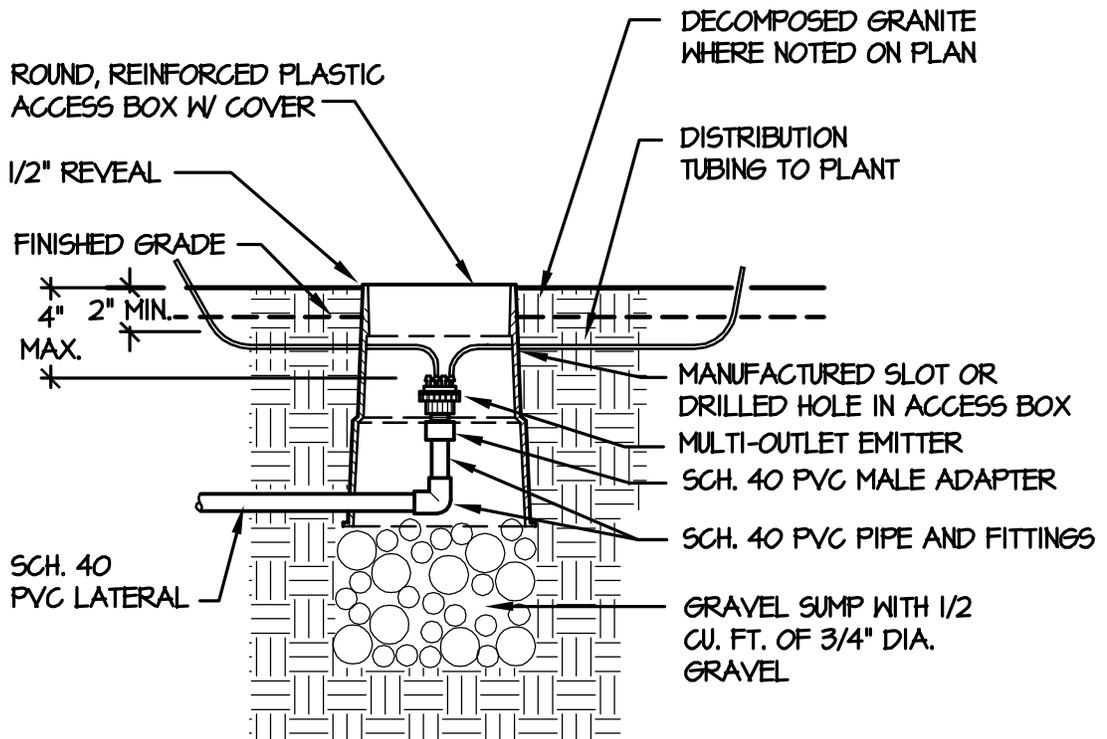
1. SLEEVES UNDER WALKWAYS SHALL BE SCHEDULE 40 PVC PIPE. SIZE SHALL BE AS NOTED ON PLANS.
2. BACKFILL WITHIN 3" OF SLEEVE SHALL BE FREE OF ROCKS AND STONES LARGER THAN 1/4" DIA. IF ROCK CANNOT BE REMOVED FROM EXCAVATED SOIL, PROVIDE CLEAN SAND BEDDING.

WRAP #12 GA. GALVANIZED WIRE AROUND EACH END OF SLEEVE (10 WRAPS MIN.) AND EXTEND TO SURFACE AS A LOCATING DEVICE



SCALE: N.T.S.

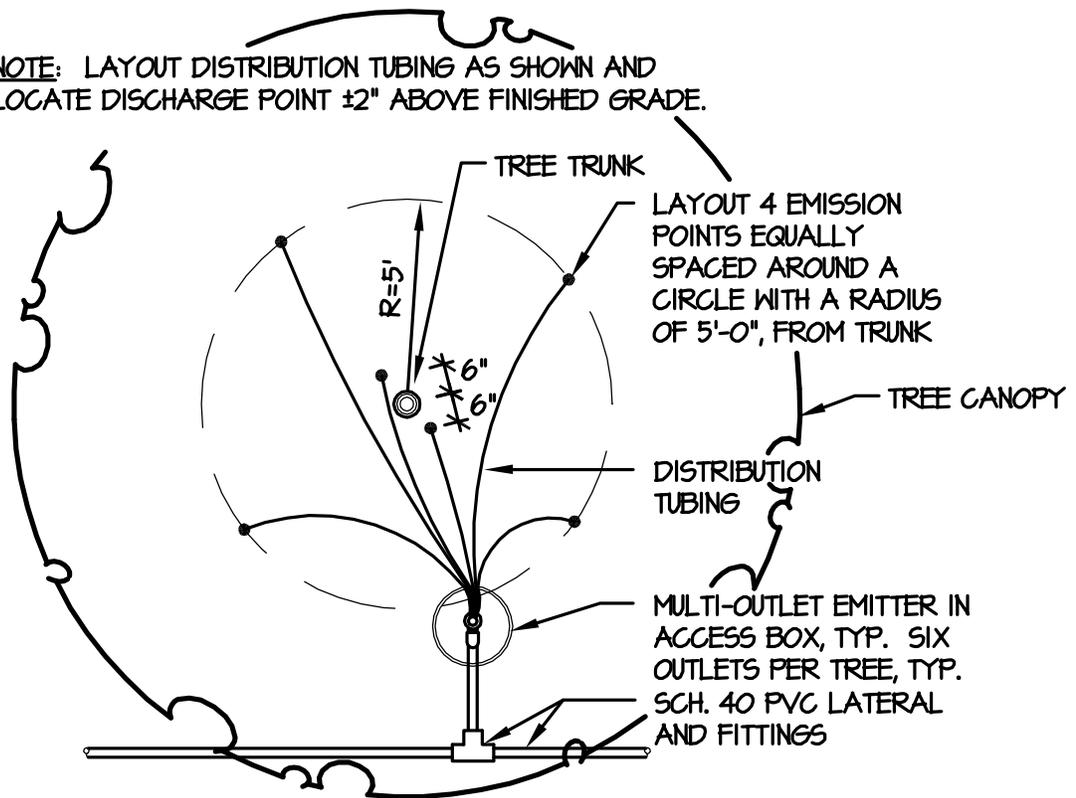
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<p><b>P-313</b></p>
REVISED:		SLEEVE UNDER WALKWAY OR SHARED USE PATH	



SCALE: N.T.S.

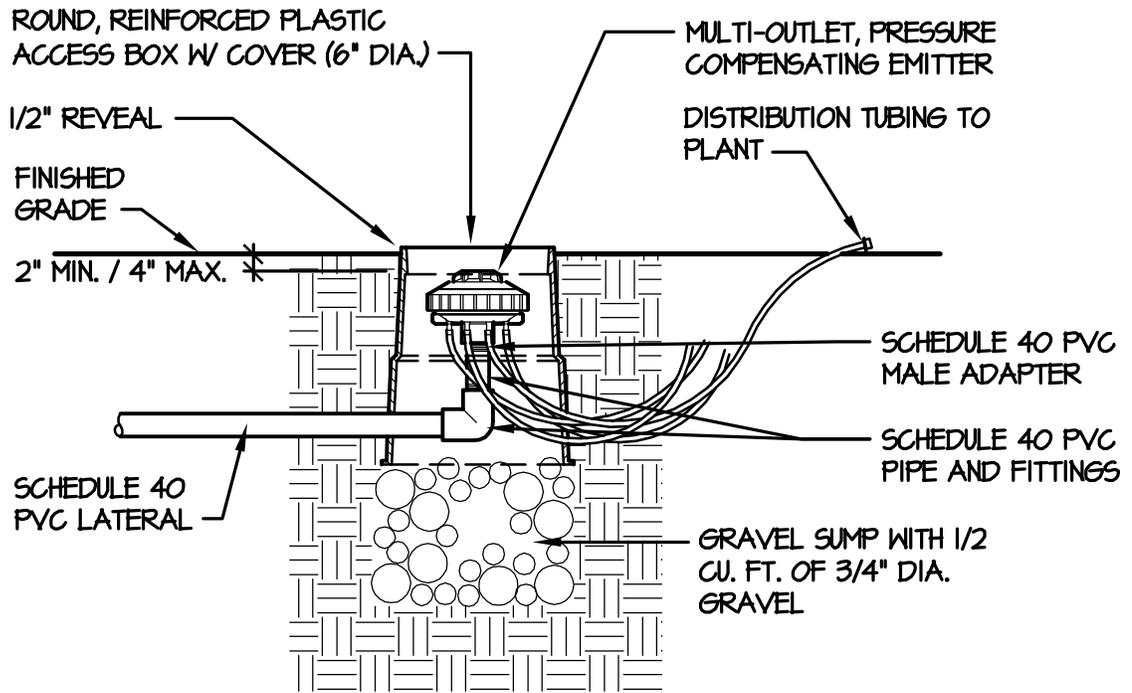
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-314
REVISED:		MULTI OUTLET EMITTER - SIX OUTLET	

**NOTE:** LAYOUT DISTRIBUTION TUBING AS SHOWN AND LOCATE DISCHARGE POINT  $\pm 2"$  ABOVE FINISHED GRADE.



SCALE: N.T.S.

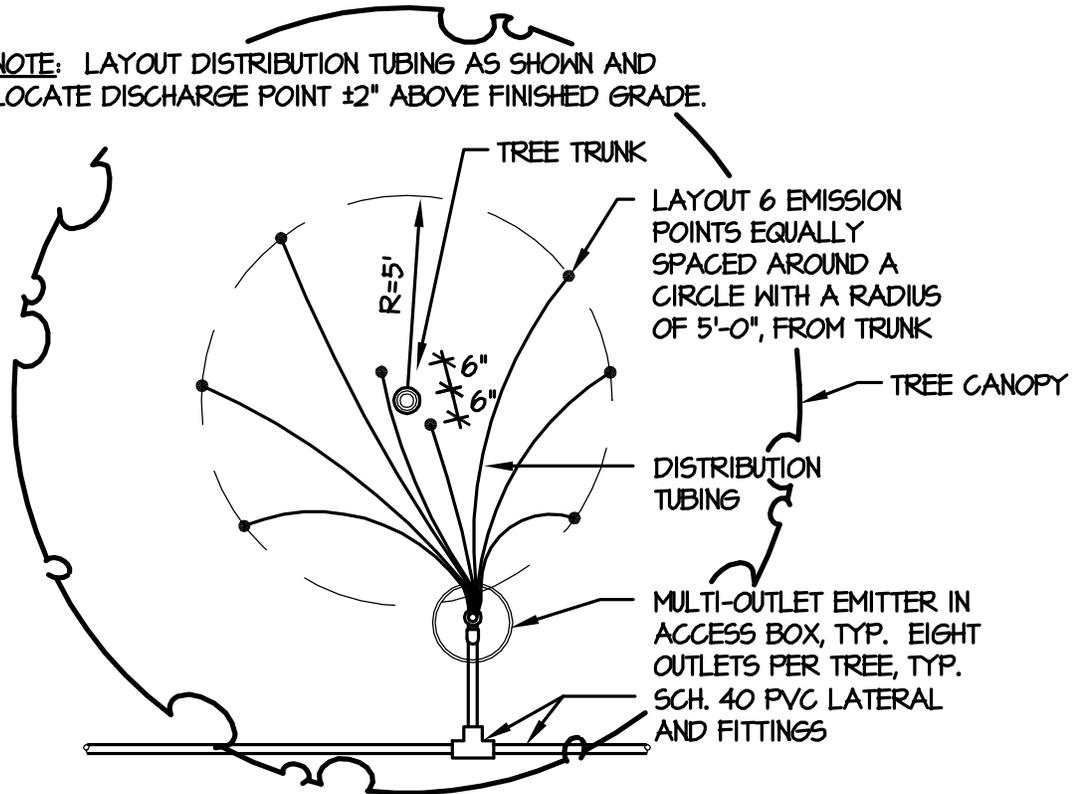
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-315</b>
REVISED:		EMITTER DISTRIBUTION TUBING LAYOUT AT TREE - SIX OUTLET	



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-316</b>
REVISED:		MULTI OUTLET EMITTER - EIGHT OUTLET	

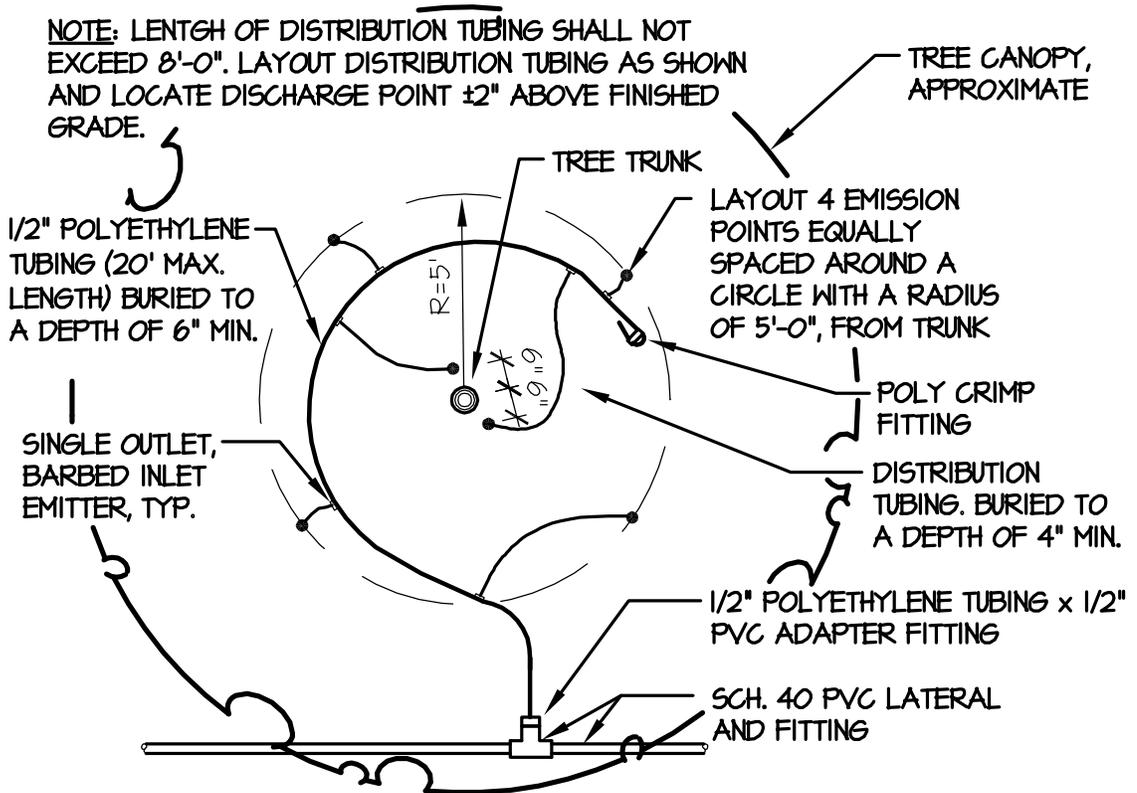
**NOTE:** LAYOUT DISTRIBUTION TUBING AS SHOWN AND LOCATE DISCHARGE POINT  $\pm 2"$  ABOVE FINISHED GRADE.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-317</b>
REVISED:		EMITTER DISTRIBUTION TUBING LAYOUT AT TREE - EIGHT OUTLET	

**NOTE:** LENGTH OF DISTRIBUTION TUBING SHALL NOT EXCEED 8'-0". LAYOUT DISTRIBUTION TUBING AS SHOWN AND LOCATE DISCHARGE POINT  $\pm 2"$  ABOVE FINISHED GRADE.

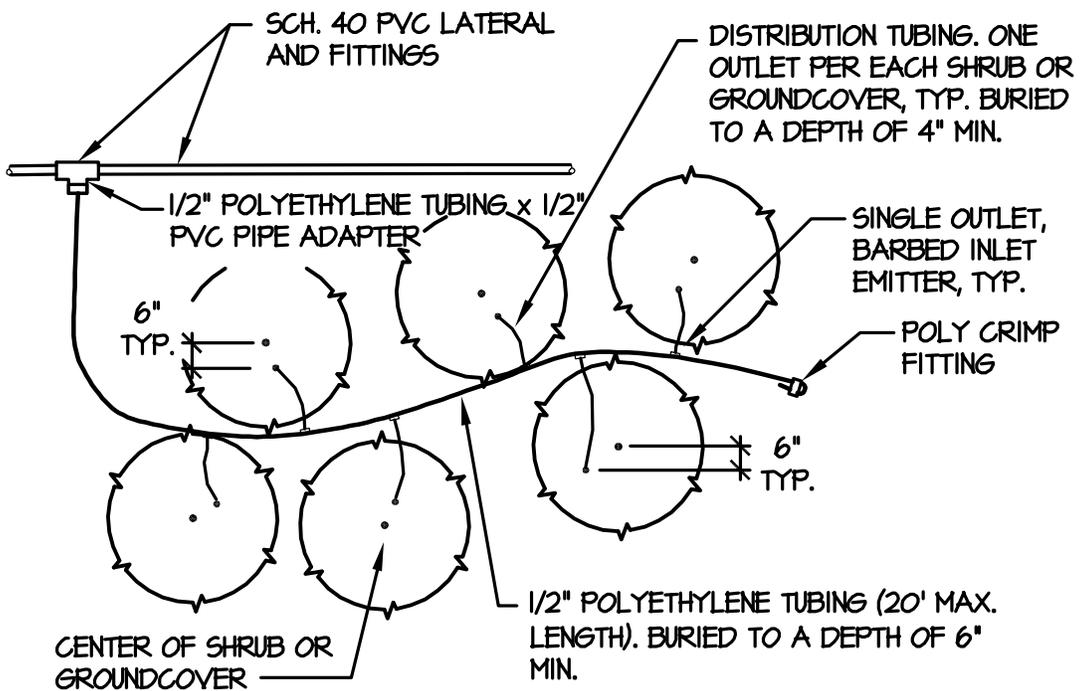


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-317A</b>
REVISED:		EMITTER/ POLYETHYLENE TUBING LAYOUT AT TREE - SIX EMITTERS PER TREE	

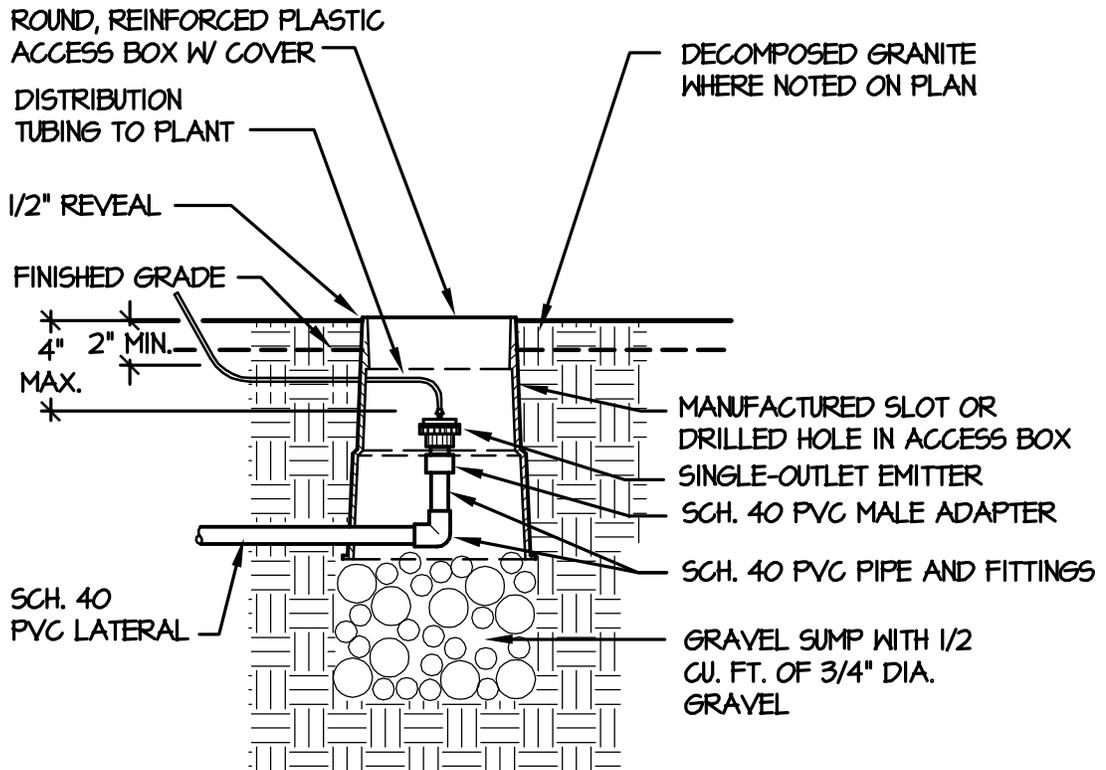
**NOTES:**

1. LENGTH OF DISTRIBUTION TUBING SHALL NOT EXCEED 8'-0".
2. LAYOUT DISTRIBUTION TUBING AS SHOWN AND LOCATE DISCHARGE POINT 2" ABOVE FINISHED GRADE.



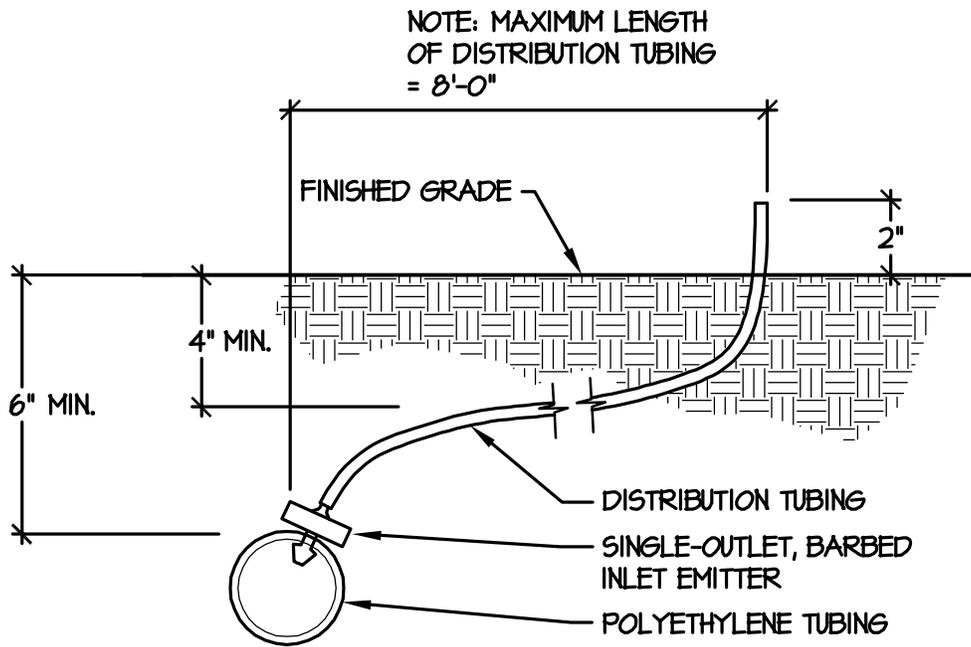
SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL IRRIGATION:	DETAIL NO.
REVISED:		EMITTER/ POLYETHYLENE TUBING LAYOUT AT SHRUBS	<b>P-317B</b>
			SHEET 1 OF 1



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-318
REVISED:		SINGLE OUTLET EMITTER ON PVC RISER	

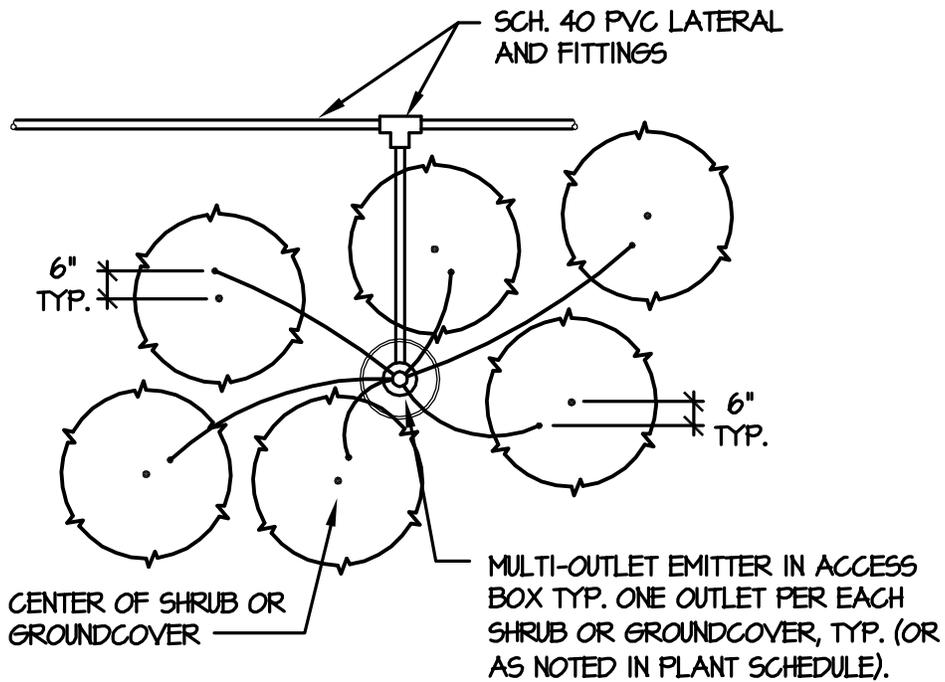


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-318A</b>
REVISED:		SINGLE OUTLET EMITTER WITH BARBED FITTING ON POLYETHYLENE TUBING	

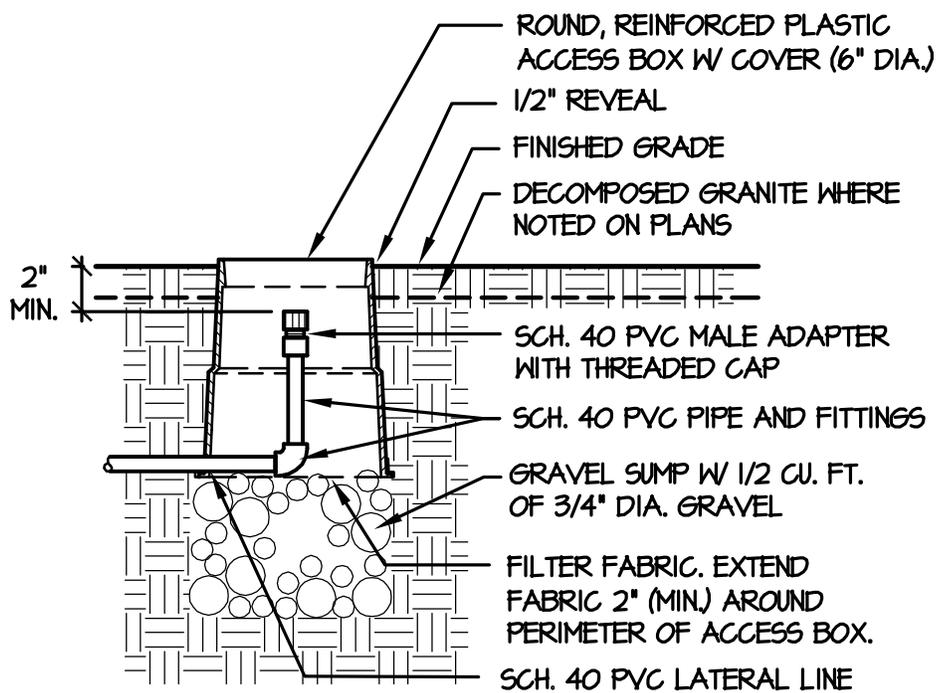
**NOTES:**

1. LENGTH OF DISTRIBUTION TUBING SHALL NOT EXCEED 8'-0".
2. LAYOUT DISTRIBUTION TUBING AS SHOWN AND LOCATE DISCHARGE POINT 2" ABOVE FINISHED GRADE.



SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL IRRIGATION:	DETAIL NO.
REVISED:		EMITTER DISTRIBUTION TUBING LAYOUT AT SHRUBS	<b>P-319</b>

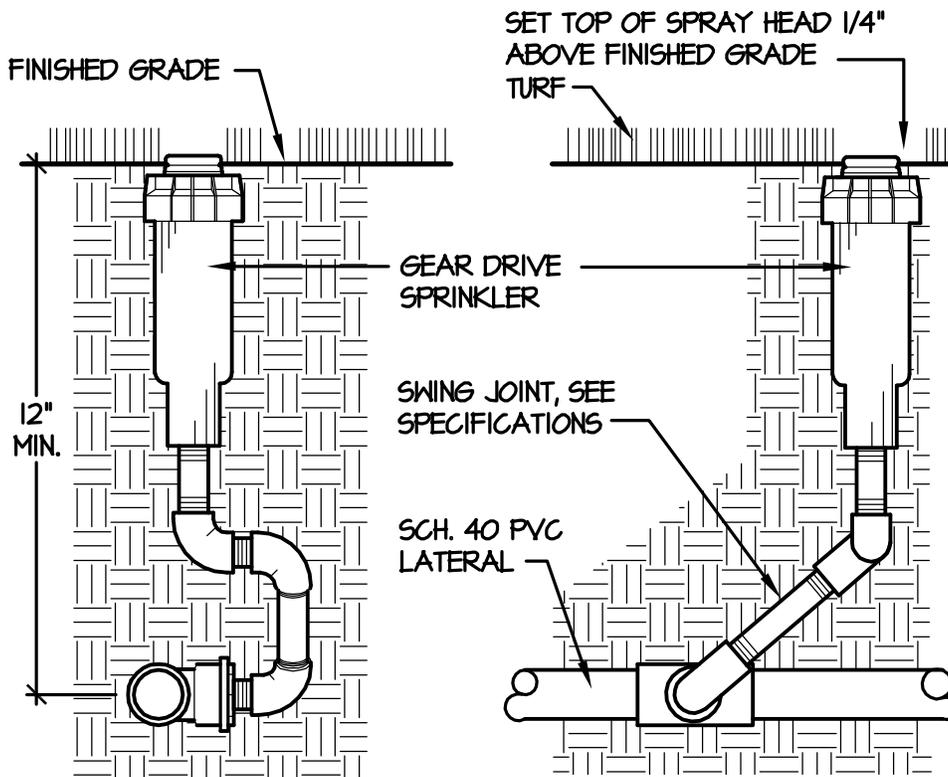


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-320
REVISED:		EMITTER LINE FLUSH CAP IN ACCESS BOX	

**NOTE:**

1. SET SPRINKLER HEAD A MINIMUM OF 6" FROM ANY ADJACENT PAVING OR EDGER.
2. SWING JOINT: PIPE SIZE EQUAL TO SPRINKLER INLET SIZE.



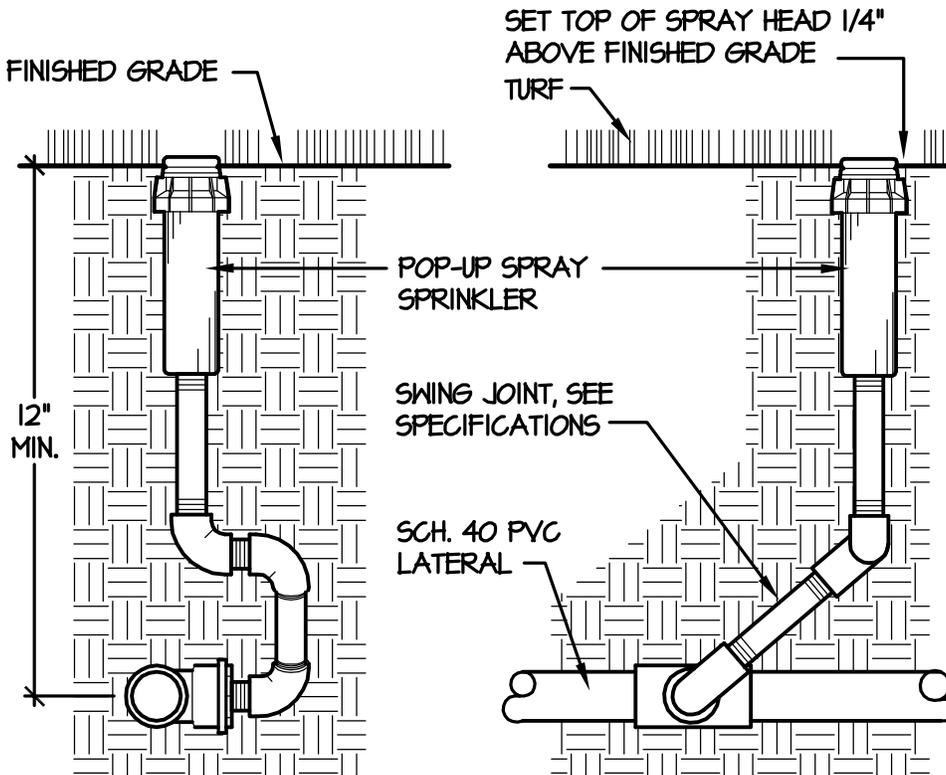
NOTE: TOP OF SPRINKLER HEAD SHALL BE COLOR CODED PURPLE FOR ALL SPRINKLER HEADS APPLYING RECLAIMED WATER

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-321
REVISED:		GEAR DRIVE SPRINKLER	

**NOTE:**

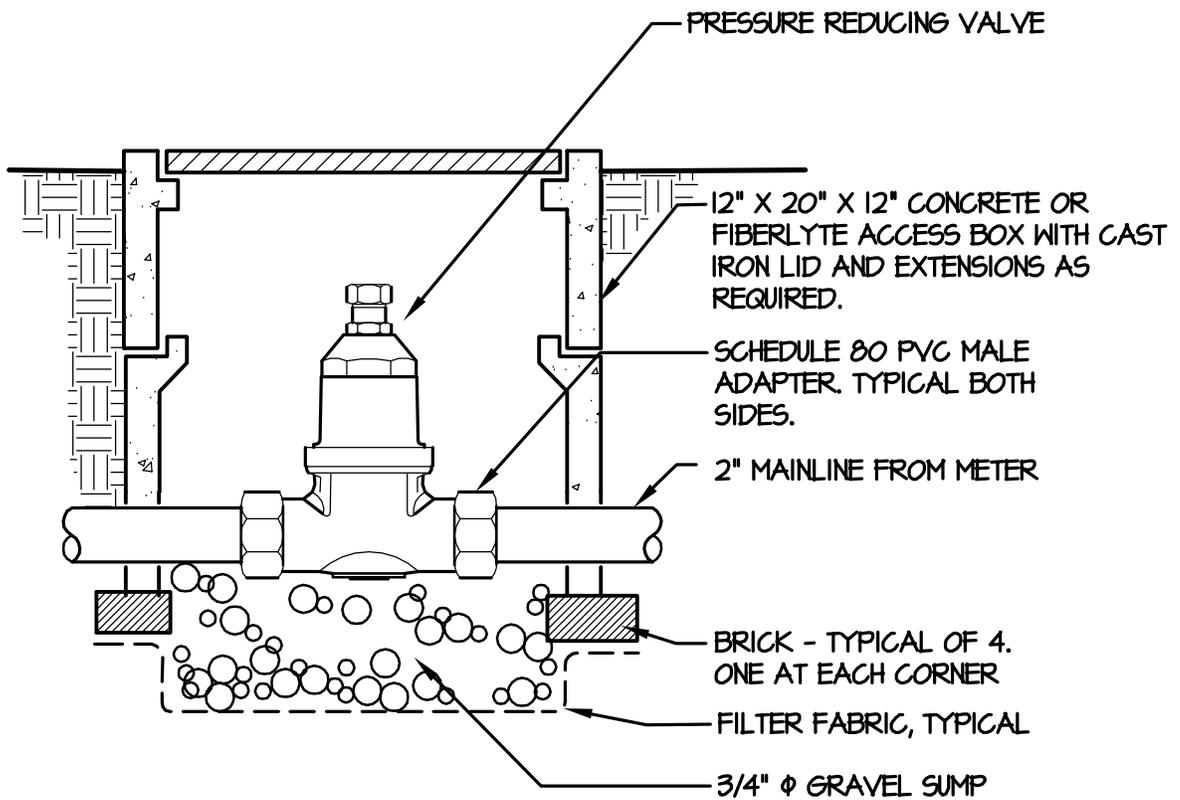
1. SET SPRINKLER HEAD A MINIMUM OF 6" FROM ANY ADJACENT PAVING OR EDGER.
2. SWING JOINT: PIPE SIZE EQUAL TO SPRINKLER INLET SIZE.



NOTE: TOP OF SPRINKLER HEAD SHALL BE COLOR CODED PURPLE FOR ALL SPRINKLER HEADS APPLYING RECLAIMED WATER

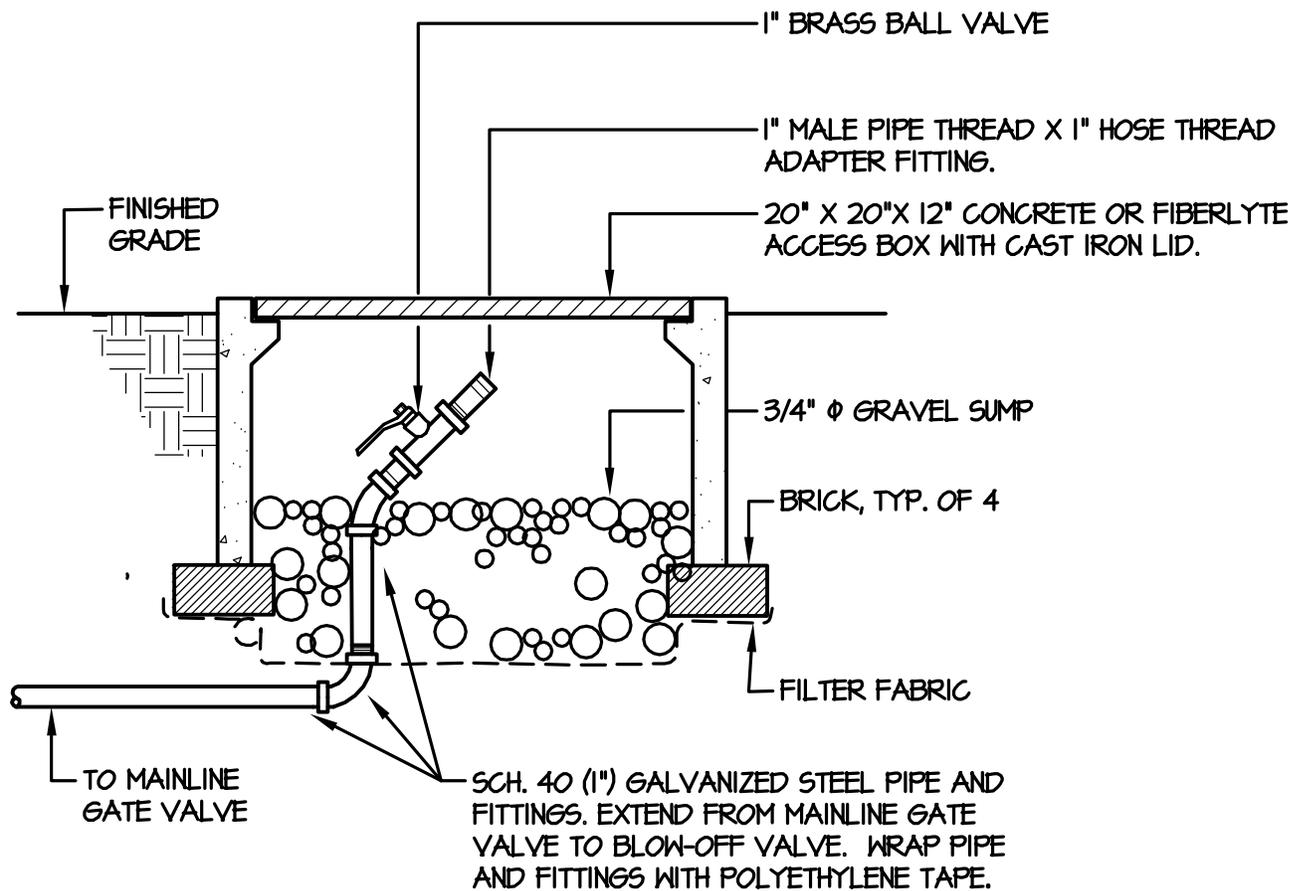
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-322</b>
REVISED:		POP-UP SPRAY SPRINKLER	



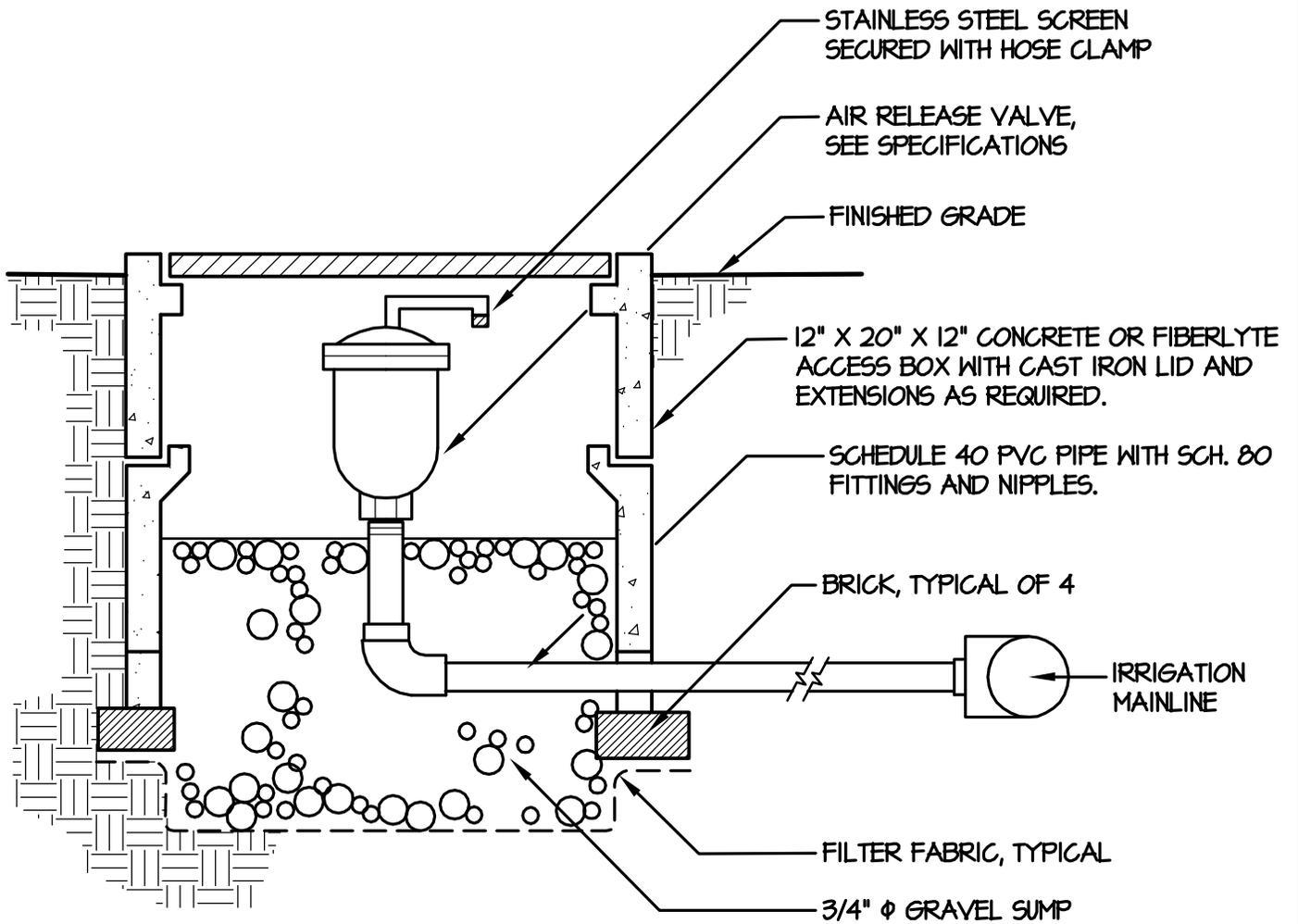
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-323
REVISED:		PRESSURE REDUCING VALVE	



SCALE: N.T.S.

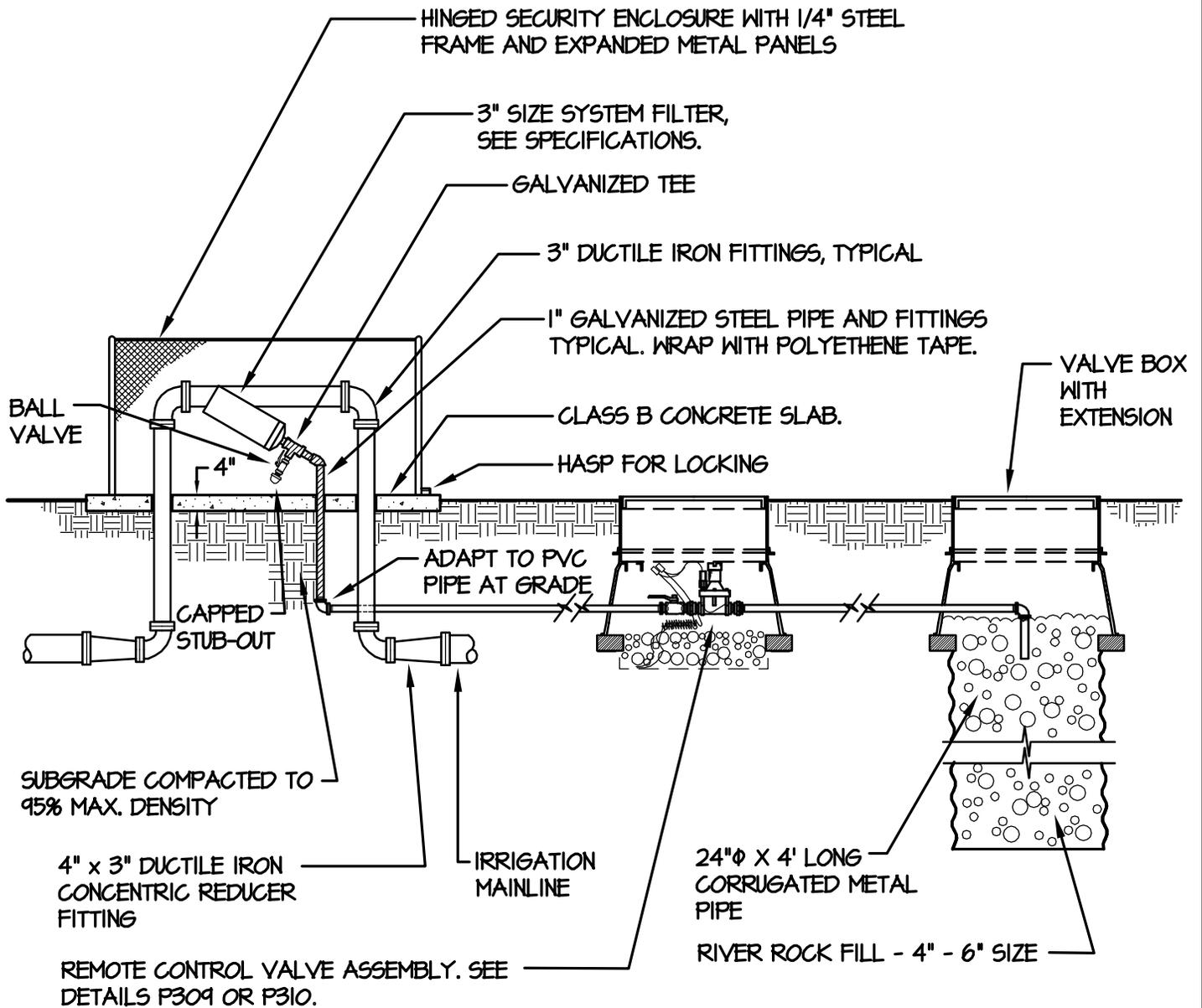
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-324</b>
REVISED:		BLOW-OFF VALVE ASSEMBLY	



SCALE: N.T.S.

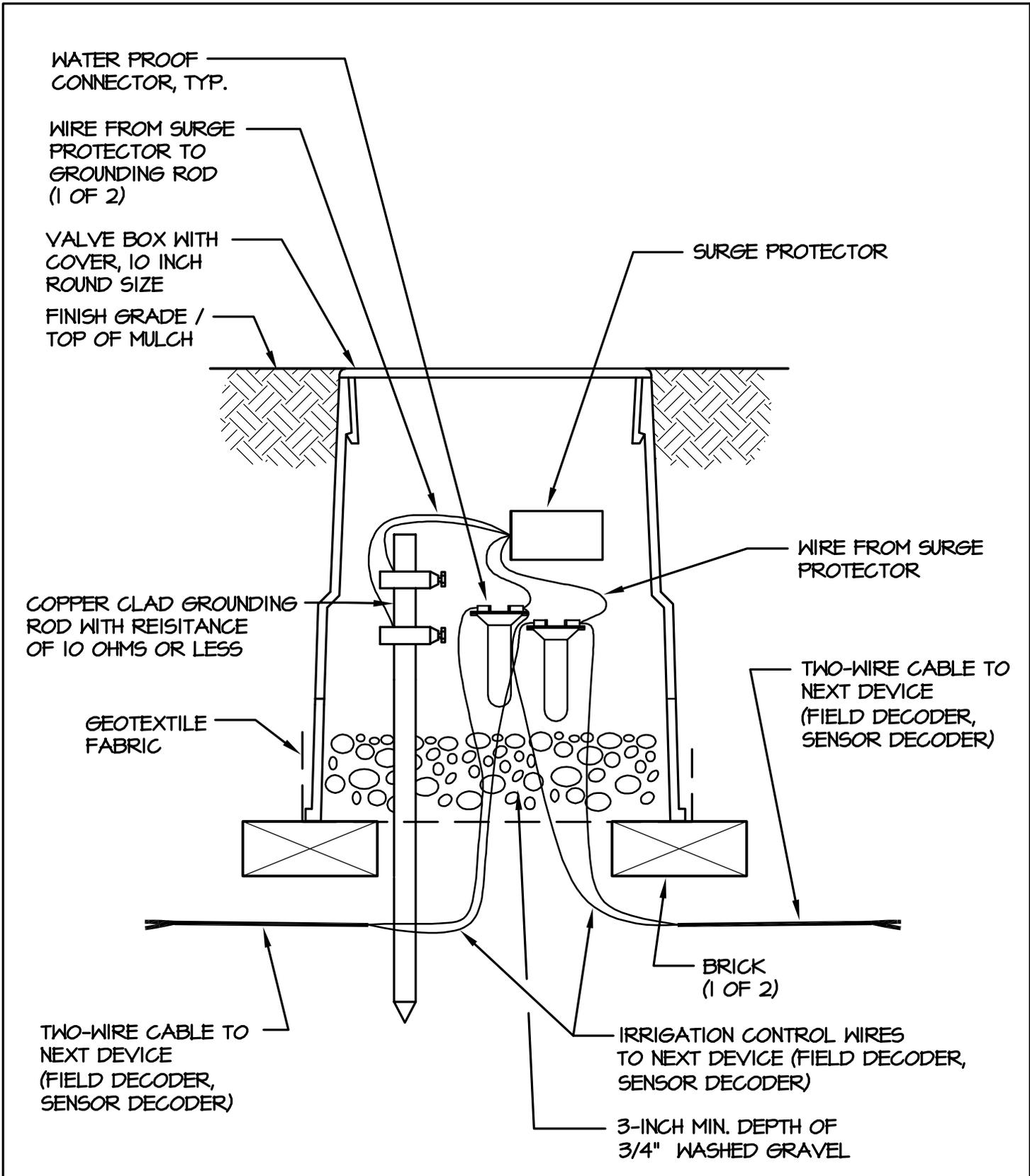
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-325</b>
REVISED:		COMBINATION AIR AND VACUUM RELEASE VALVE	
			SHEET 1 OF 1

NOTE:  
 BACKFLUSH SUMP LOCATION SHALL BE AS  
 APPROVED BY ENGINEER.



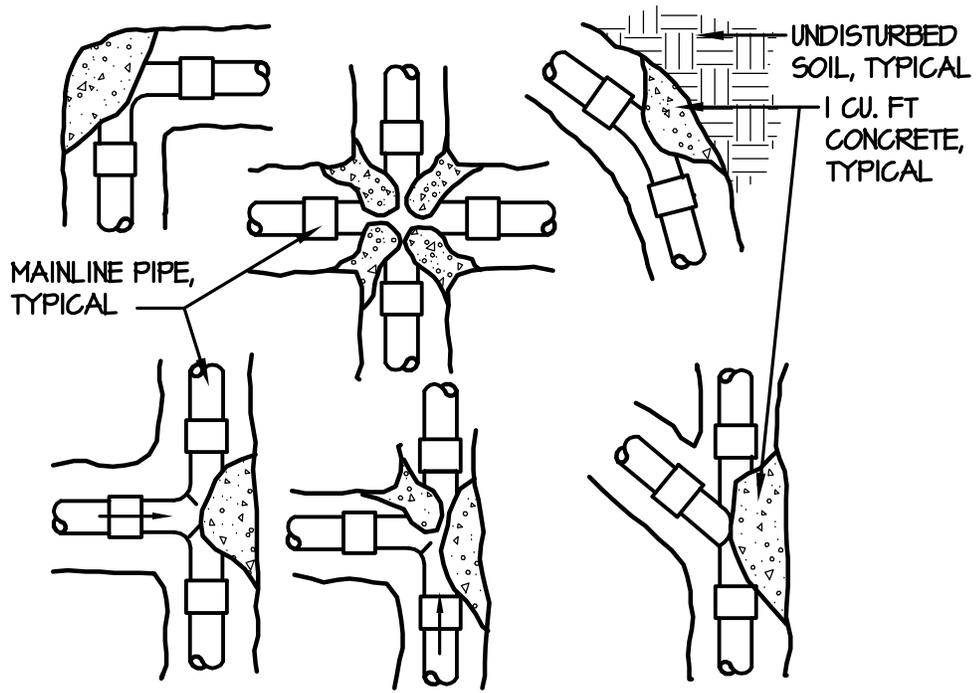
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b>          NATURAL RESOURCES          PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<p><b>P-326</b></p>
REVISED:		SYSTEM FILTER AND AUTOMATED BACK-FLUSH SYSTEM	



SCALE: N.T.S.

ISSUED: 01/16	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL IRRIGATION:	DETAIL NO.
REVISED:		SURGE PROTECTION AND GROUND ROD FOR TWO-WIRE SYSTEMS	<b>P-327</b>
			SHEET 1 OF 1



THRUST BLOCKS TO BE INSTALLED AT 4" MAINLINE  
CHANGES IN DIRECTION GREATER THAN 30°

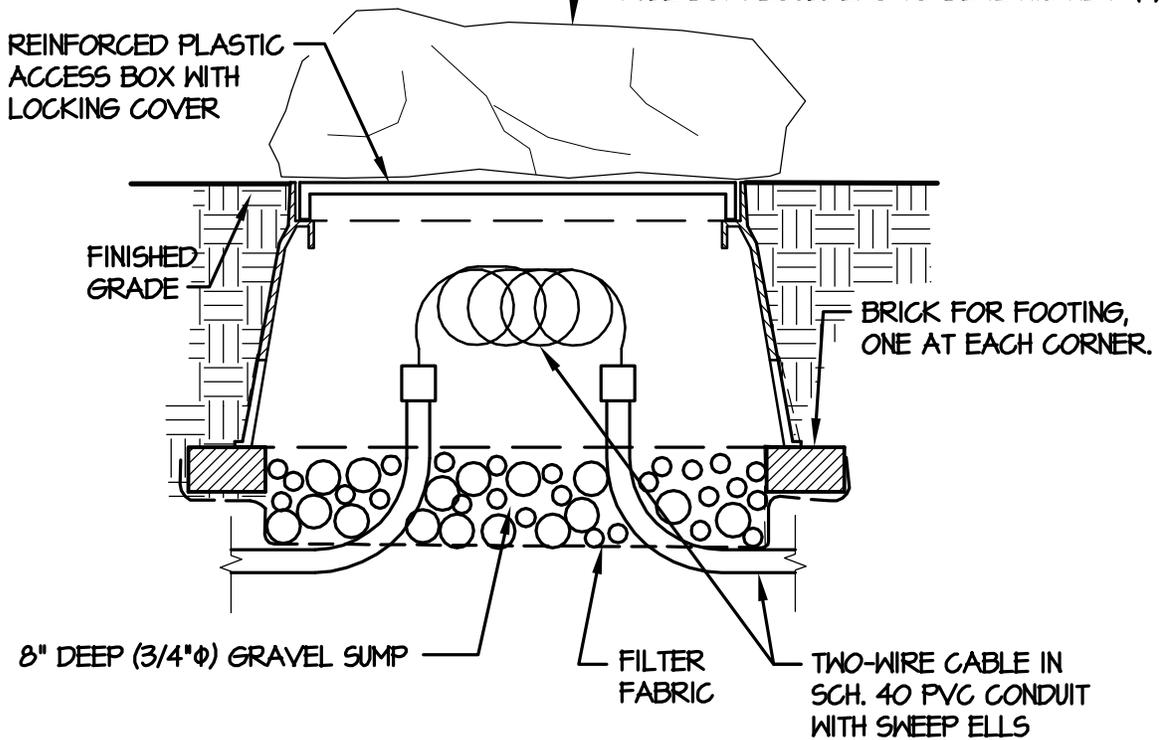
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-328</b>
REVISED:		CONCRETE THRUST BLOCK	

**NOTE:**

- I. PROVIDE A PULL BOX EVERY 200 FEET (MAX.). RETAIN 3' LONG COIL OF COMMUNICATION CABLE IN EACH PULL BOX.

AFTER INSTALLATION AND TESTING OF CONTROL SYSTEM, INSTALL ONE SMALL/FLAT BOULDER ON TOP OF EACH PULL BOX. BOULDERS TO BE 12"x18"x24" (±).

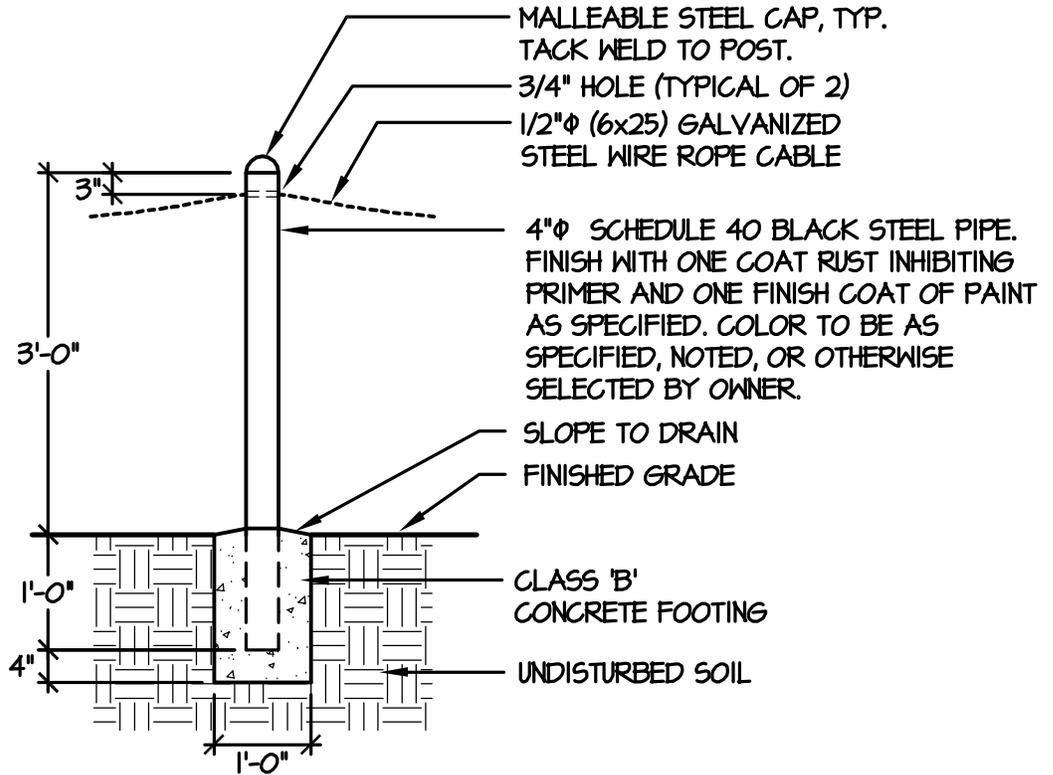


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	P-329
REVISED:		PULL BOX FOR TWO-WIRE CABLE	

**NOTES:**

1. CABLE TO BE TERMINATED AT END/CORNER PANELS ONLY. SPLICING OF CABLE BETWEEN END/CORNER PANELS IS PROHIBITED.
2. DISTANCE BETWEEN POSTS SHALL BE 12'-0".

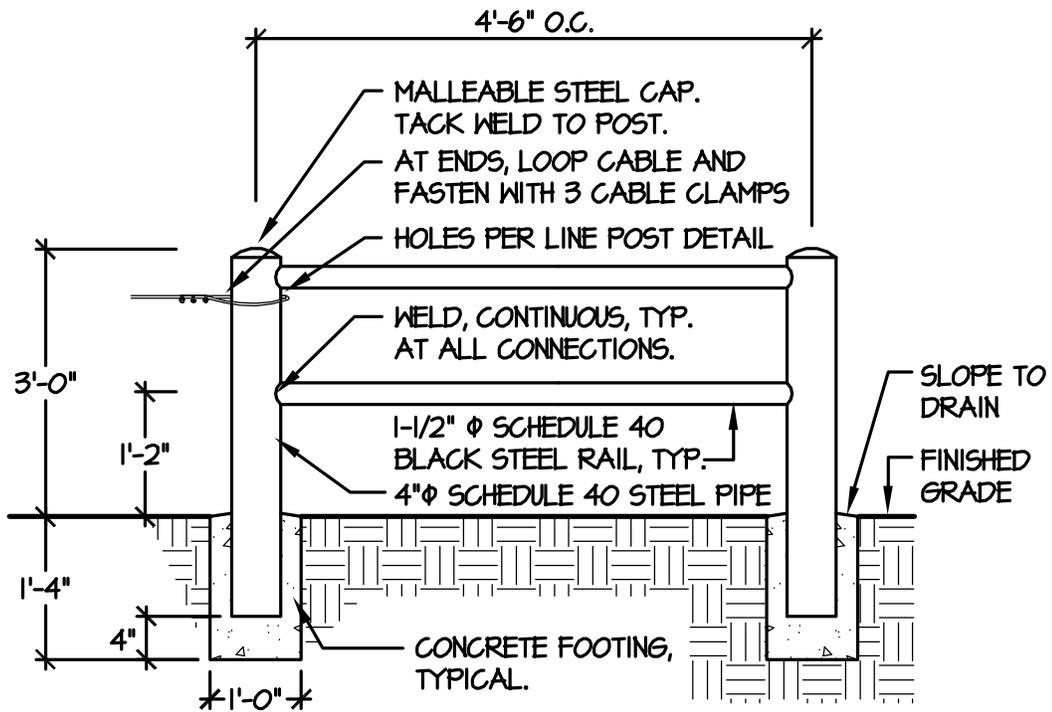


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		POST AND CABLE BARRIER:	<b>P-400</b>
REVISED:		POST & CABLE BARRIER	

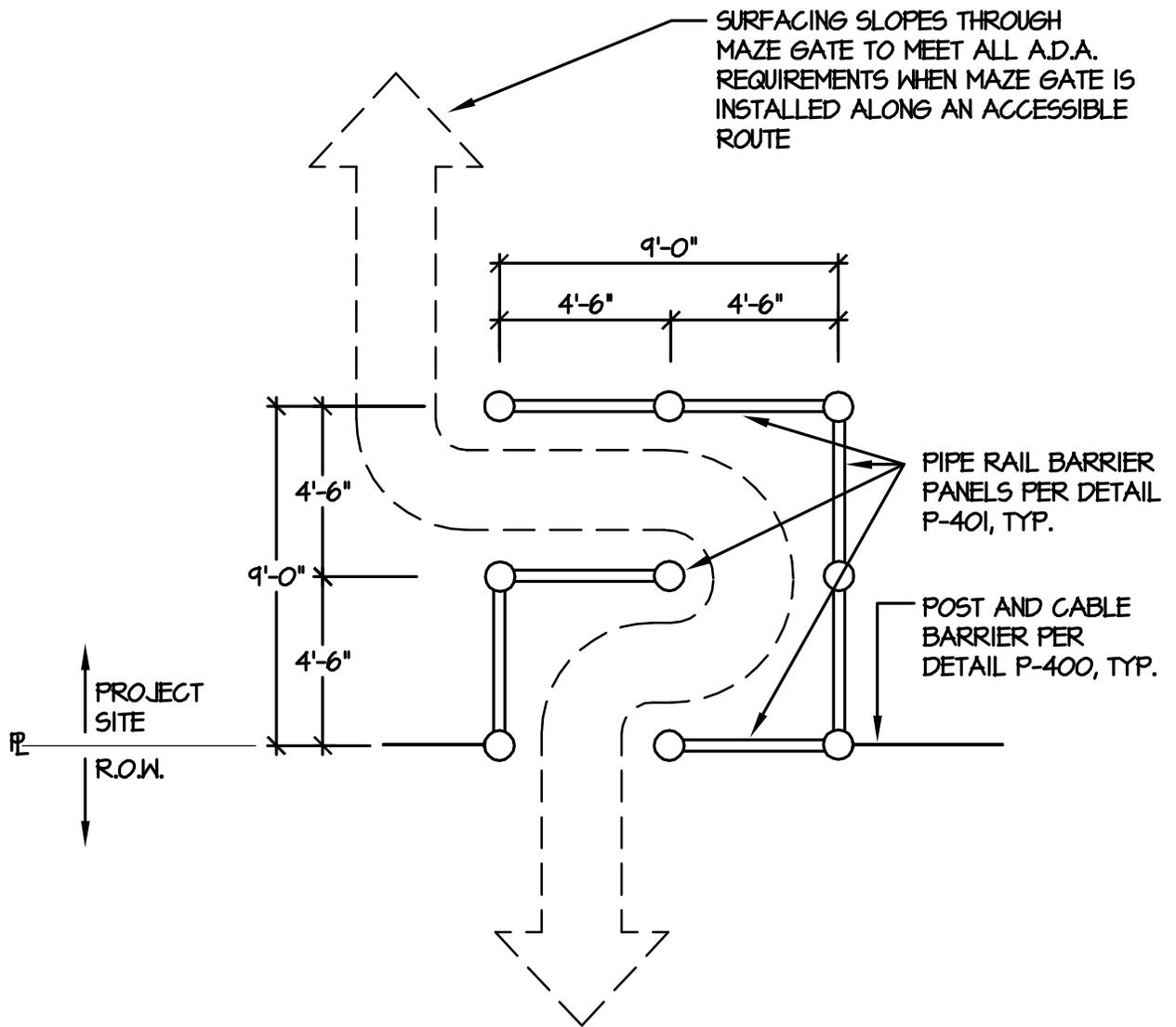
**NOTES:**

1. GRIND SMOOTH ALL WELDS. PAINT ALL POSTS AND RAILS WITH ONE COAT RUST INHIBITING PRIMER AND ONE COAT FINISH PAINT AS SPECIFIED. COLOR TO BE AS SPECIFIED, NOTED, OR SELECTED BY OWNER.
2. AT CORNERS, PROVIDE SECOND 'END CONDITION' PANEL AT RIGHT ANGLE TO FIRST.



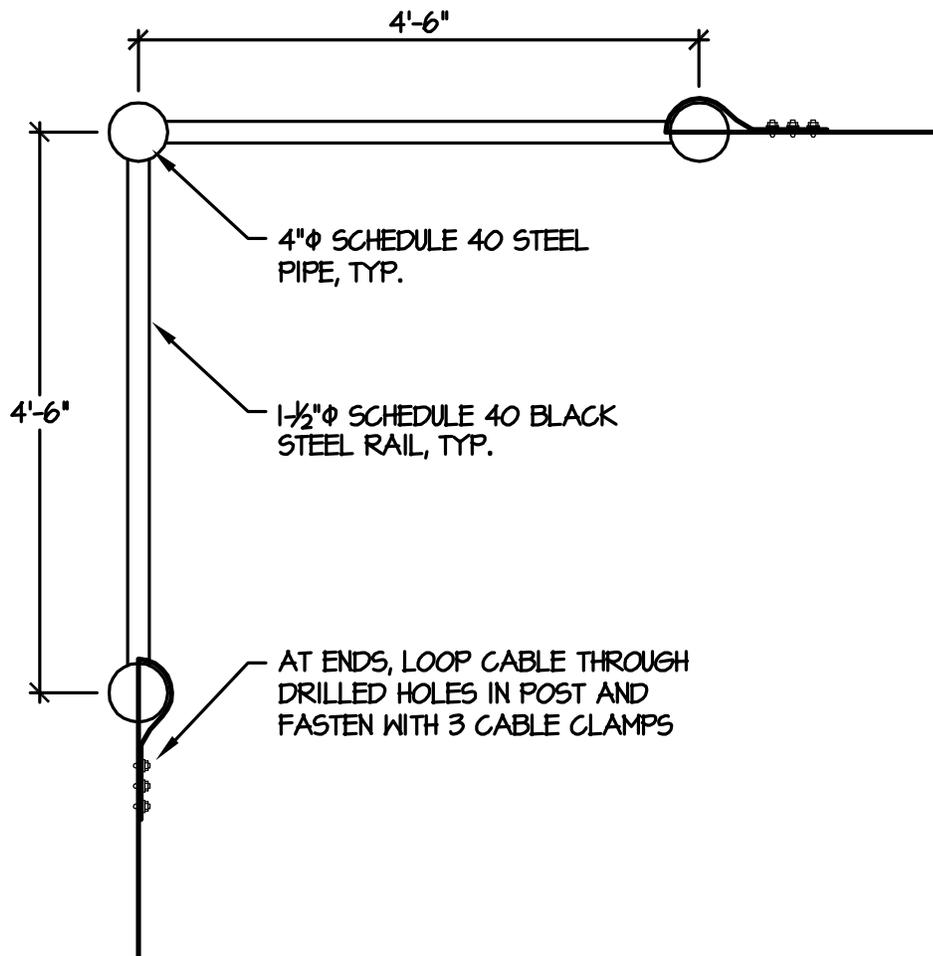
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		IRRIGATION:	<b>P-401</b>
REVISED:		POST & CABLE BARRIER, END & CORNER PANEL	



SCALE: N.T.S.

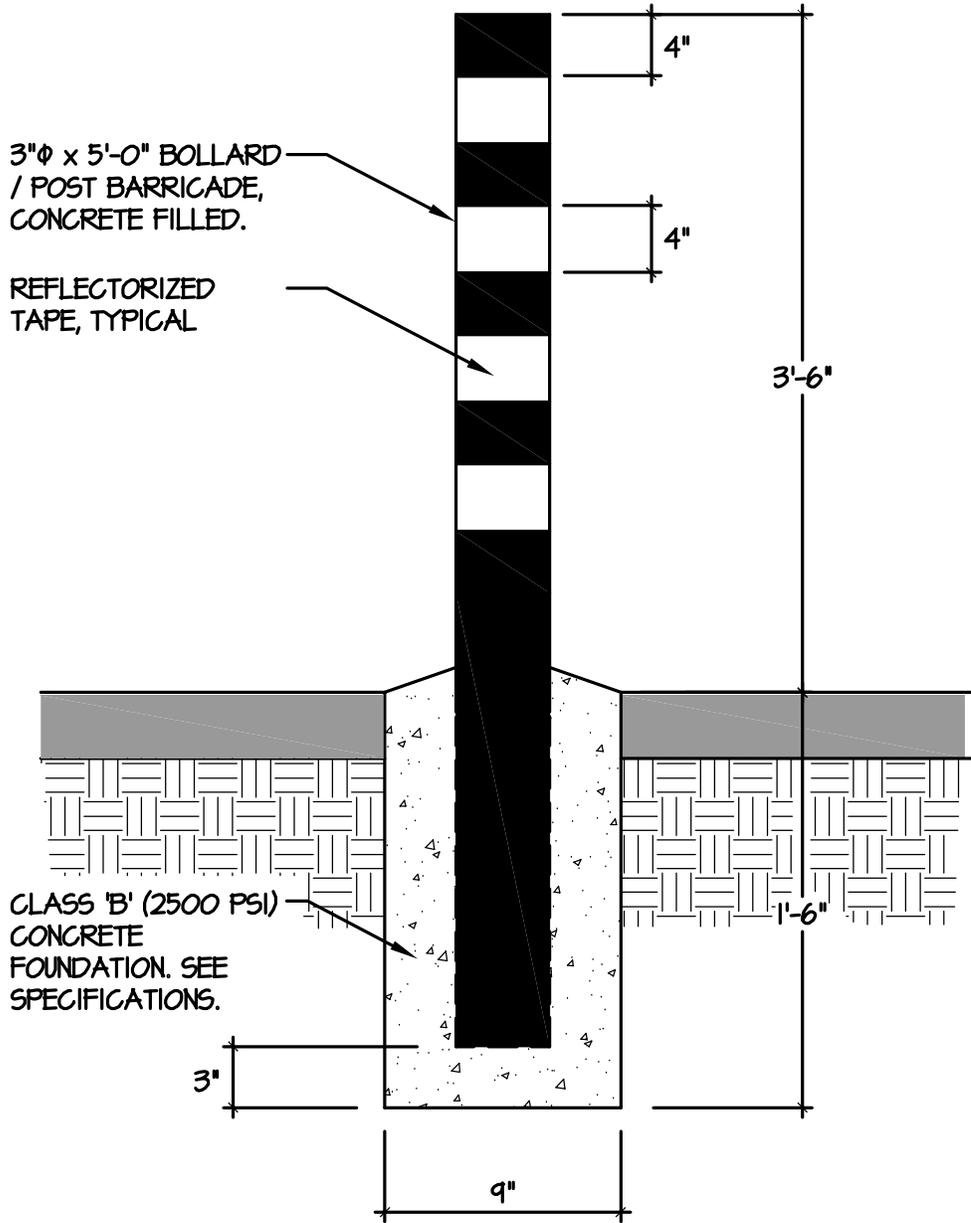
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		POST AND CABLE BARRIER:	P-402
REVISED:		MAZE GATE IN POST-AND-CABLE BARRIER	



PLAN

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		POST & CABLE BARRIER:	<b>P-403</b>
REVISED:		POST & CABLE BARRIER, END & CORNER PANEL PLAN VIEW	

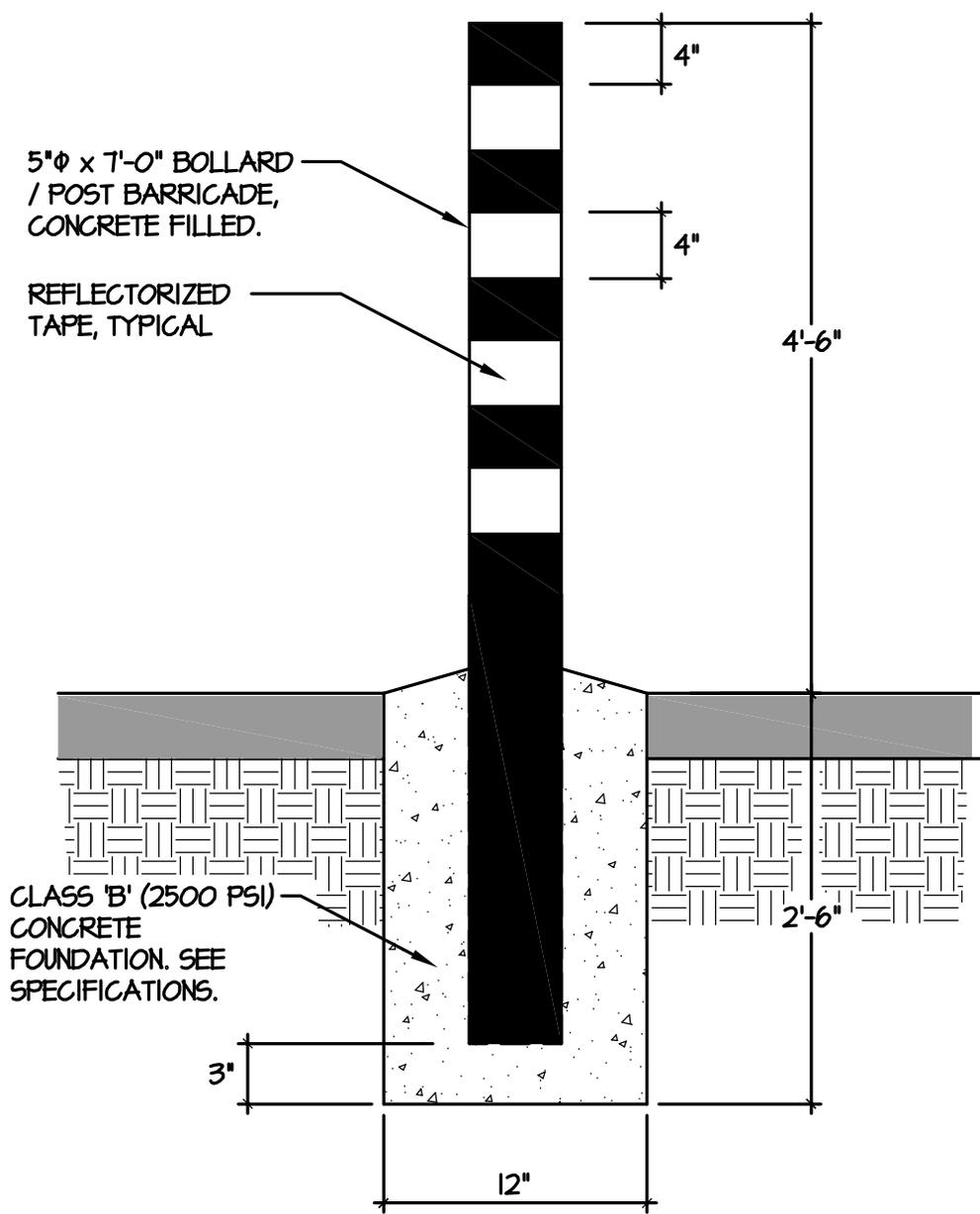


**NOTE:**

BOLLARDS / POST BARRICADES SHALL BE PAINTED WITH ONE COAT OF RUST INHIBITING RED OXIDE PRIMER AND ONE FINISH COAT OF FLAT ENAMEL PAINT AS SPECIFIED. COLOR OF FINISH COAT SHALL BE BLACK UNLESS OTHERWISE NOTED. PAINTED BOLLARDS / POST BARRICADES SHALL RECEIVE FOUR (4) REFLECTORIZED TAPE AS SHOWN.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BOLLARDS	<b>P-404</b>
REVISED:		BOLLARD / POST BARRICADE TYPE "A"	

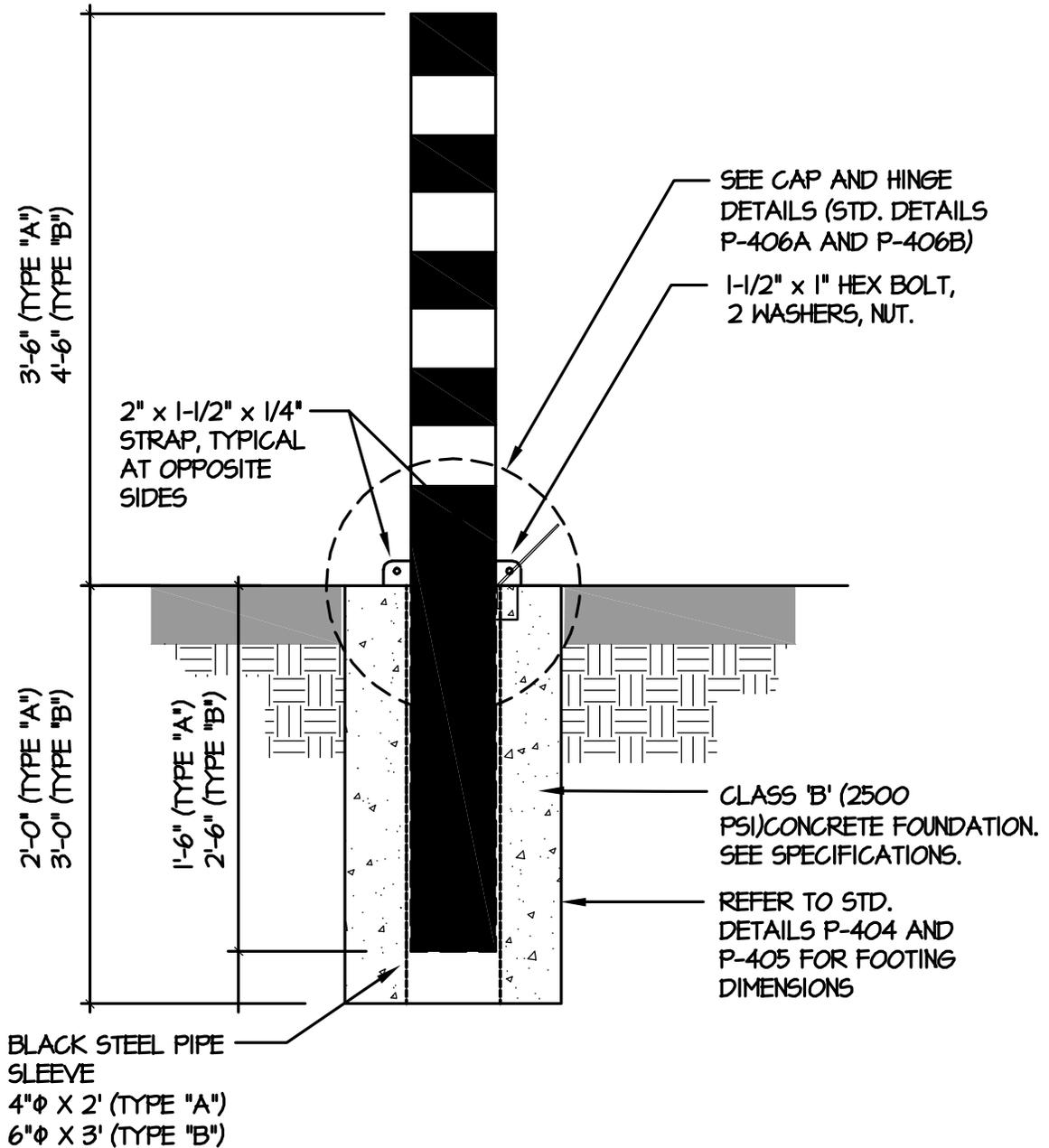


**NOTE:**

BOLLARDS / POST BARRICADES SHALL BE PAINTED WITH ONE COAT OF RUST INHIBITING RED OXIDE PRIMER AND ONE FINISH COAT OF FLAT ENAMEL PAINT AS SPECIFIED. COLOR OF FINISH COAT SHALL BE BLACK UNLESS OTHERWISE NOTED. PAINTED BOLLARDS / POST BARRICADES SHALL RECEIVE FOUR (4) BANDS OF 4" REFLECTORIZED TAPE AS SHOWN.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BOLLARDS	P-405
REVISED:		BOLLARD / POST BARRICADE TYPE "B"	

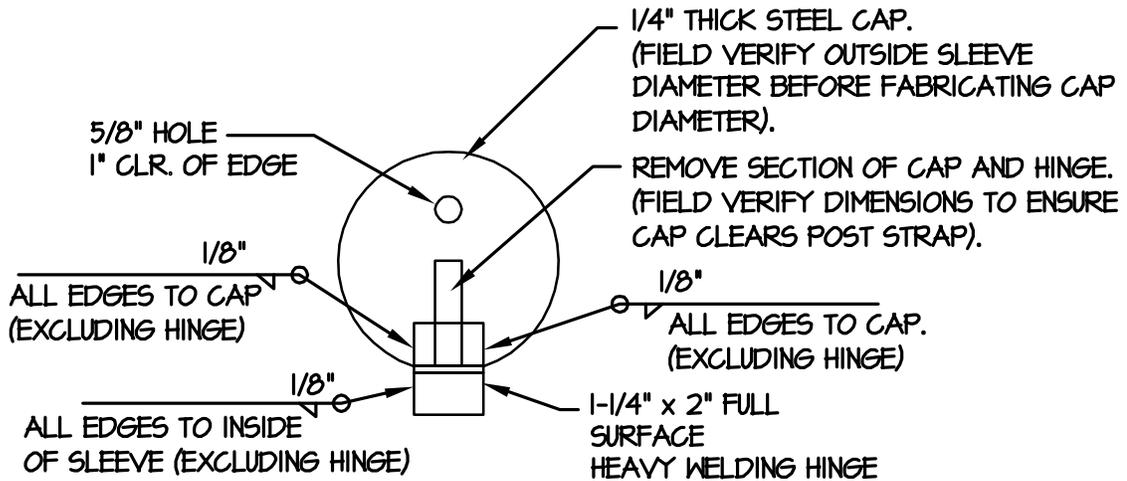
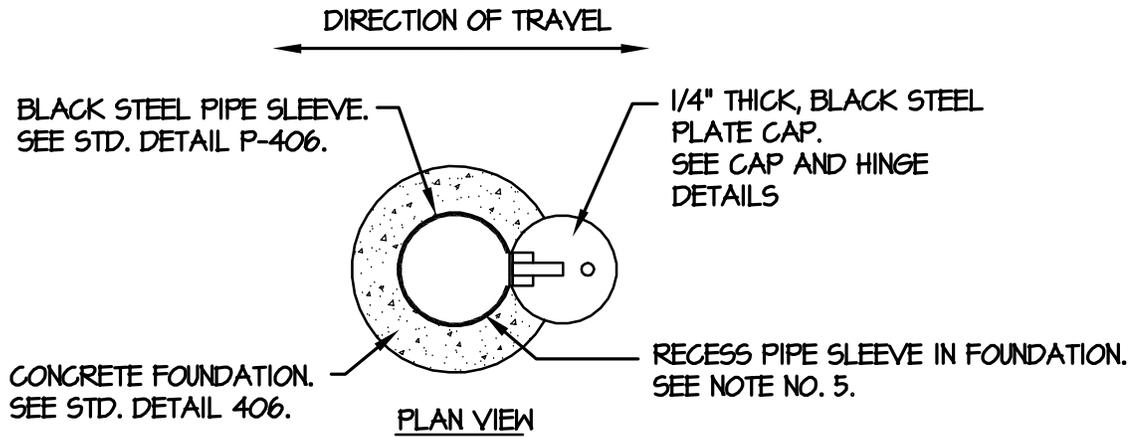


**NOTE:**

1. REMOVABLE POST BARRICADE SHALL NOT BE FILLED WITH CONCRETE.
2. HAND TIGHTEN BOLT & NUT USING WASHERS EACH SIDE OF STRAPS. CUT BOLT APPROX. 1/8" FROM FACE OF NUT & PEEN EXPOSED END OF BOLT.
3. REFER TO STD. DETAILS P-404 AND P-405.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BOLLARDS	P-406
REVISED:		REMOVABLE BOLLARD / POST BARRICADE	



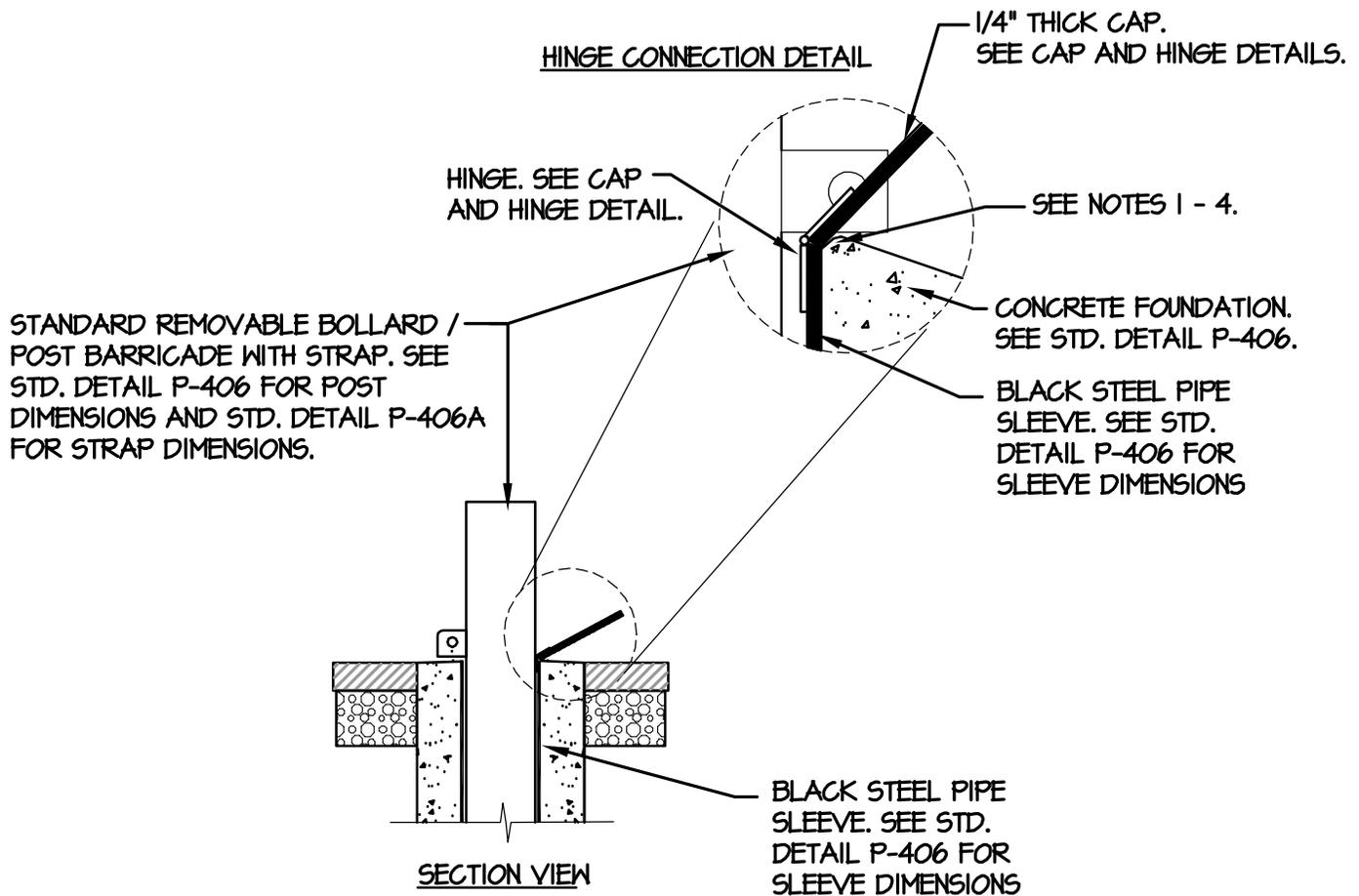
CAP AND HINGE DETAIL

**GENERAL NOTES:**

1. WHEN ATTACHING HINGE TO EXISTING PIPE SLEEVE, FIELD ADJUST TO ENSURE REMOVABLE POST AND HINGE FIT IN SLEEVE. REMOVE PORTION OF SLEEVE AND CONCRETE FOUNDATION AS NECESSARY.
2. WHEN NEW REMOVABLE POST BARRICADE ASSEMBLY IS BEING CONSTRUCTED, REMOVE 1-1/4" x 2" SECTION FROM TOP OF SLEEVE FOR HINGE AND WELD.
3. FIELD VERIFY OPERATION OF HINGE TO ENSURE FULL ROTATION.
4. ENSURE THAT THE TOP OF HINGE IS BELOW THE TOP OF THE CONCRETE FOUNDATION.
5. FOR NEW BOLLARDS / POST BARRICADES, RECESS PIPE SLEEVE IN FOUNDATION TO RECEIVE FLUSH CAP WHEN IN CLOSED POSITION.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BOLLARDS	P-406A
REVISED:		REMOVABLE BOLLARD / POST BARRICADE CAP AND HINGE	



**GENERAL NOTES:**

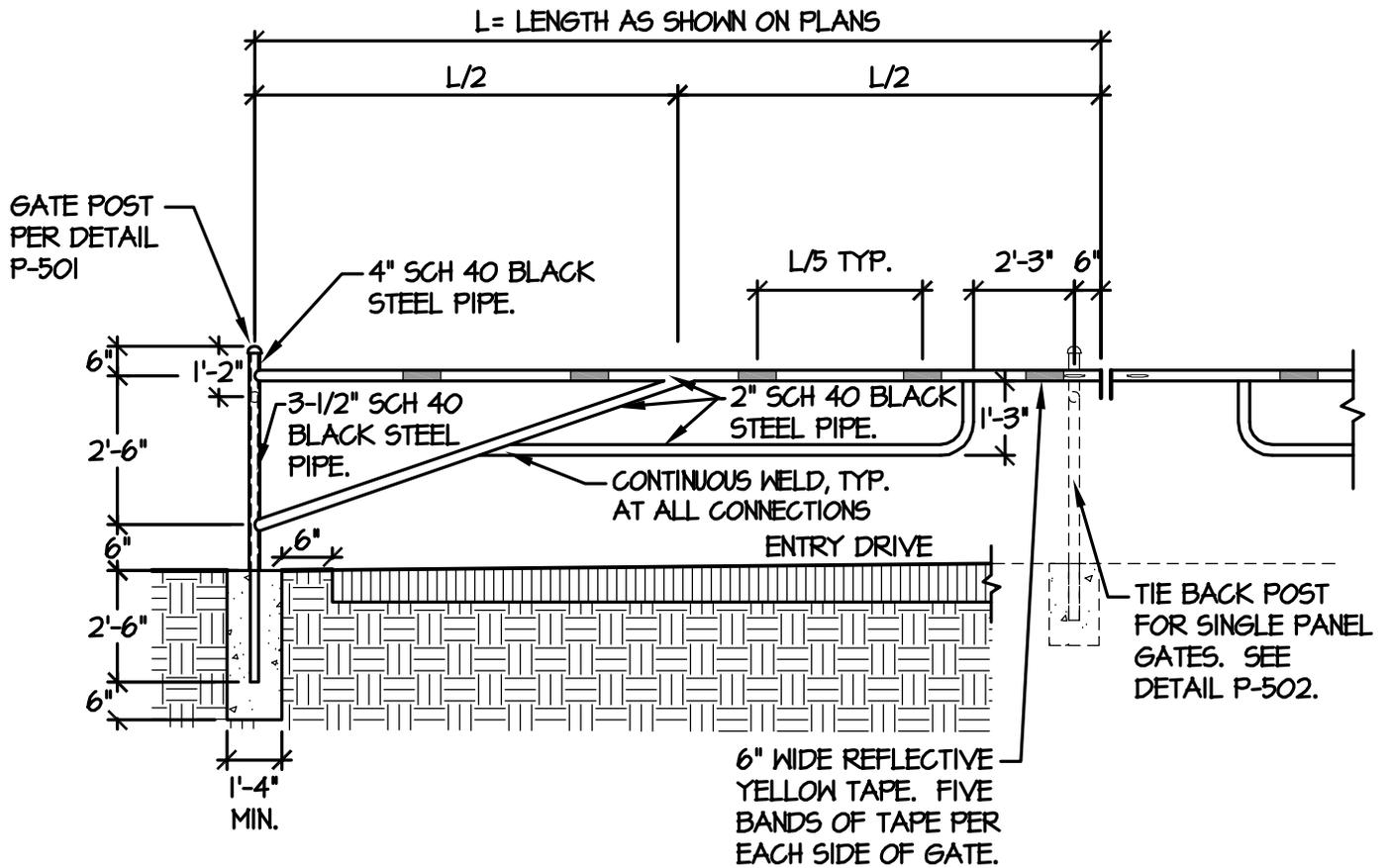
1. WHEN ATTACHING HINGE TO EXISTING PIPE SLEEVE, FIELD ADJUST TO ENSURE REMOVABLE POST AND HINGE FIT IN SLEEVE. REMOVE PORTION OF SLEEVE AND CONCRETE FOUNDATION AS NECESSARY.
2. WHEN NEW REMOVABLE BOLLARD / POST BARRICADE ASSEMBLY IS BEING CONSTRUCTED, REMOVE 1-1/4" x 2" SECTION FROM TOP OF SLEEVE FOR HINGE AND WELD.
3. FIELD VERIFY PLACEMENT OF HINGE TO ENSURE FULL ROTATION.
4. ENSURE THAT THE TOP OF HINGE IS BELOW THE TOP OF THE CONCRETE FOUNDATION AND PIPE SLEEVE.
5. FOR NEW BOLLARDS / POST BARRICADES, RECESS PIPE SLEEVE IN FOUNDATION TO RECEIVE FLUSH CAP WHEN IN CLOSED POSITION.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BOLLARDS	<b>P-406B</b>
REVISED:		REMOVABLE BOLLARD / POST BARRICADE CAP AND HINGE	

**NOTE:**

1. GATE AND POSTS TO BE FINISHED WITH ONE COAT RUST INHIBITING PRIMER AND ONE FINISH COAT PAINT AS SPECIFIED. FINISH COLOR TO BE AS SPECIFIED, NOTED, OR AS SELECTED BY OWNER.
2. GATE PANEL SHOWN IS TYPICAL OF 2 PANELS REQUIRED FOR EACH PARK ENTRY GATE.

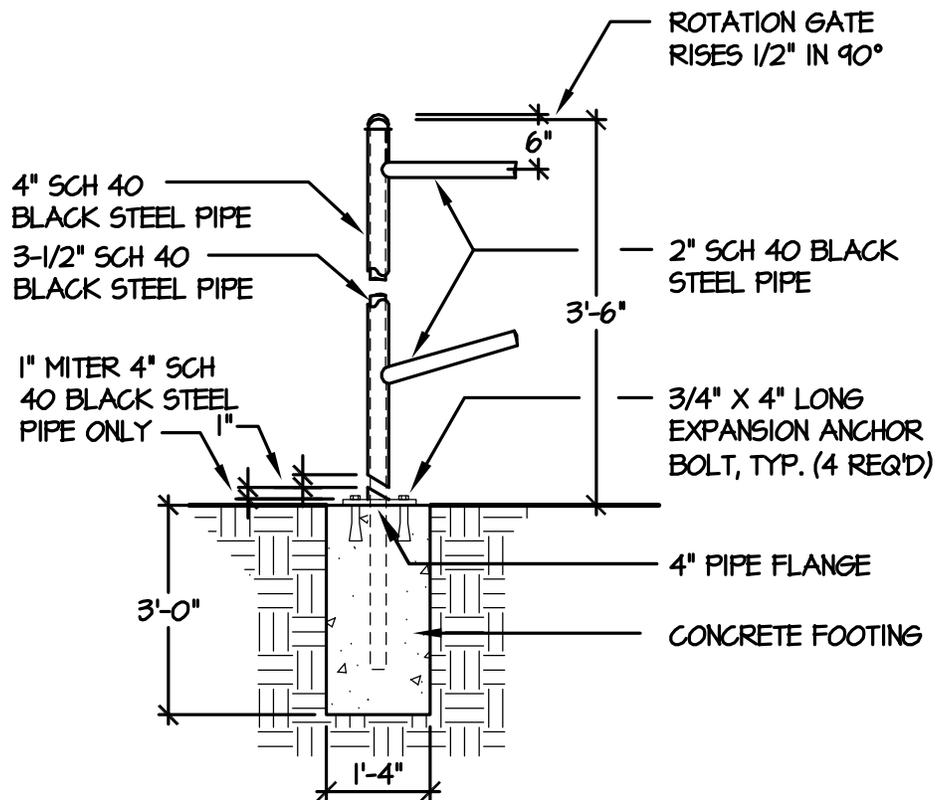


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	<b>P-500</b>
REVISED:		PARK ENTRY GATE - GATE PANEL	

**NOTE:**

- I. GATE AND POSTS TO BE FINISHED WITH ONE COAT RUST INHIBITING PRIMER AND ONE FINISH COAT PAINT AS SPECIFIED. FINISH COLOR TO BE AS SPECIFIED, NOTED, OR AS SELECTED BY OWNER.

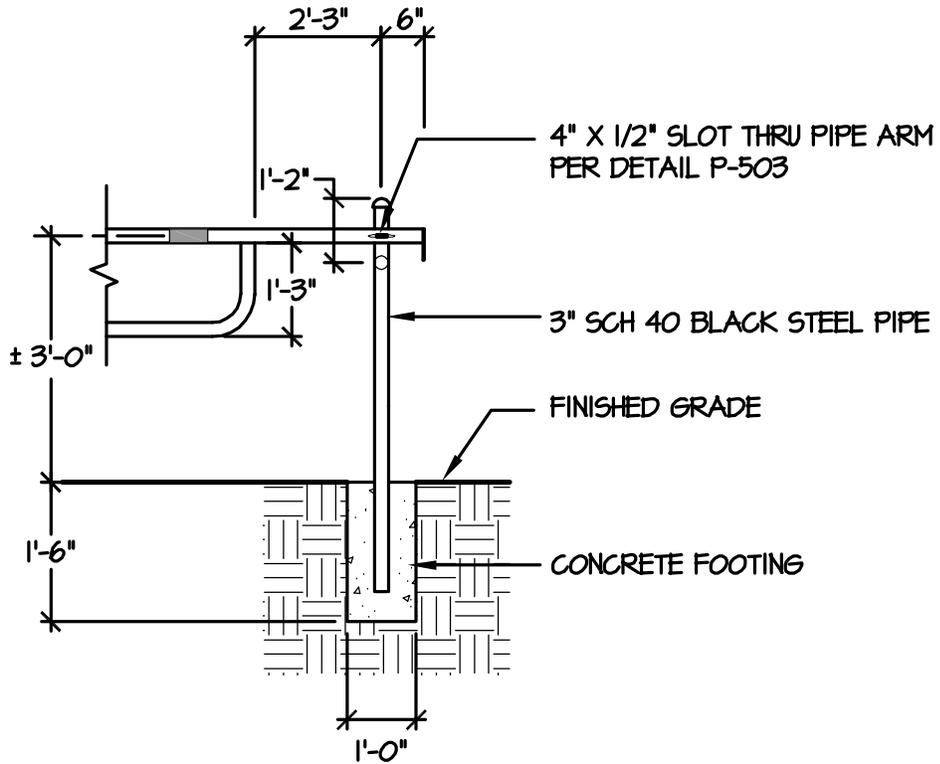


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	<b>P-501</b>
REVISED:		PARK ENTRY GATE - GATE POST	

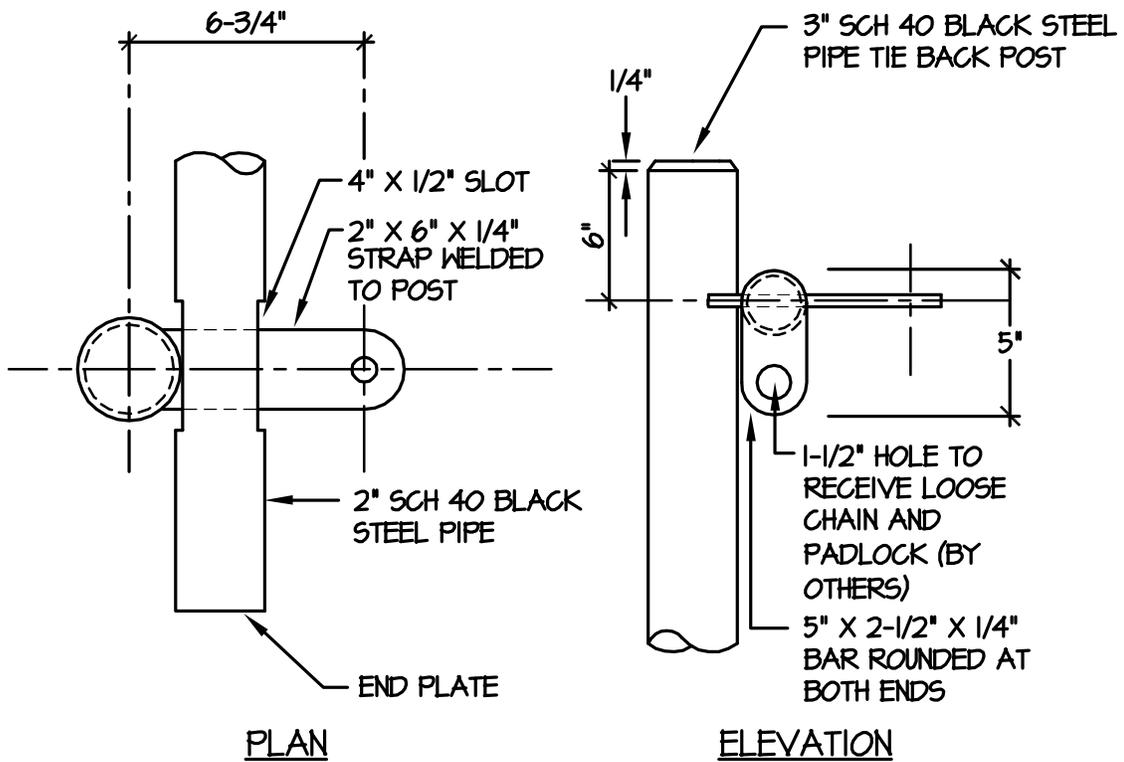
**NOTE:**

- I. GATE AND POSTS TO BE FINISHED WITH ONE COAT RUST INHIBITING PRIMER AND ONE FINISH COAT PAINT AS SPECIFIED. FINISH COLOR TO BE AS SPECIFIED, NOTED, OR AS SELECTED BY OWNER.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	<b>P-502</b>
REVISED:		PARK ENTRY GATE - TIE BACK POST	

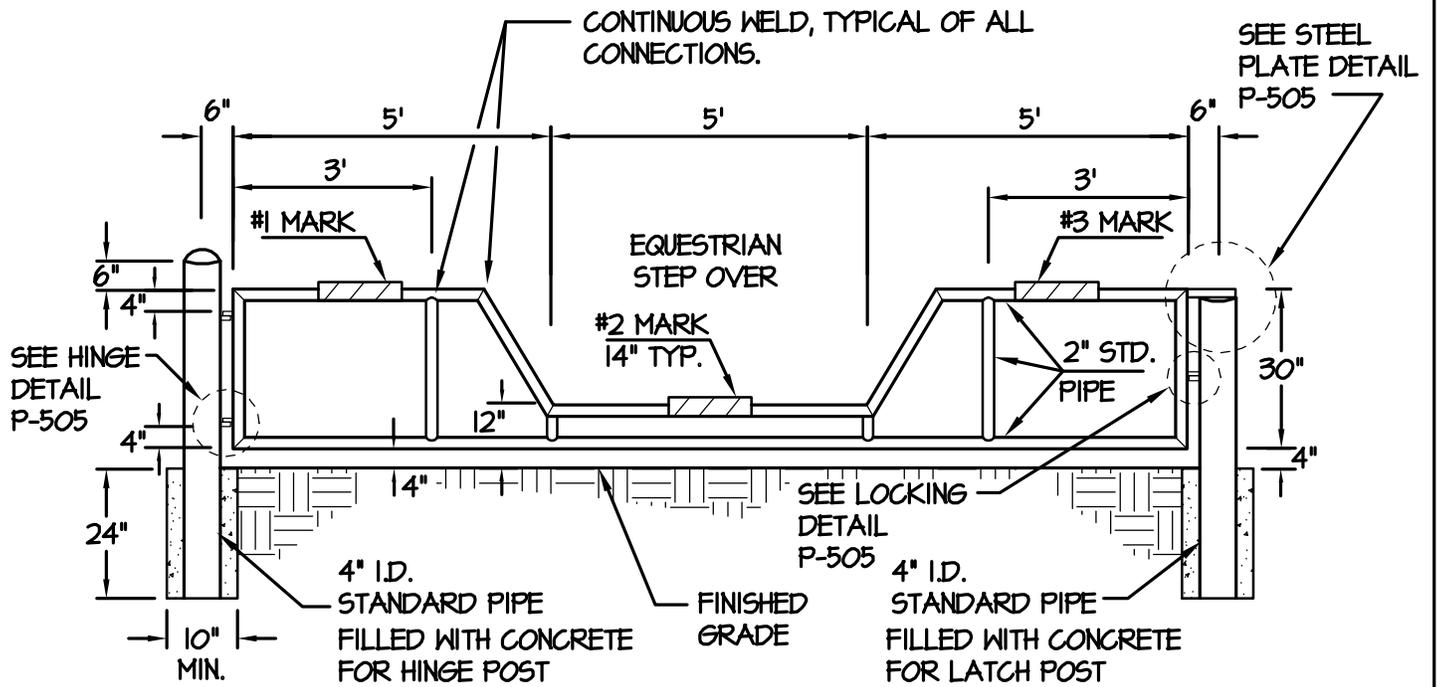


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	<b>P-503</b>
REVISED:		PARK ENTRY GATE - TIE BACK ANCHOR AND LOCKING MECHANISM	
			SHEET 1 OF 1

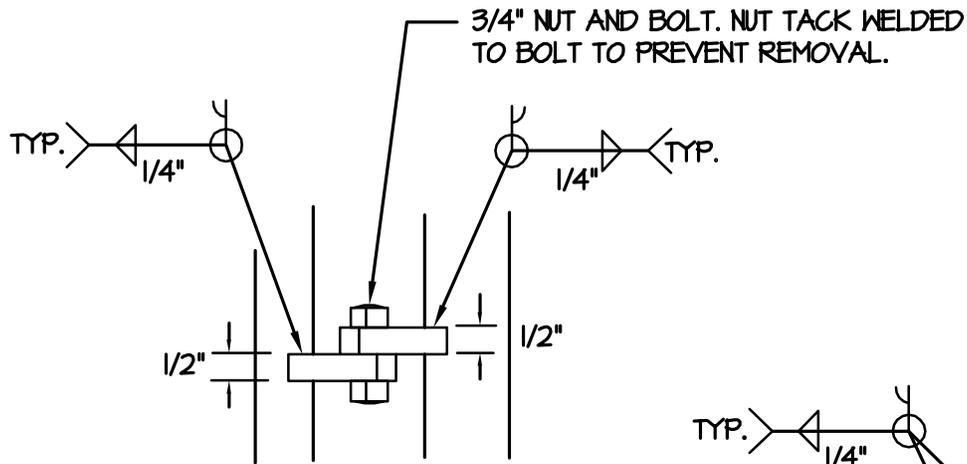
**NOTE:**

- GATE AND POSTS TO BE FINISHED WITH ONE COAT RUST INHIBITING PRIMER AND ONE FINISH COAT PAINT AS SPECIFIED. FINISH COLOR TO BE AS SPECIFIED, NOTED, OR AS SELECTED BY OWNER.

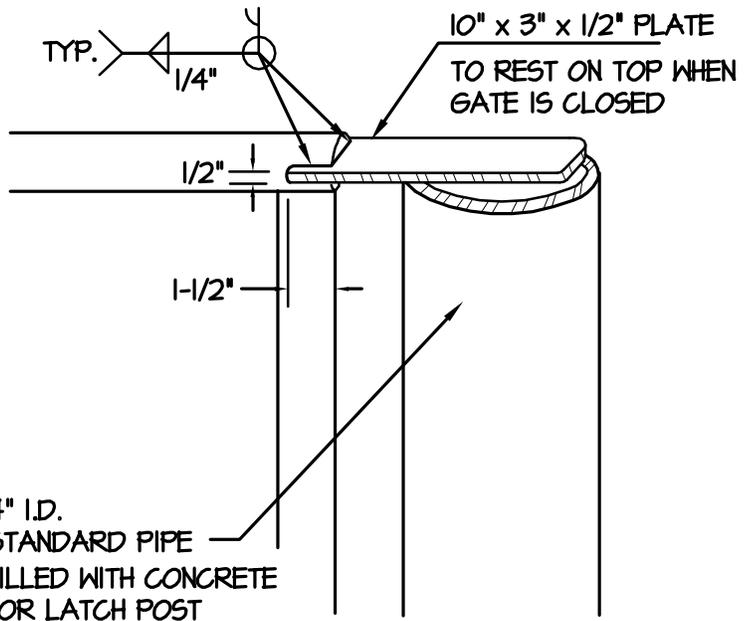


SCALE: N.T.S.

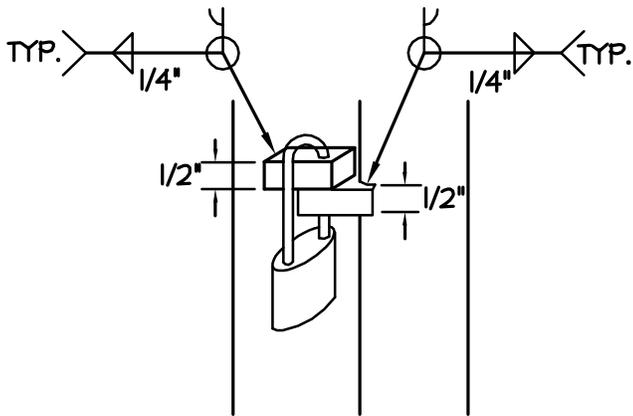
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	<b>P-504</b>
REVISED:		EQUESTRIAN STEP-OVER GATE	



HINGE DETAIL



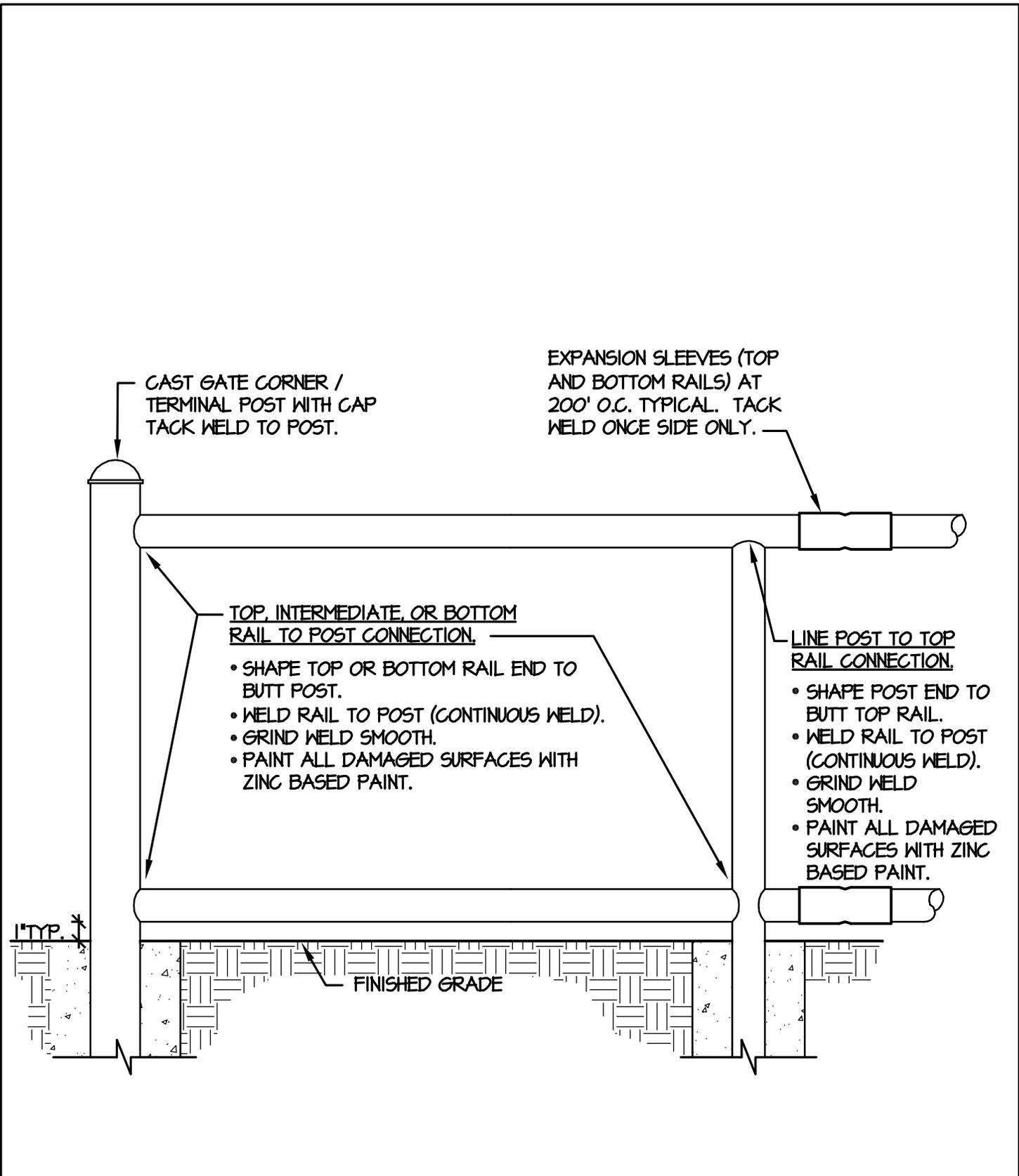
STEEL PLATE DETAIL



LOCKING DETAIL

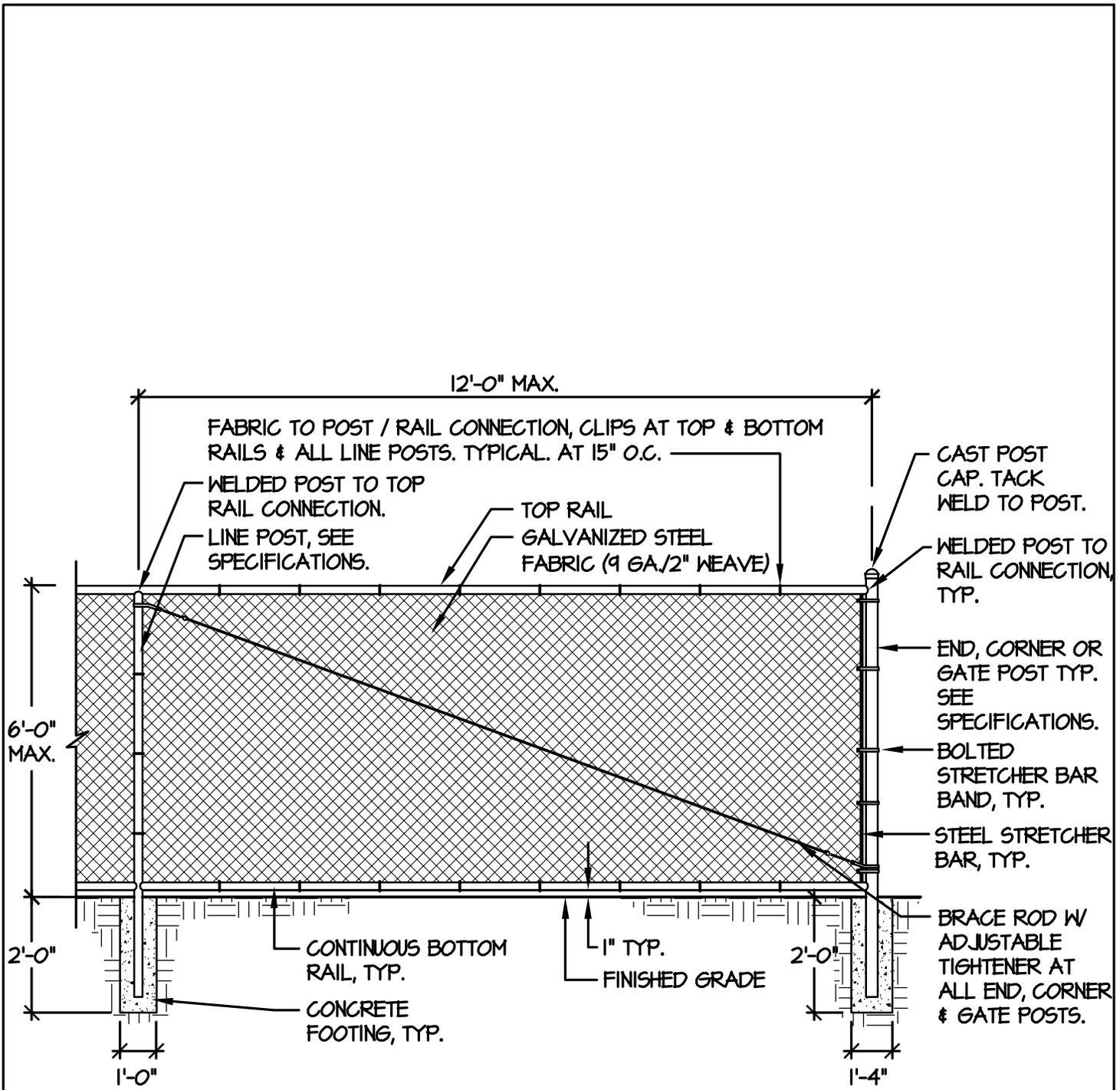
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		ENTRY GATES:	P-505
REVISED:		EQUESTRIAN STEP-OVER GATE DETAILS	



SCALE: N.T.S.

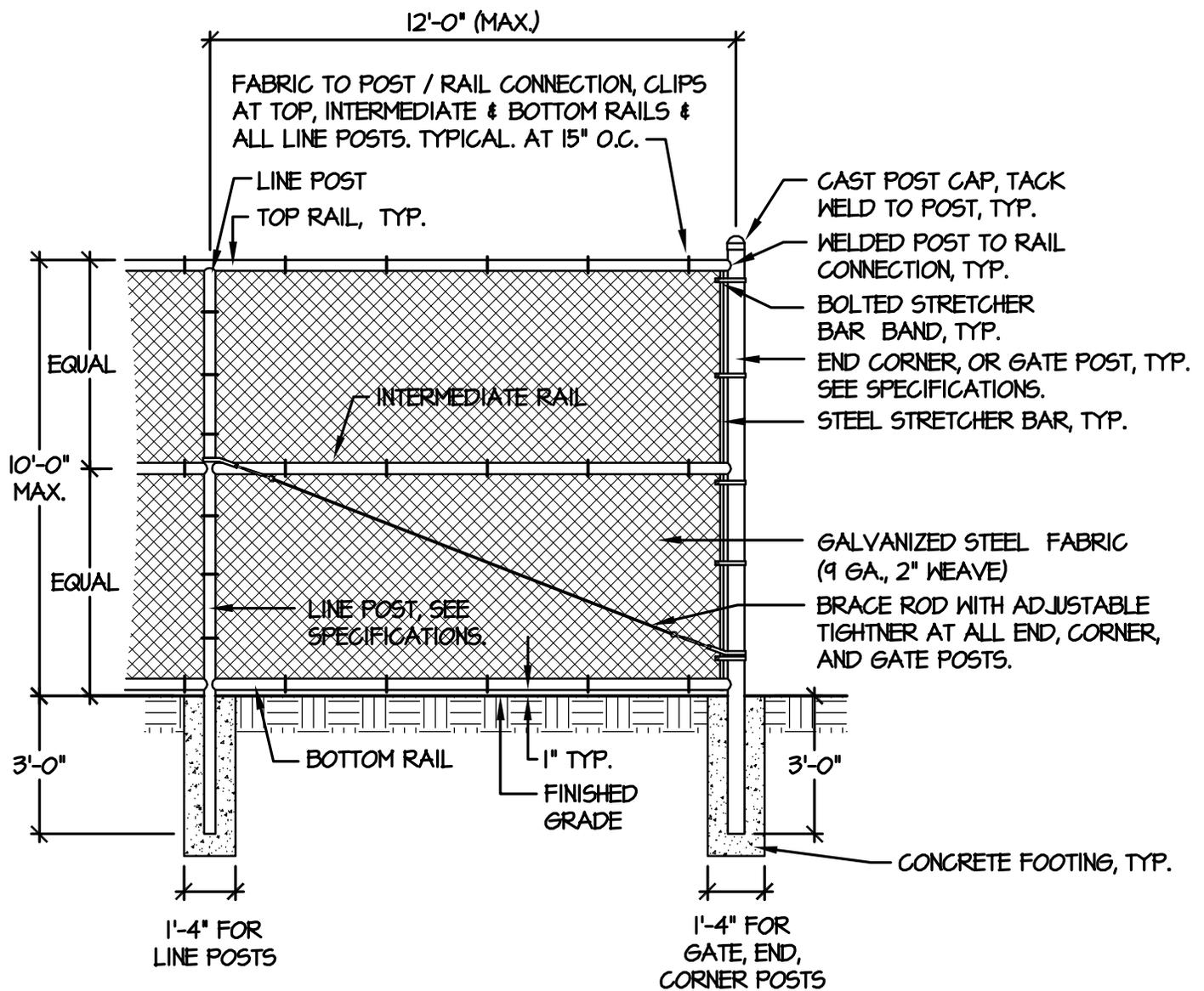
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-600</b>
REVISED:		CHAIN LINK FENCE TYPICAL FRAMING PLAN	



**NOTE:** INSTALL FABRIC ON FIELD / PUBLIC USE SIDE OF FENCE, WHERE APPLICABLE.

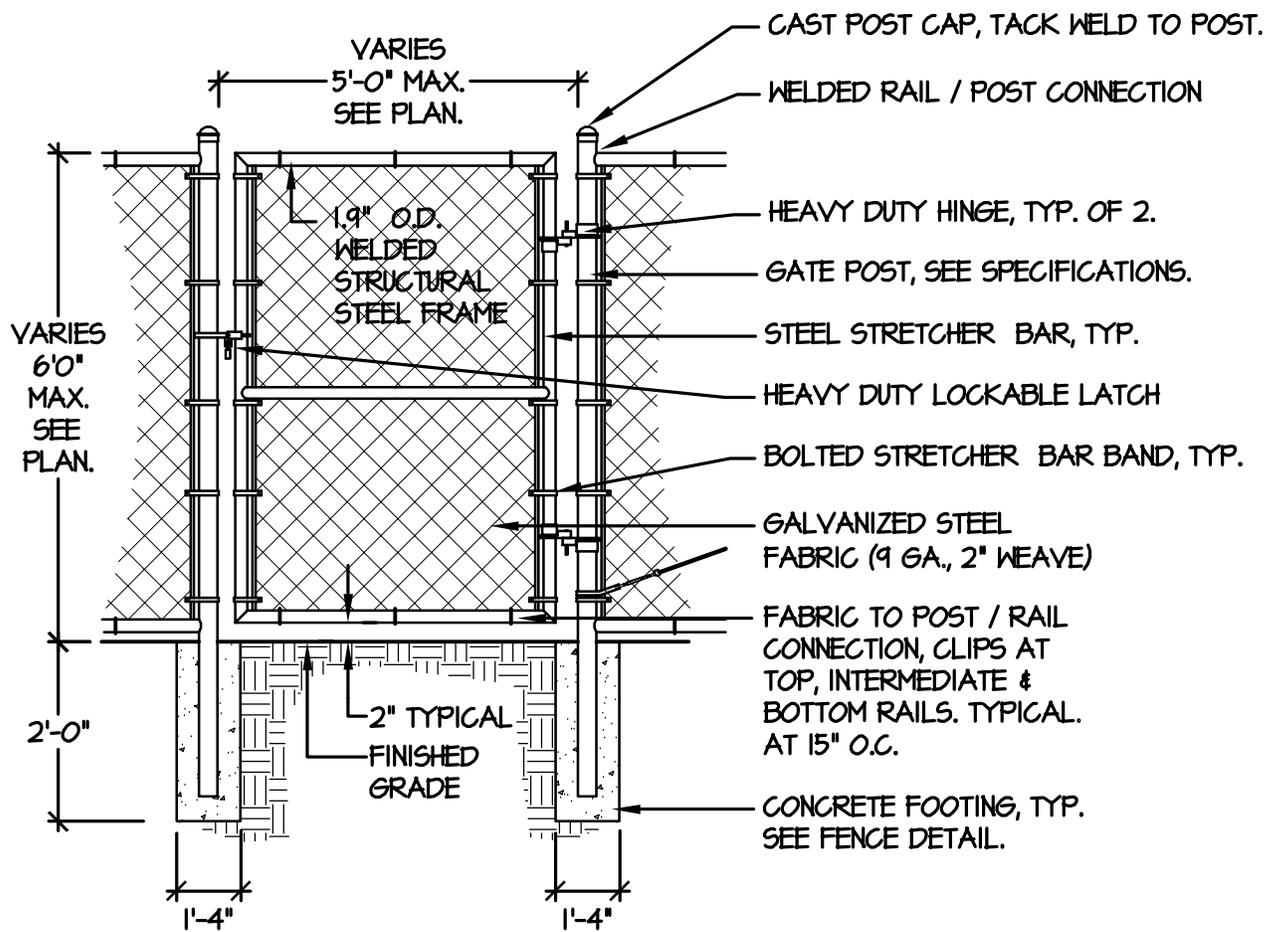
SCALE: N.T.S.

ISSUED: 01/16	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL CHAIN-LINK FENCING AND GATES:	DETAIL NO.
REVISED:		CHAIN LINK FENCE UP TO 6'-0" IN HEIGHT	<b>P-601</b>



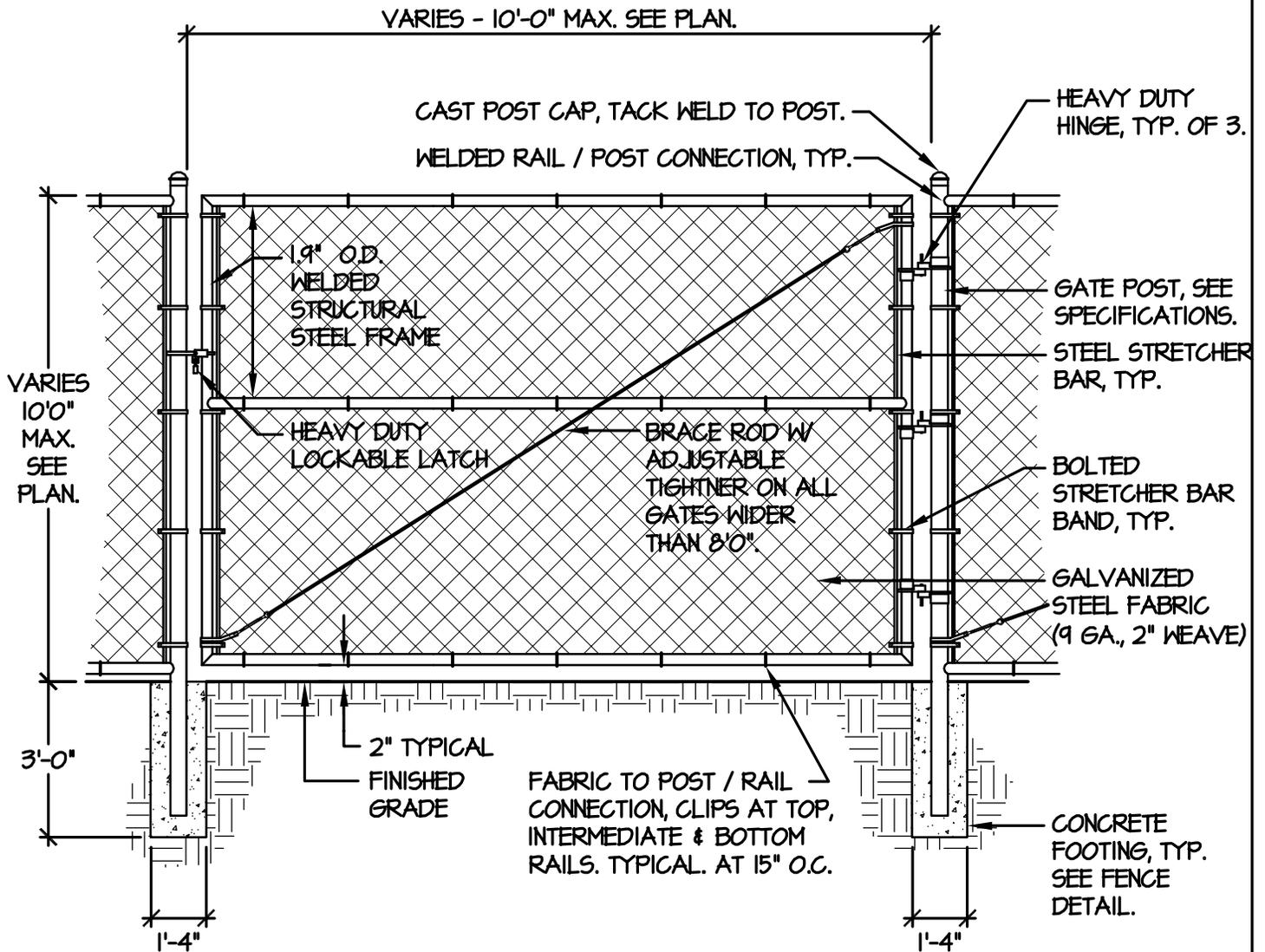
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-602</b>
REVISED:		CHAIN LINK FENCE > 6'-0" TO 10'-0" IN HEIGHT	



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-603</b>
REVISED:		CHAIN LINK GATE - SINGLE SWING 6'-0" MAX. HEIGHT - 5'-0" MAX. WIDTH	
			SHEET 1 OF 1

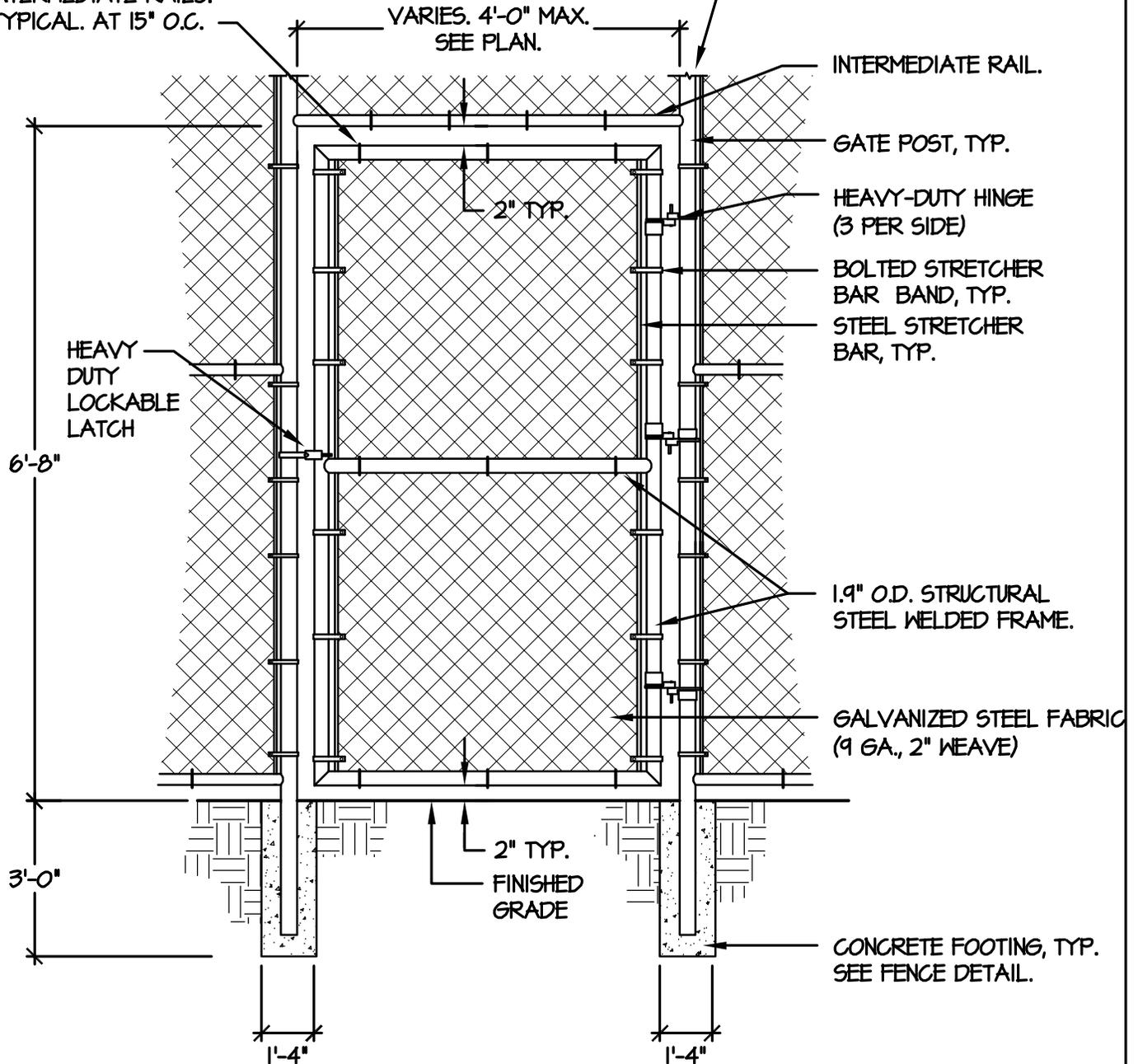


SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL CHAIN-LINK FENCING AND GATES:	DETAIL NO.
REVISED:		CHAIN LINK GATE - SINGLE SWING 10'-0" MAX. HEIGHT - 10'-0" MAX. WIDTH	<b>P-604</b>
			SHEET 1 OF 1

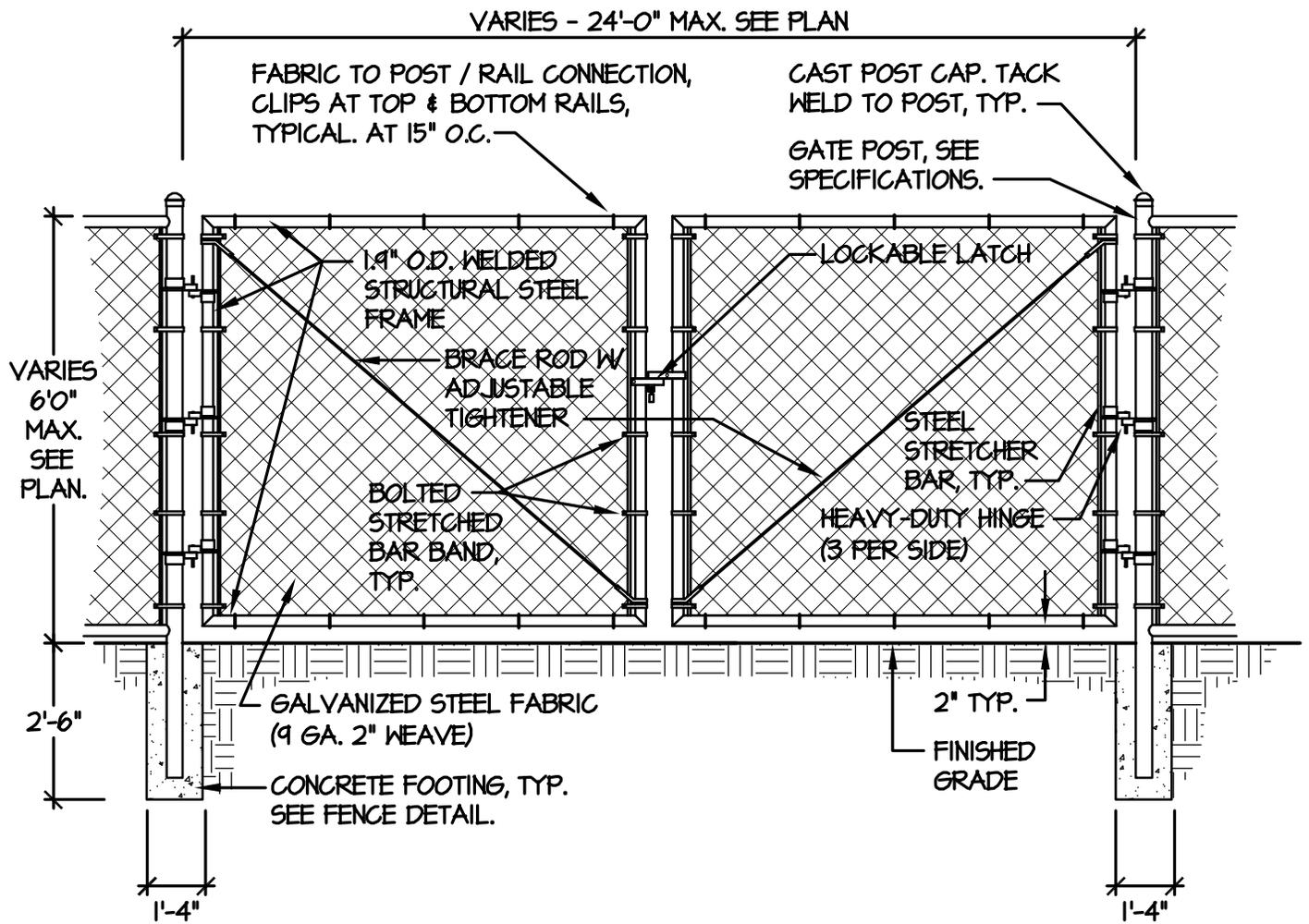
FABRIC TO RAIL CONNECTION, CLIPS AT TOP, BOTTOM & INTERMEDIATE RAILS. TYPICAL. AT 15" O.C.

NOTE: EXTEND POSTS TO TOP RAIL AND MAKE WELDED CONNECTION PER DETAIL P-600.



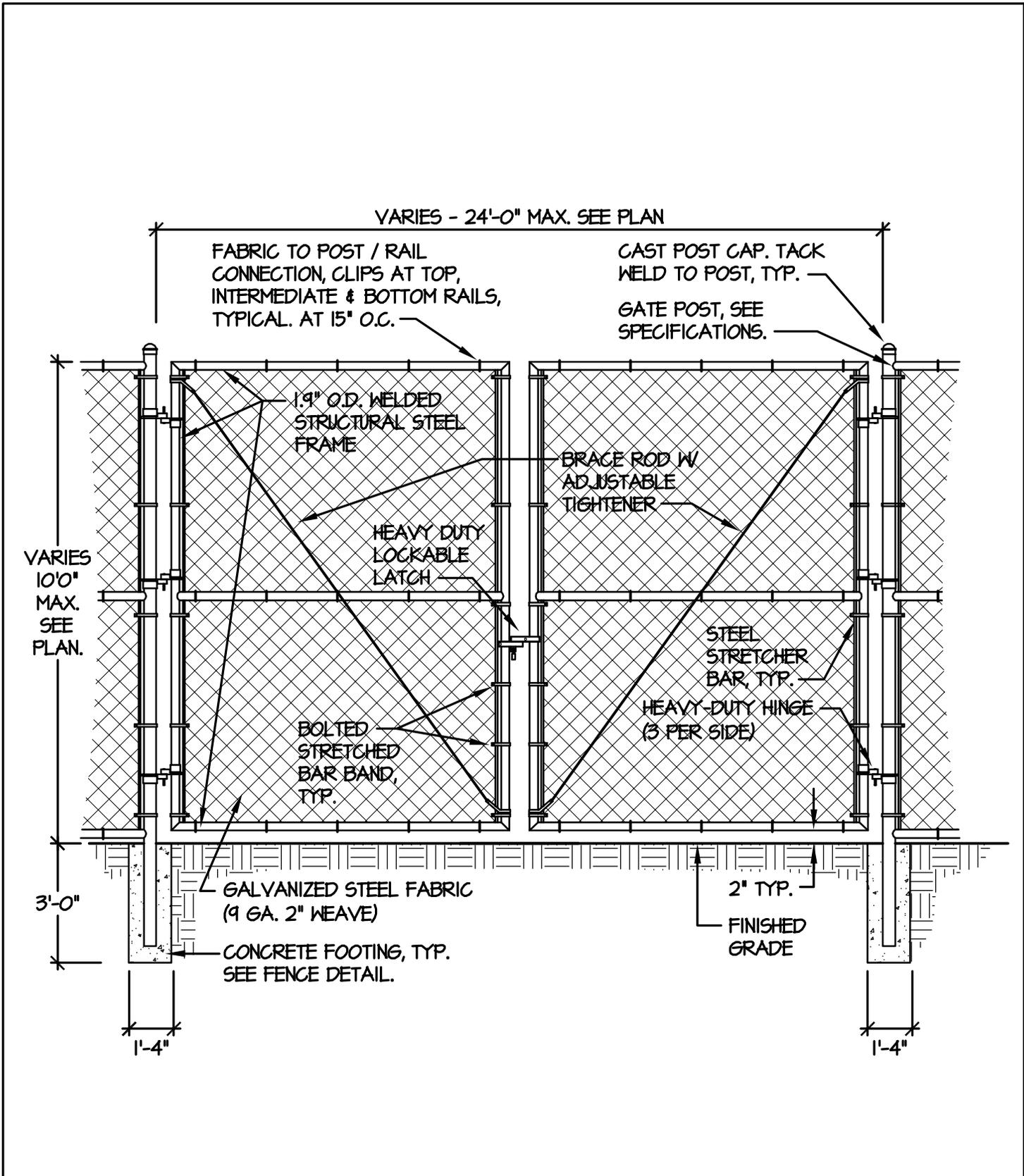
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-605</b>
REVISED:		CHAIN LINK GATE - SINGLE SWING 6'-8" HEIGHT IN 10'-0" FENCE	



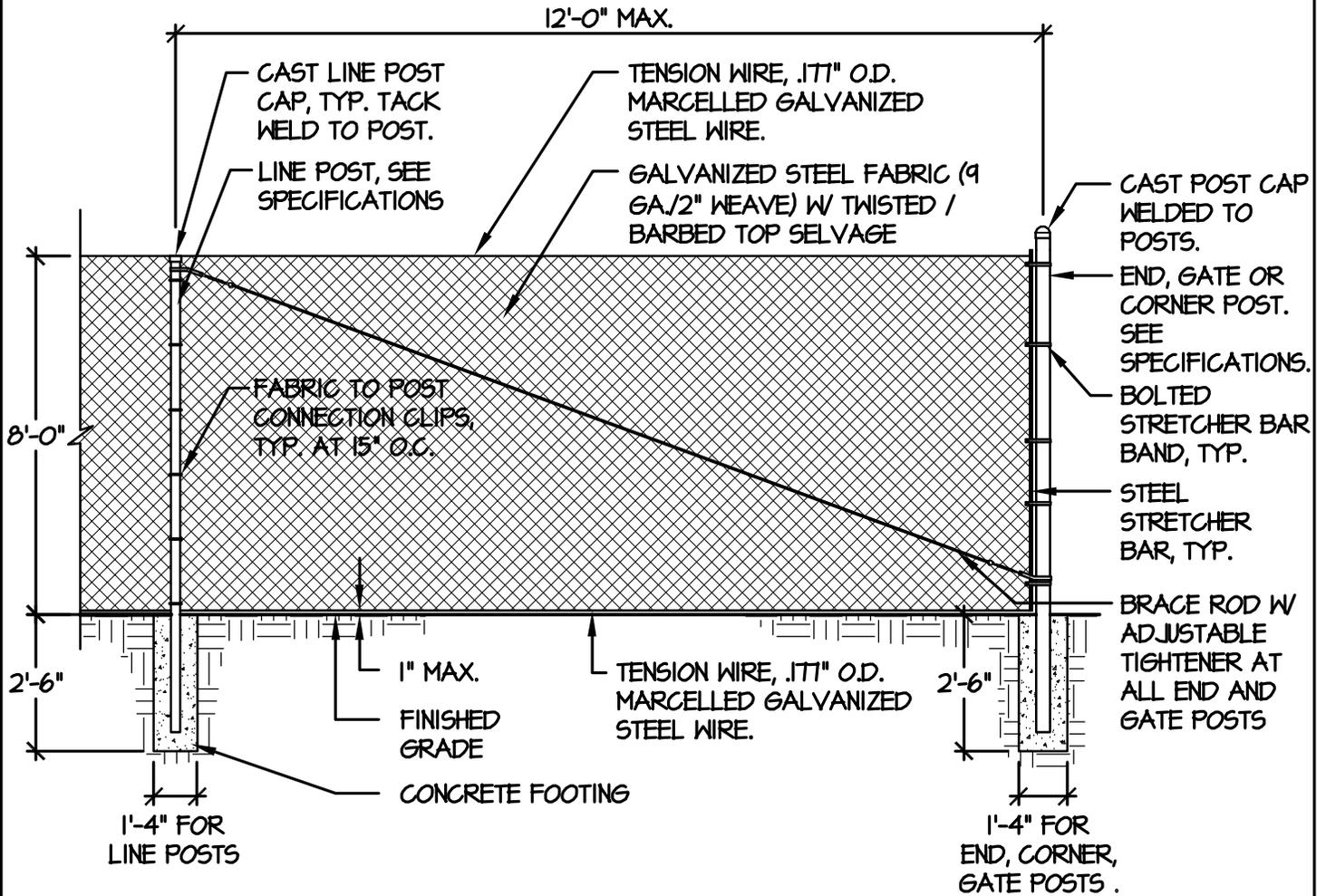
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-606</b>
REVISED:		CHAIN LINK GATE - DOUBLE SWING 6'-0" MAX. HEIGHT - 24'-0" MAX. WIDTH	
			SHEET 1 OF 1



SCALE: N.T.S.

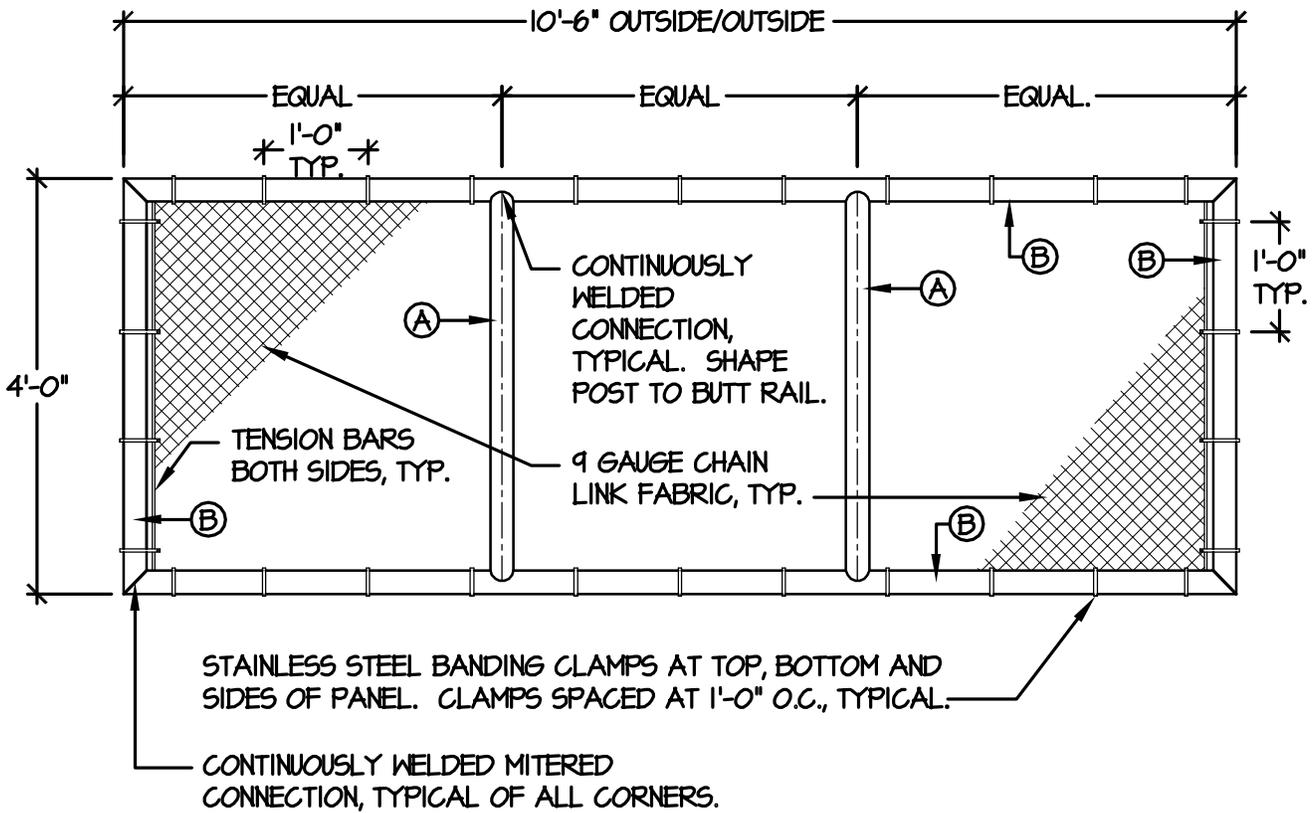
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-607</b>
REVISED:		CHAIN LINK GATE - DOUBLE SWING 10'-0" MAX. HEIGHT - 24'-0" MAX. WIDTH	



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-608</b>
REVISED:		CHAIN LINK SECURITY FENCE - 8'-0" HEIGHT	
			SHEET 1 OF 1

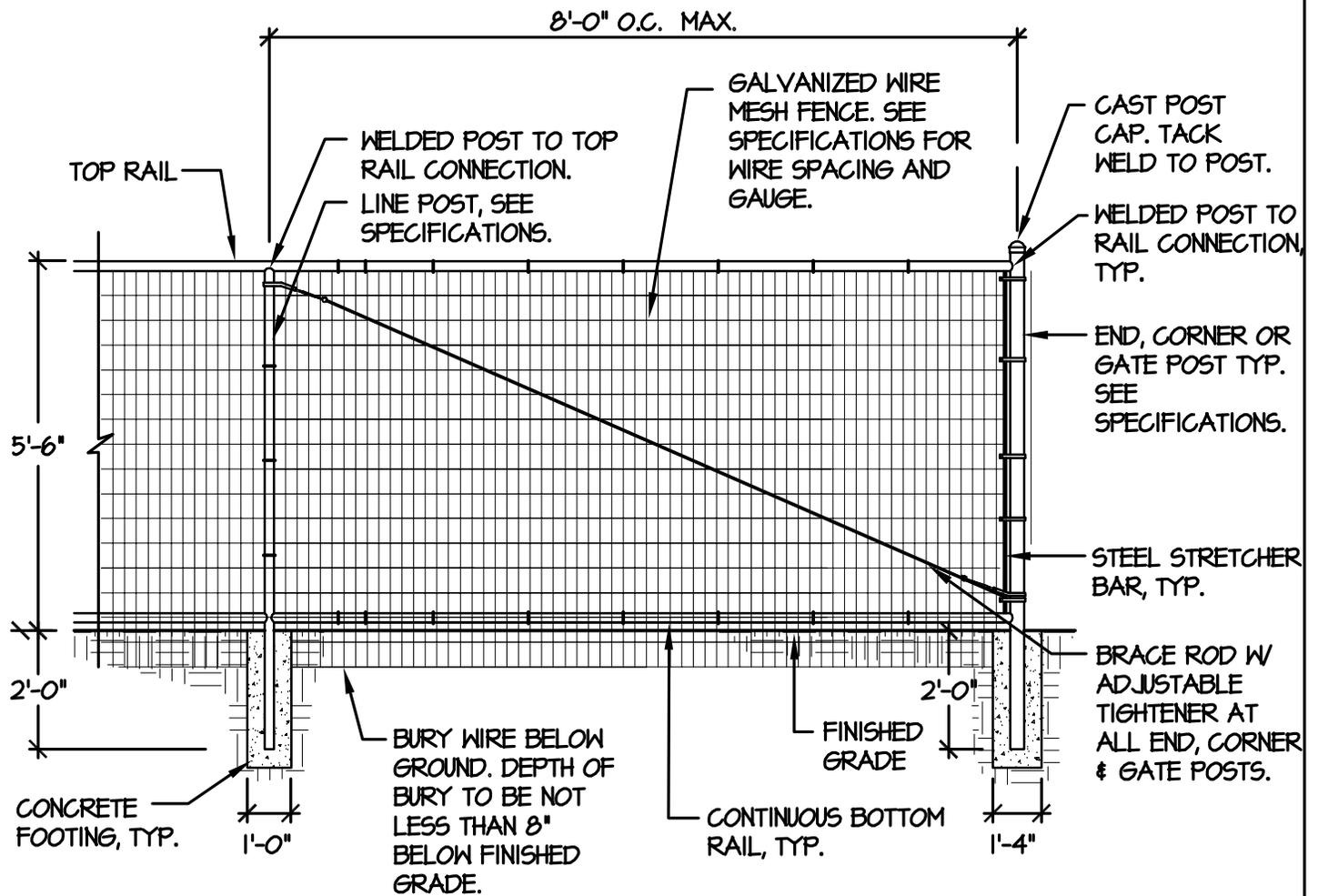
**NOTE:** GRIND SMOOTH ALL WELDS AND TOUCH-UP WITH ZINC BASED PAINT.



- Ⓐ 1.66" O.D. GALVANIZED STEEL PIPE
- Ⓑ 1.9" O.D. GALVANIZED STEEL PIPE

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-609</b>
REVISED:		REMOVABLE OUTFIELD FENCE PANEL	

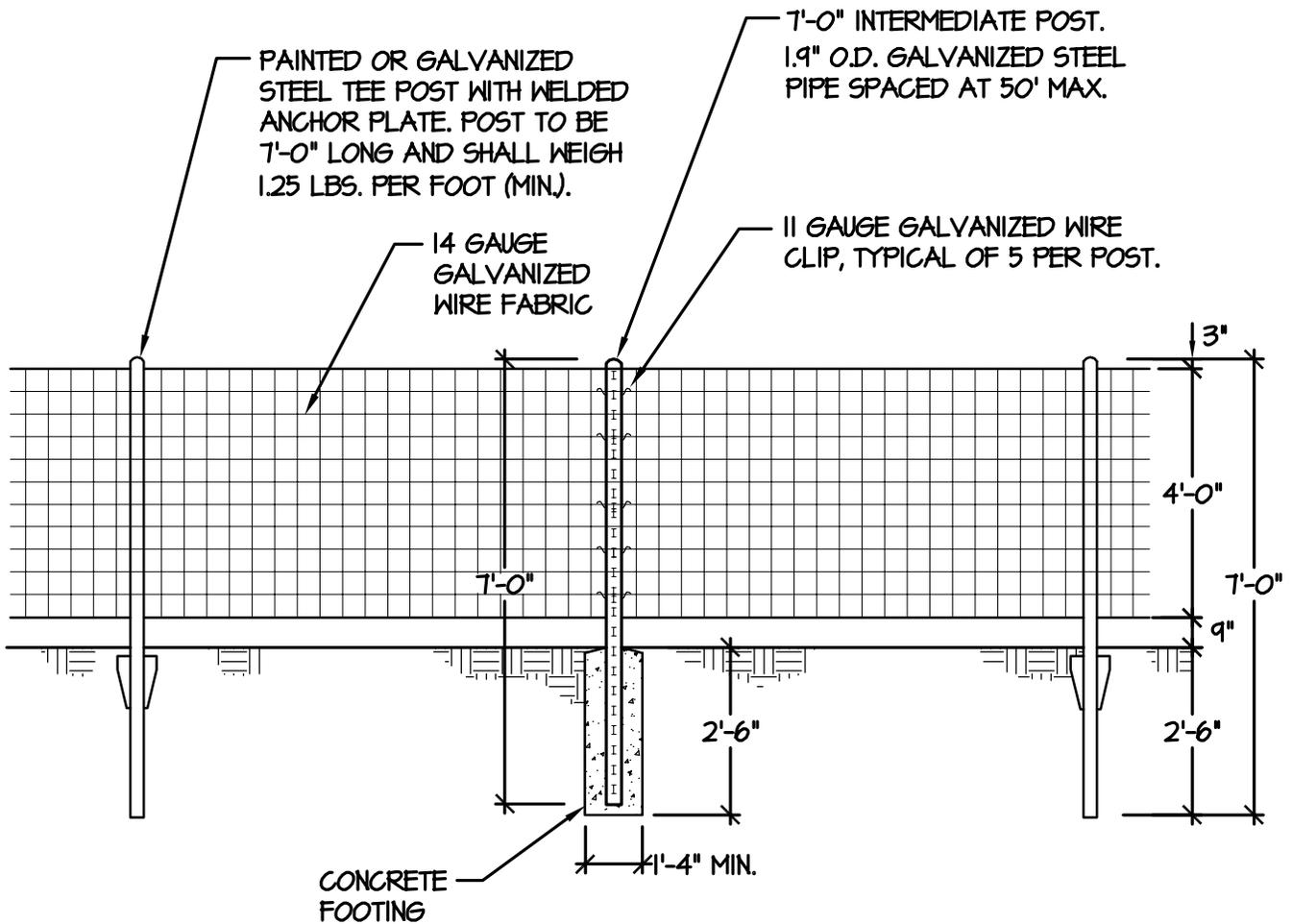


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-610</b>
REVISED:		DOG PARK FENCE	

NOTES:

1. INSTALL T-POSTS AT 10' O.C. MAXIMUM.
2. INSTALL 2"  $\phi$  GALVANIZED STEEL INTERMEDIATE POSTS AT 50'-0" O.C. (MAXIMUM).
3. INSTALL POST CAP AT ALL INTERMEDIATE POSTS AND TACK WELD TO POST.
4. WIRE FABRIC SHALL BE 14 GAUGE WELDED WIRE, GALVANIZED FENCE FABRIC WITH 2" HORIZONTAL AND 4" VERTICAL WIRE SPACING.
5. INSTALL FABRIC ON PATHWAY SIDE OF POSTS WHERE APPLICABLE.

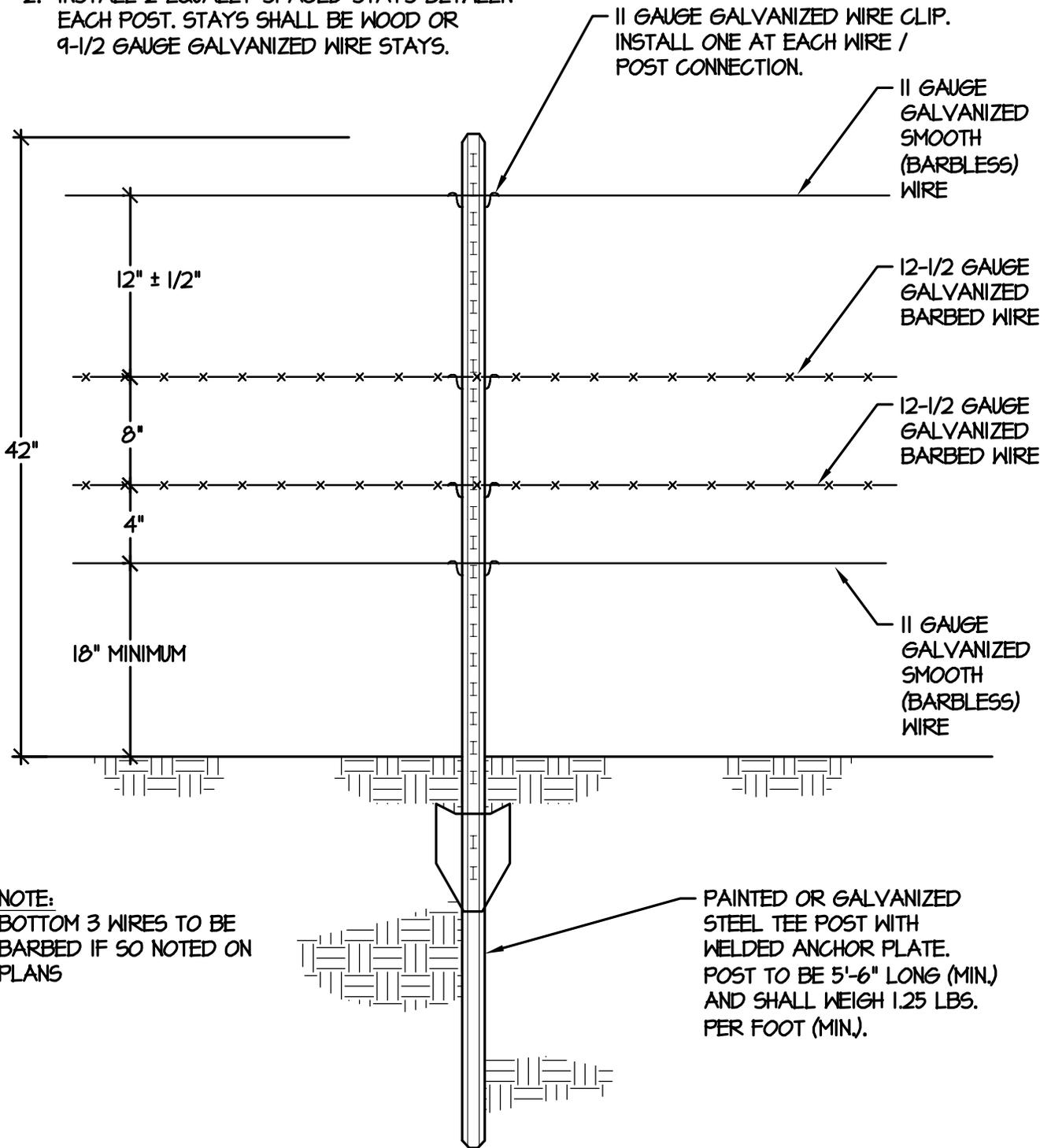


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	P-611
REVISED:		WOVEN WIRE FENCE	
			SHEET 1 OF 1

**NOTES:**

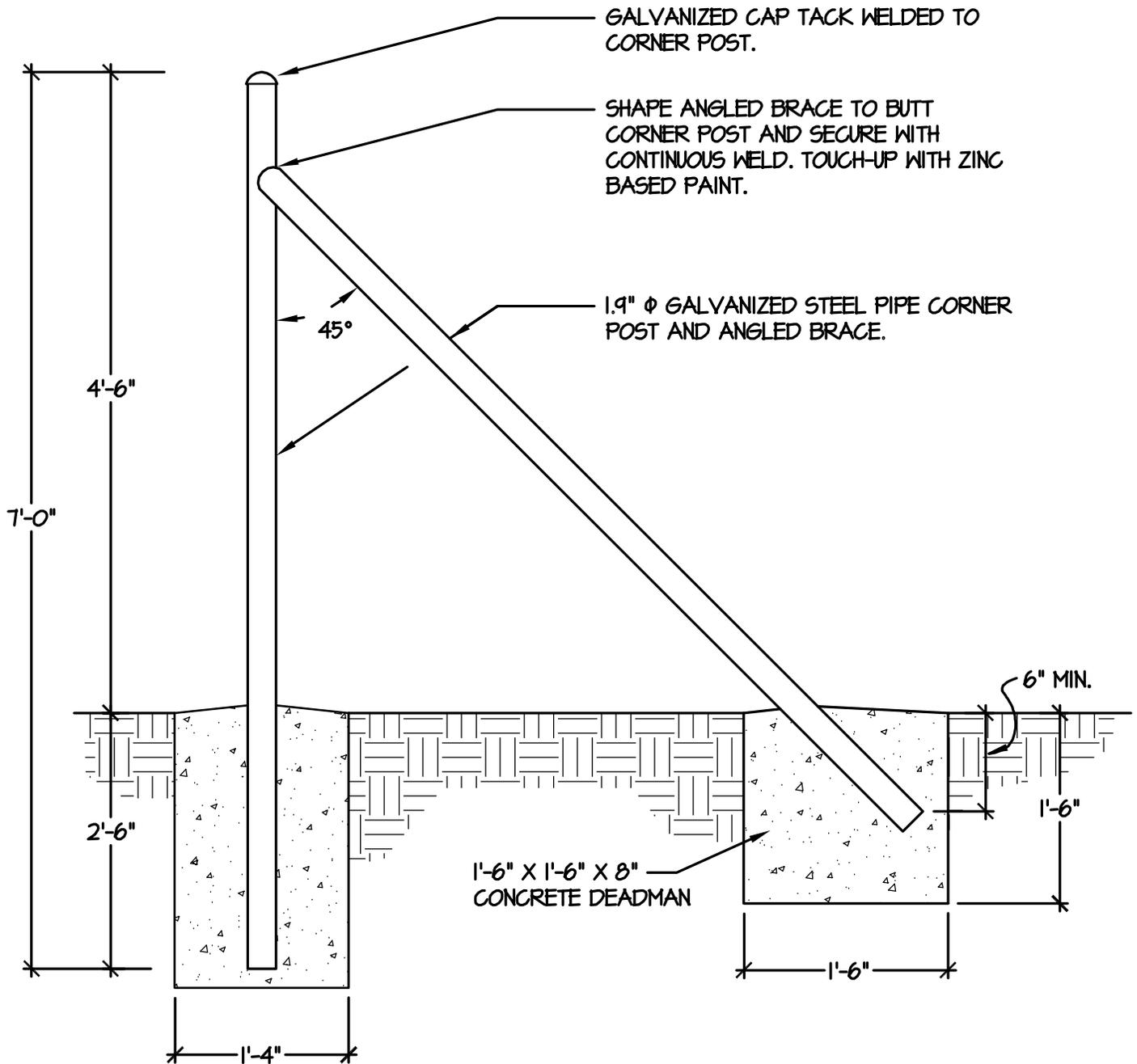
1. INSTALL T-POSTS AT 15' ON CENTER.
2. INSTALL 2 EQUALLY SPACED STAYS BETWEEN EACH POST. STAYS SHALL BE WOOD OR 9-1/2 GAUGE GALVANIZED WIRE STAYS.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-612A</b>
REVISED:		WIRE GAME FENCE DETAIL	

**NOTE:** INSTALL 2 ANGLED BRACE PIPE AT CORNER POSTS. ALIGN BRACES WITH FENCE RUN IN EACH DIRECTION.

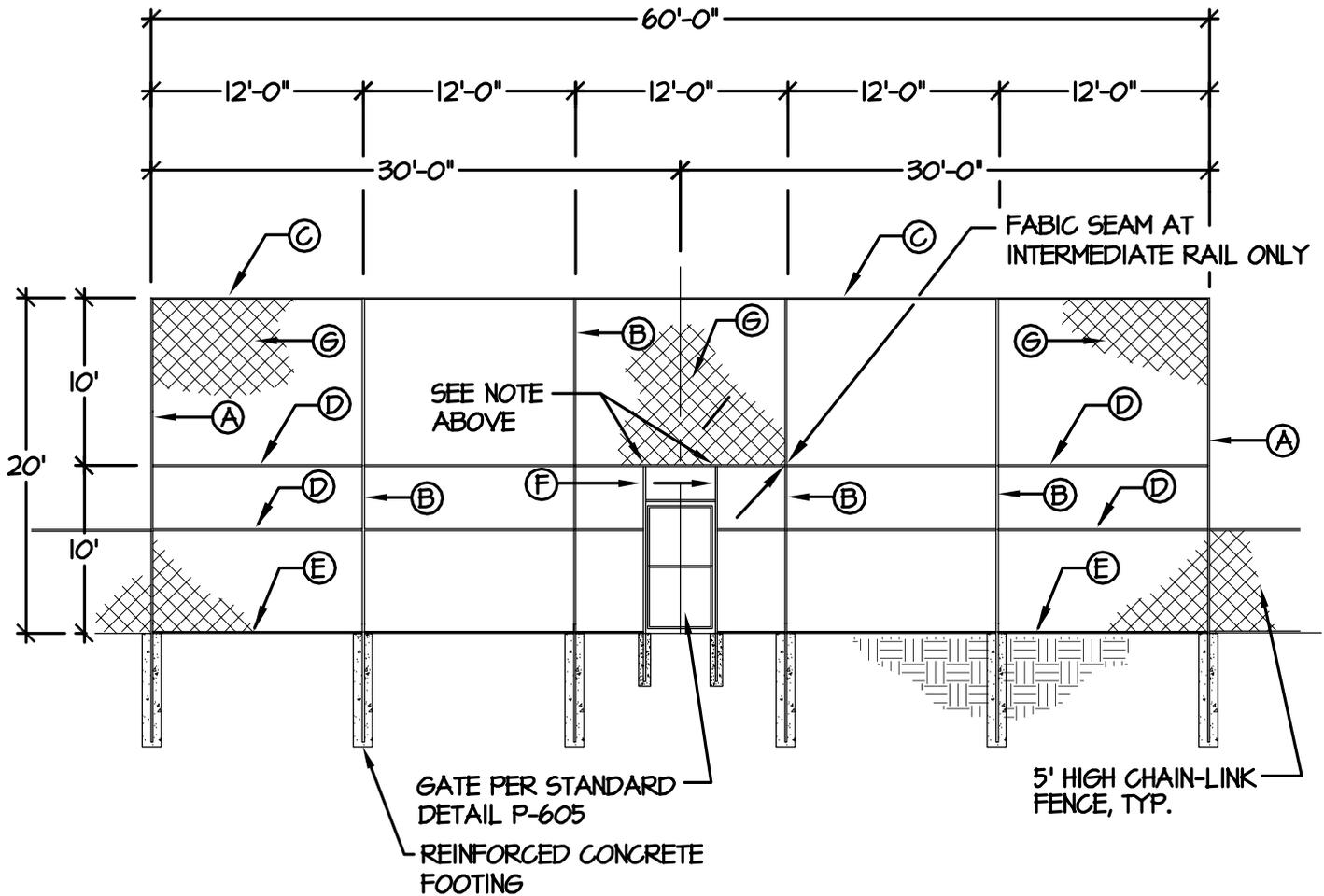


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		CHAIN-LINK FENCING AND GATES:	<b>P-612B</b>
REVISED:		WIRE GAME FENCE END AND CORNER POST ASSEMBLY	
			SHEET 1 OF 1

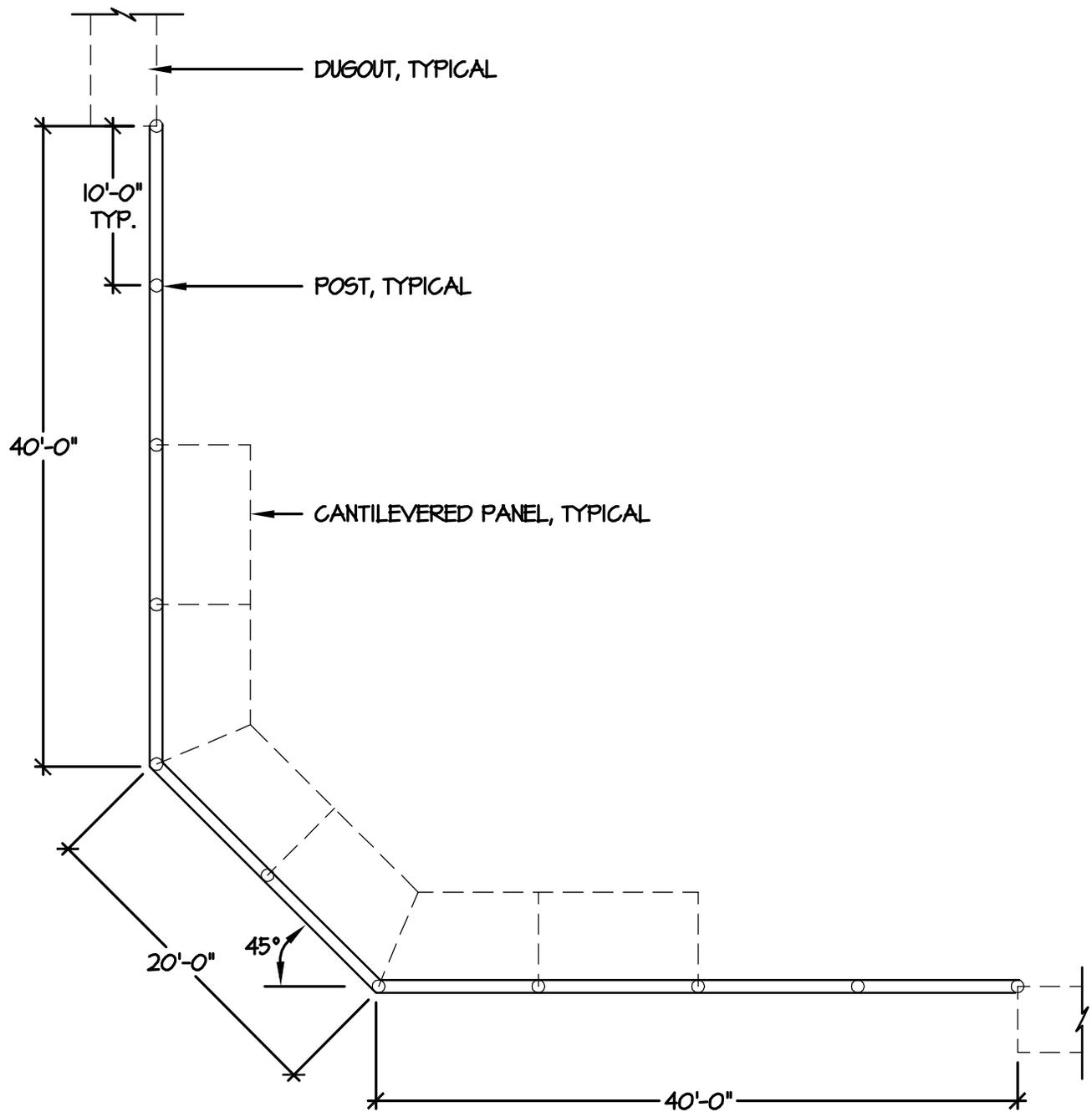
- Ⓐ END POST (4.5" O.D.)
- Ⓑ LINE POST (4.5" O.D.)
- Ⓒ TOP RAIL (1.9" O.D.)
- Ⓓ INTERMEDIATE RAIL (1.9" O.D.)
- Ⓔ BOTTOM RAIL (1.9" O.D.)
- Ⓕ GATE POSTS (2.875" O.D.)
- Ⓖ CHAIN LINK FABRIC  
- 9 GA./2" WEAVE

**NOTE:**  
WELD PLATE TO TOP OF GATE POST TO PREVENT WATER INTRUSION INTO POST. REST RAIL ON TOP OF PLATE/POST AND SECURE WITH TACK WELD.



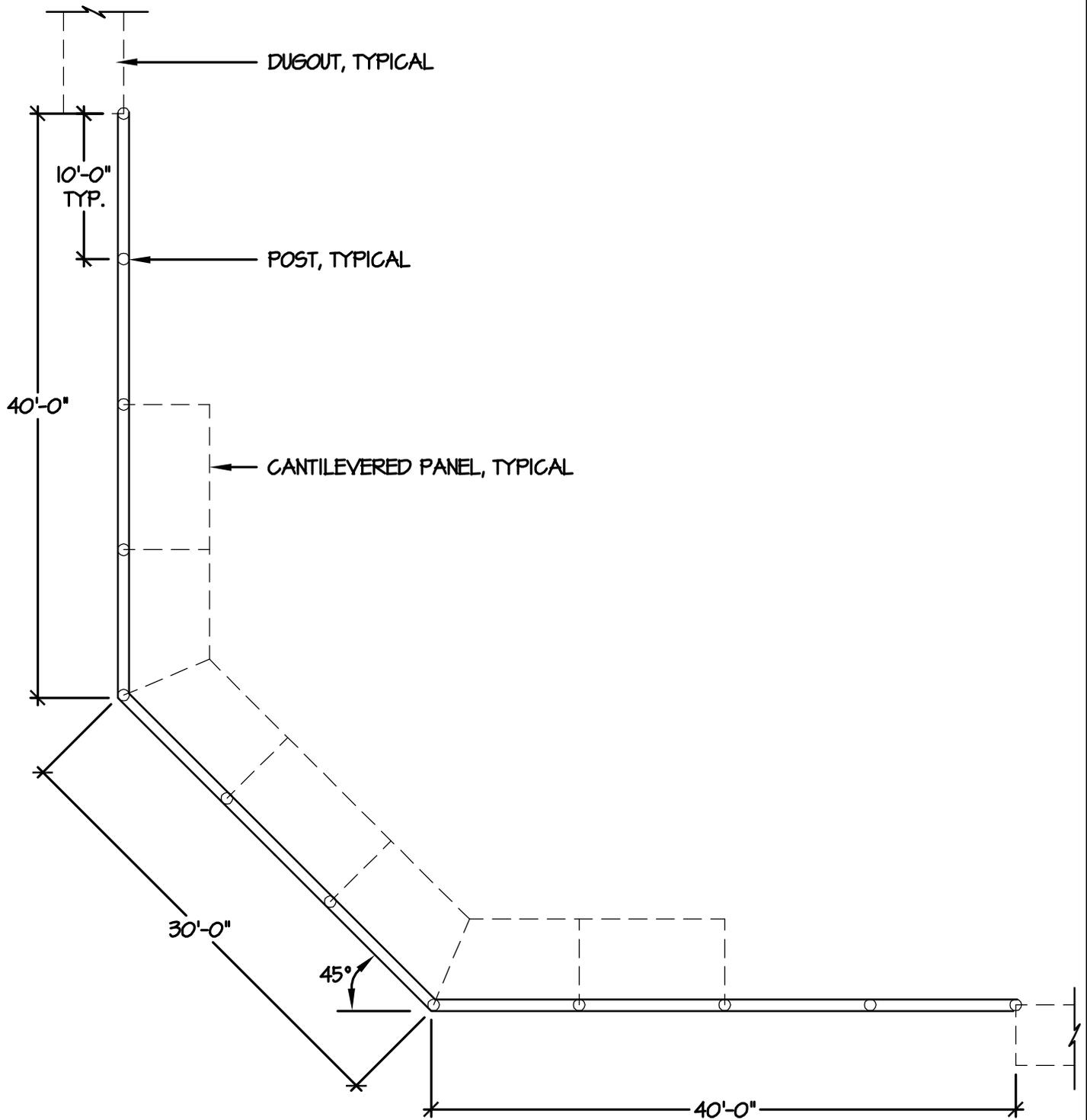
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		FIELD & COURT LAYOUTS:	<b>P-613</b>
REVISED:		MULTI-SPORT FIELD END LINE FENCE LAYOUT	
			SHEET 1 OF 1



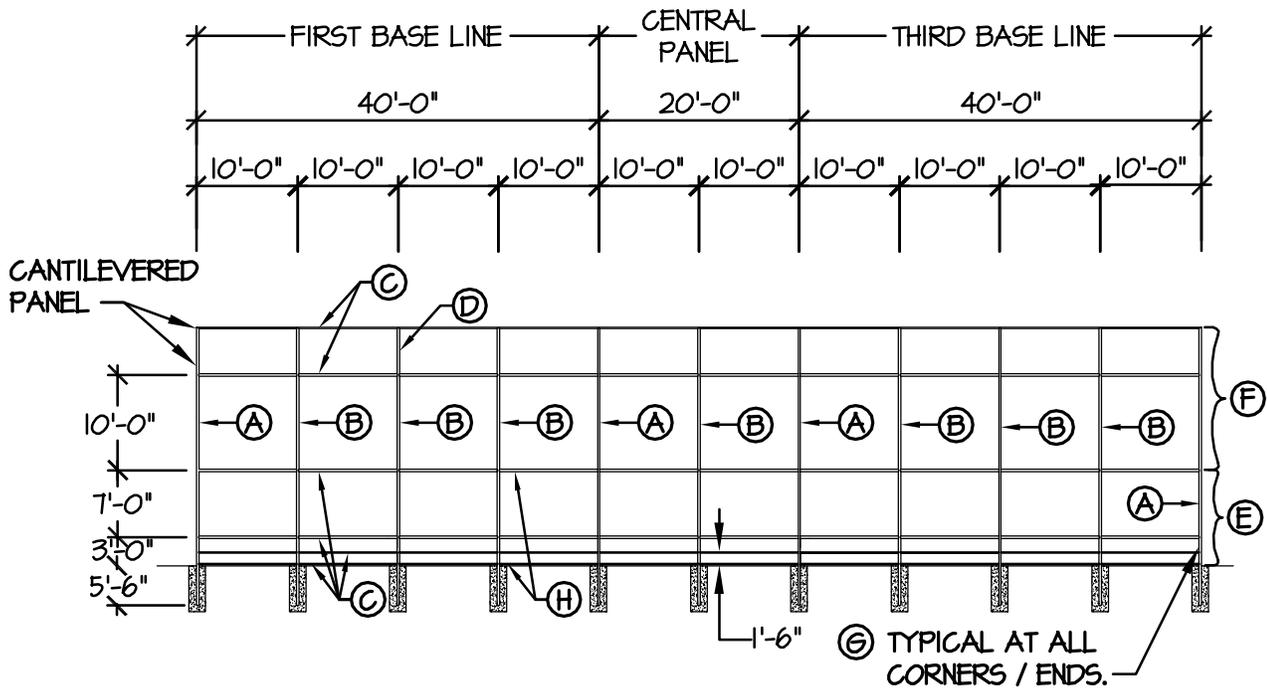
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BACKSTOPS:	<b>P-700</b>
REVISED:		BACKSTOP LAYOUT - LITTLE LEAGUE BASEBALL, PONY LEAGUE BASEBALL, AND FAST-PITCH SOFTBALL FIELDS	



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BACKSTOPS:	<b>P-701</b>
REVISED:		BACKSTOP LAYOUT - FULL-SIZE BASEBALL, AND ADULT SLOW-PITCH SOFTBALL FIELDS	

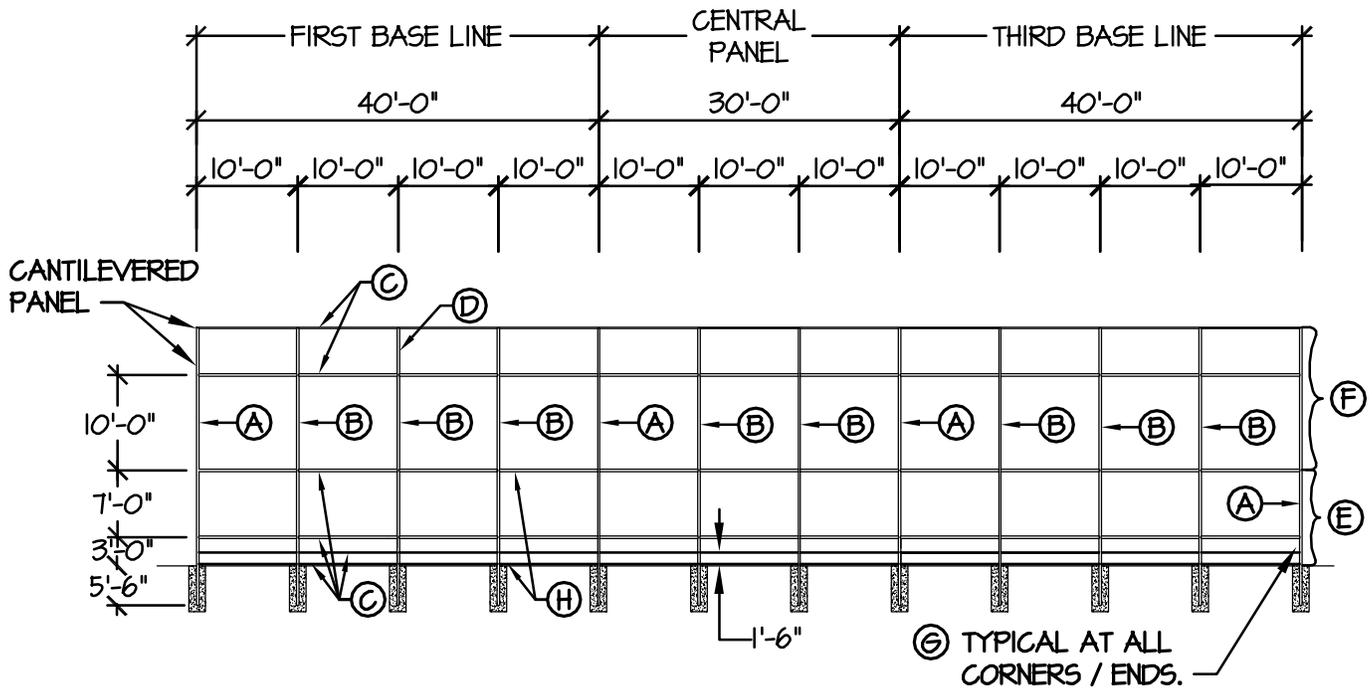


- (A) CORNER POST (5.563" O.D.)
- (B) LINE POST (5.563" O.D.)
- (C) TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- (D) CANTILEVERED FRAME (1.9" O.D.)
- (E) CHAIN LINK FABRIC - 6 GA./2" WEAVE (BOTTOM OF BACKSTOP TO 10')
- (F) CHAIN LINK FABRIC - 9 GA./2" WEAVE (10' TO TOP OF BACKSTOP)
- (G) STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C. TYPICAL.
- (H) HORIZONTAL STRETCHER BAR WITH STAINLESS STEEL BANDING CLAMPS AT 12" O.C. TYPICAL. (BOTTOM RAIL AND 10' INTERMEDIATE RAILS ONLY).

UNFOLDED ELEVATION OF BACKSTOP

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BACKSTOPS:	P-702
REVISED:		BACKSTOP FRAMING PLAN - LITTLE LEAGUE BASEBALL, PONY LEAGUE BASEBALL AND FAST PITCH SOFTBALL FIELDS	

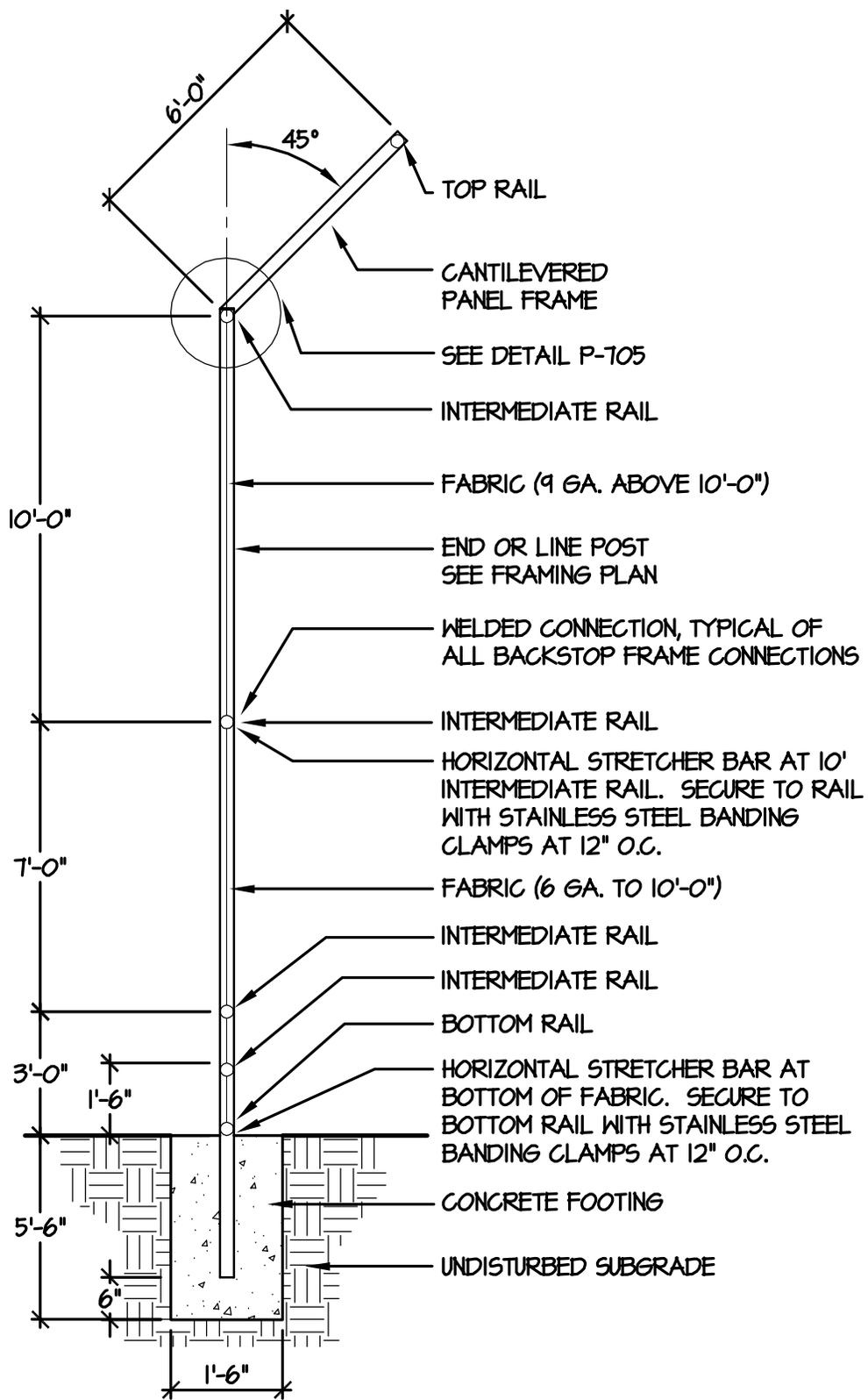


- Ⓐ CORNER POST (5.563" O.D.)
- Ⓑ LINE POST (5.563" O.D.)
- Ⓒ TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- Ⓓ CANTILEVERED FRAME (1.9" O.D.)
- Ⓔ CHAIN LINK FABRIC - 6 GA./2" WEAVE (BOTTOM OF BACKSTOP TO 10')
- Ⓕ CHAIN LINK FABRIC - 9 GA./2" WEAVE (10' TO TOP OF BACKSTOP)
- Ⓖ STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C. TYPICAL.
- Ⓗ HORIZONTAL STRETCHER BAR WITH STAINLESS STEEL BANDING CLAMPS AT 12" O.C. TYPICAL. (BOTTOM RAIL AND 10' INTERMEDIATE RAILS ONLY).

UNFOLDED ELEVATION OF BACKSTOP

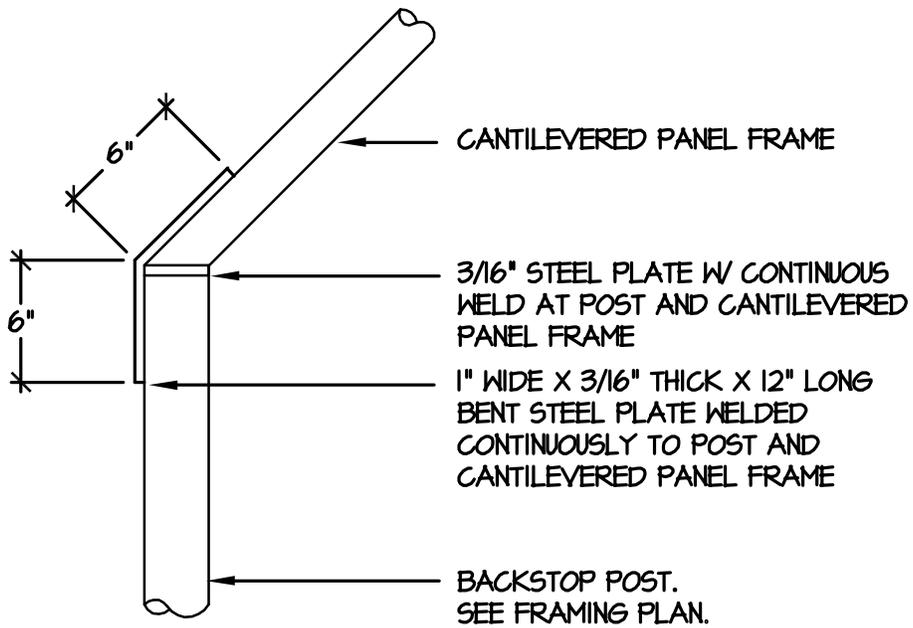
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		BACKSTOPS:	P-703
REVISED:		BACKSTOP FRAMING PLAN - FULL-SIZE BASEBALL & ADULT SLOW PITCH SOFTBALL FIELDS	



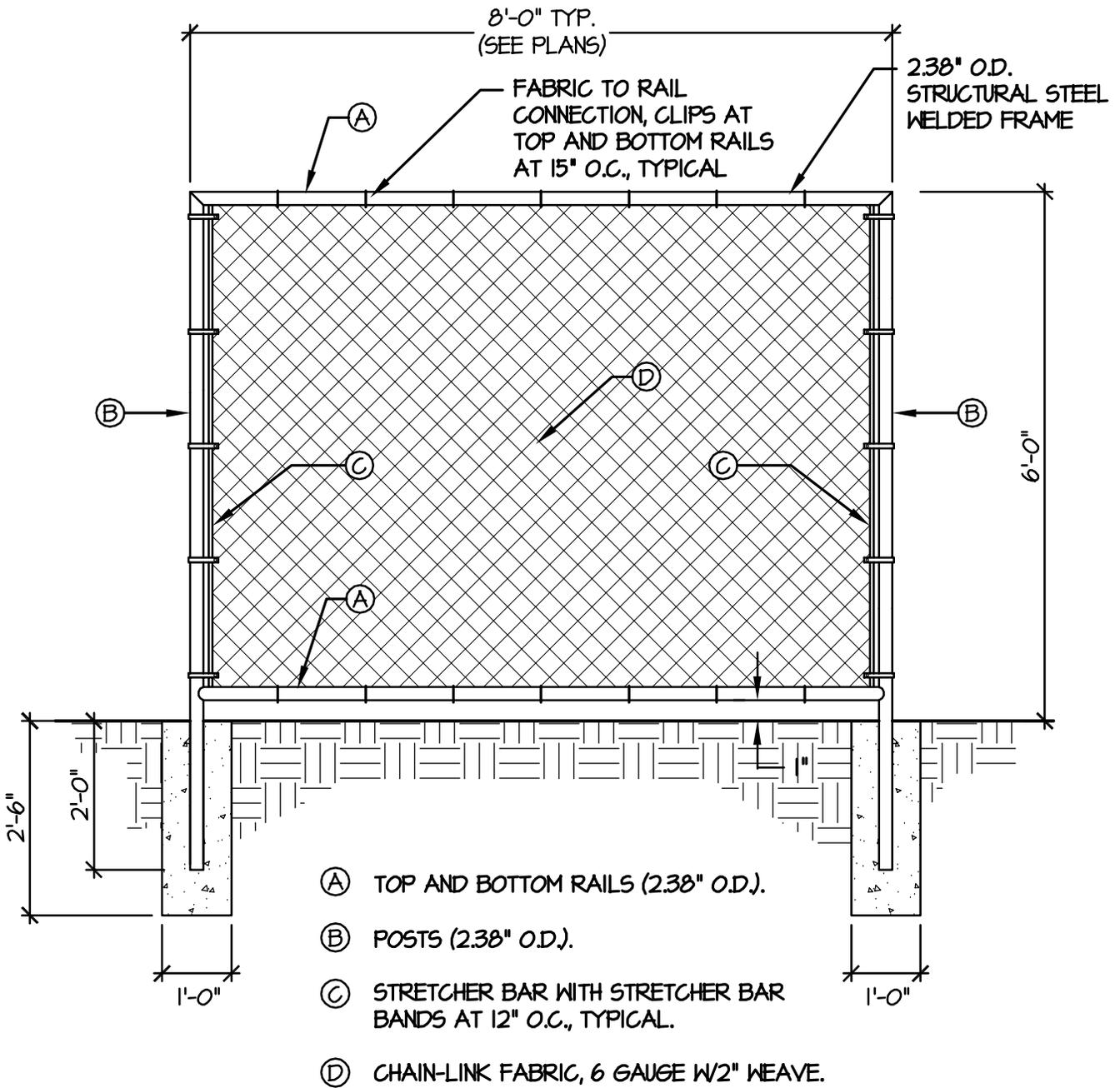
SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL BACKSTOPS:	DETAIL NO.
REVISED:		SECTION THROUGH BACKSTOP	<b>P-704</b>
		SHEET 1 OF 1	



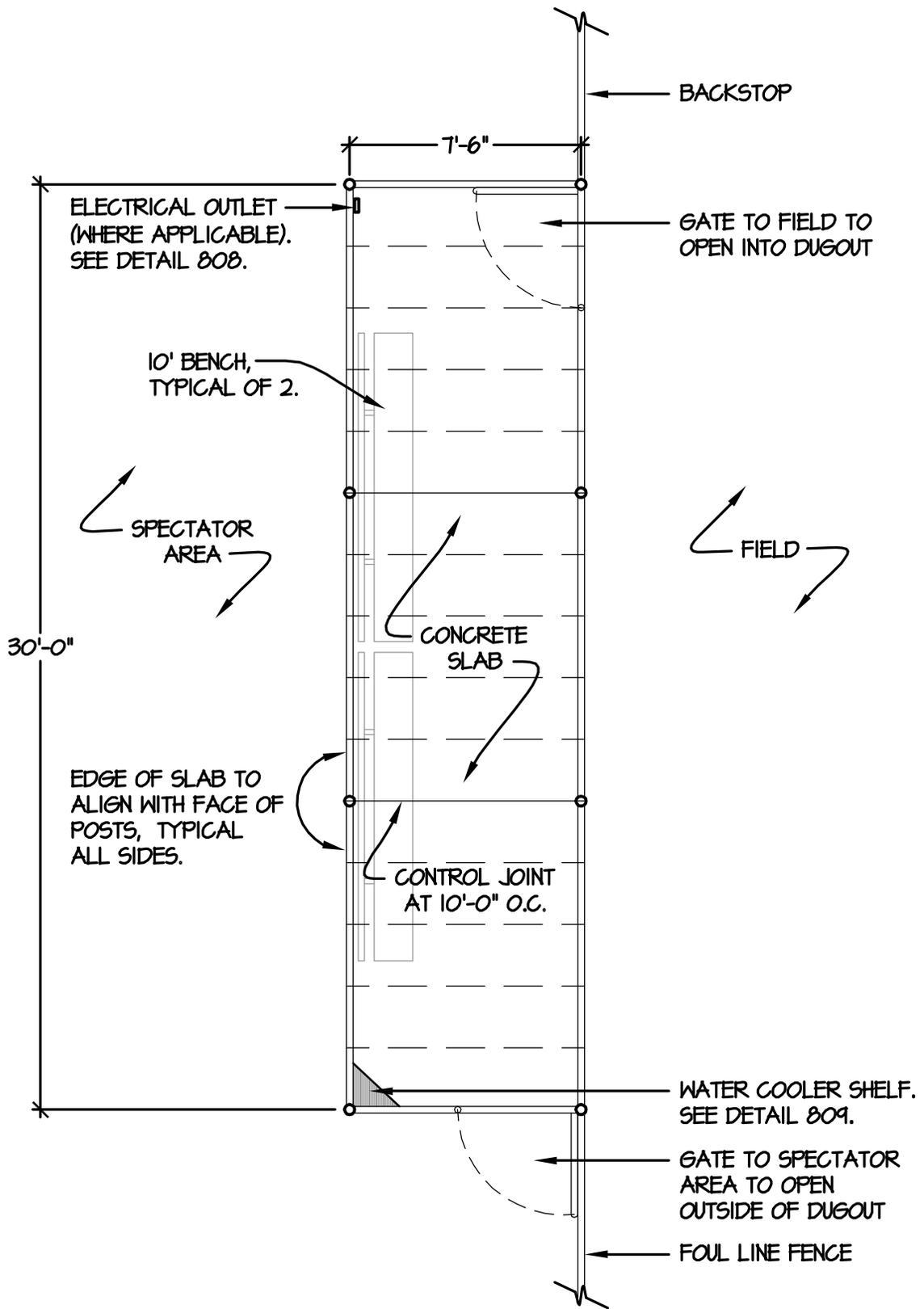
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.	
01/16		BACKSTOPS:	<b>P-705</b>	
REVISED:		BACKSTOP CANTILEVERED PANEL CONNECTION TO BACKSTOP POSTS		SHEET 1 OF 1



SCALE: N.T.S.

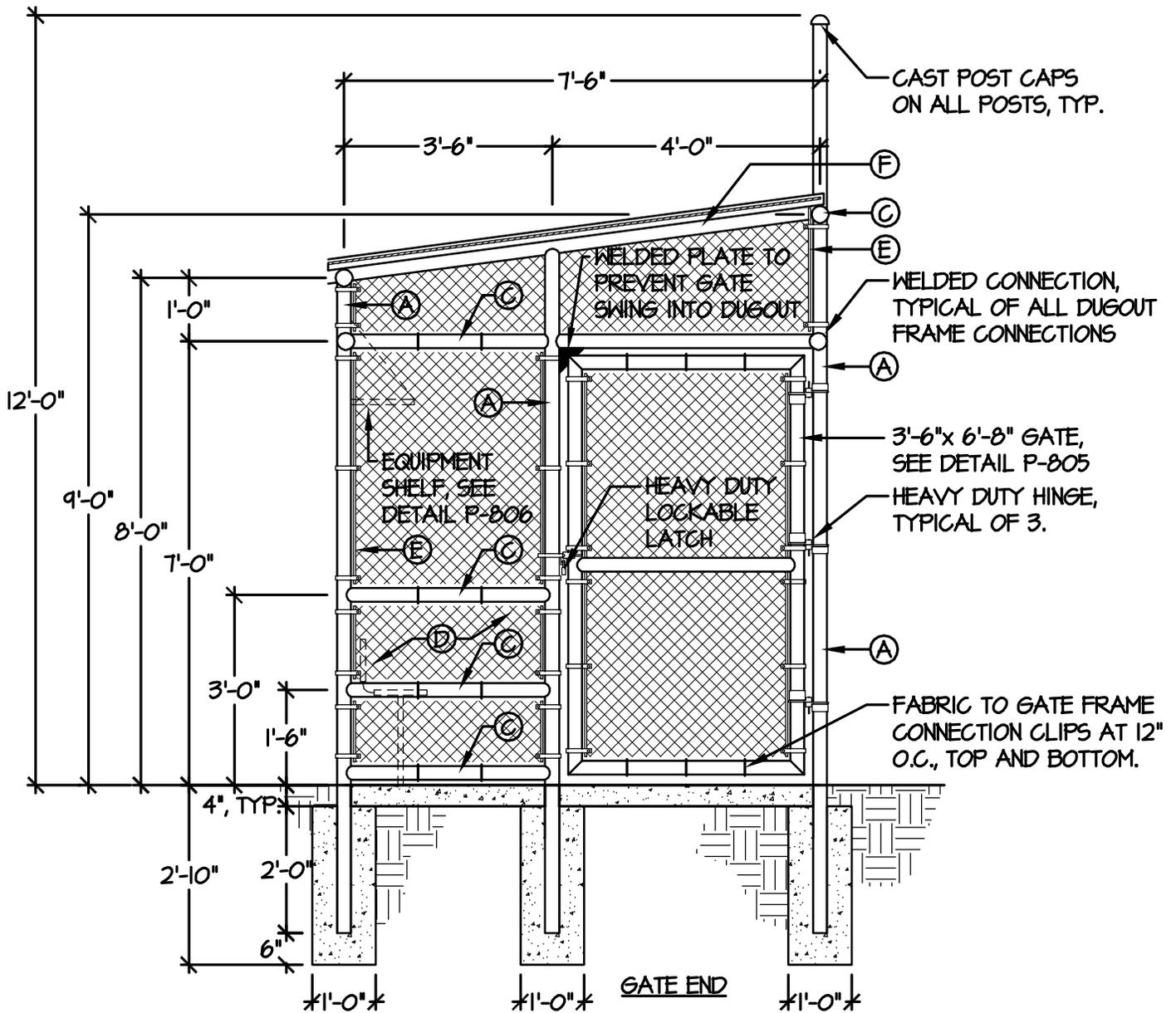
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BACKSTOPS:	P-706
REVISED:		BACKSTOP FOR PITCHER WARM-UP AREA	



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.	
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-800</b>	
REVISED:		DUGOUT PLAN		
				SHEET 1 OF 1

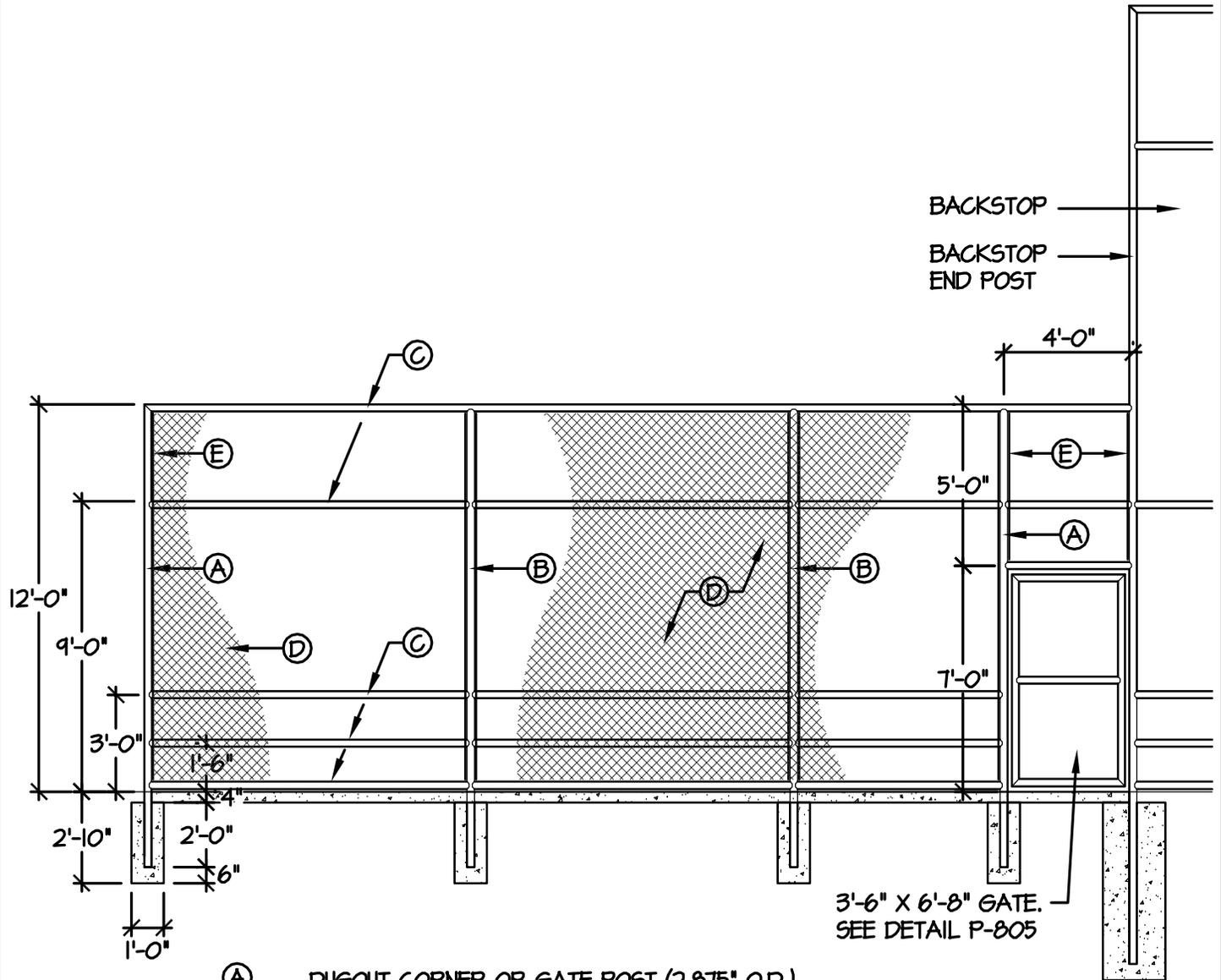




- (A) DUGOUT CORNER OR GATE POST (2.875" O.D.)
- (B) DUGOUT LINE POST (2.38" O.D.)
- (C) DUGOUT TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- (D) DUGOUT CHAIN LINK FABRIC (9 GA./2" WEAVE ON ENDS AND REAR. 6 GA./2" WEAVE ON FIELD SIDE)
- (E) DUGOUT STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C., TYPICAL.
- (F) DUGOUT ROOF FRAMING MEMBER (1.9" O.D.)

SCALE: N.T.S.

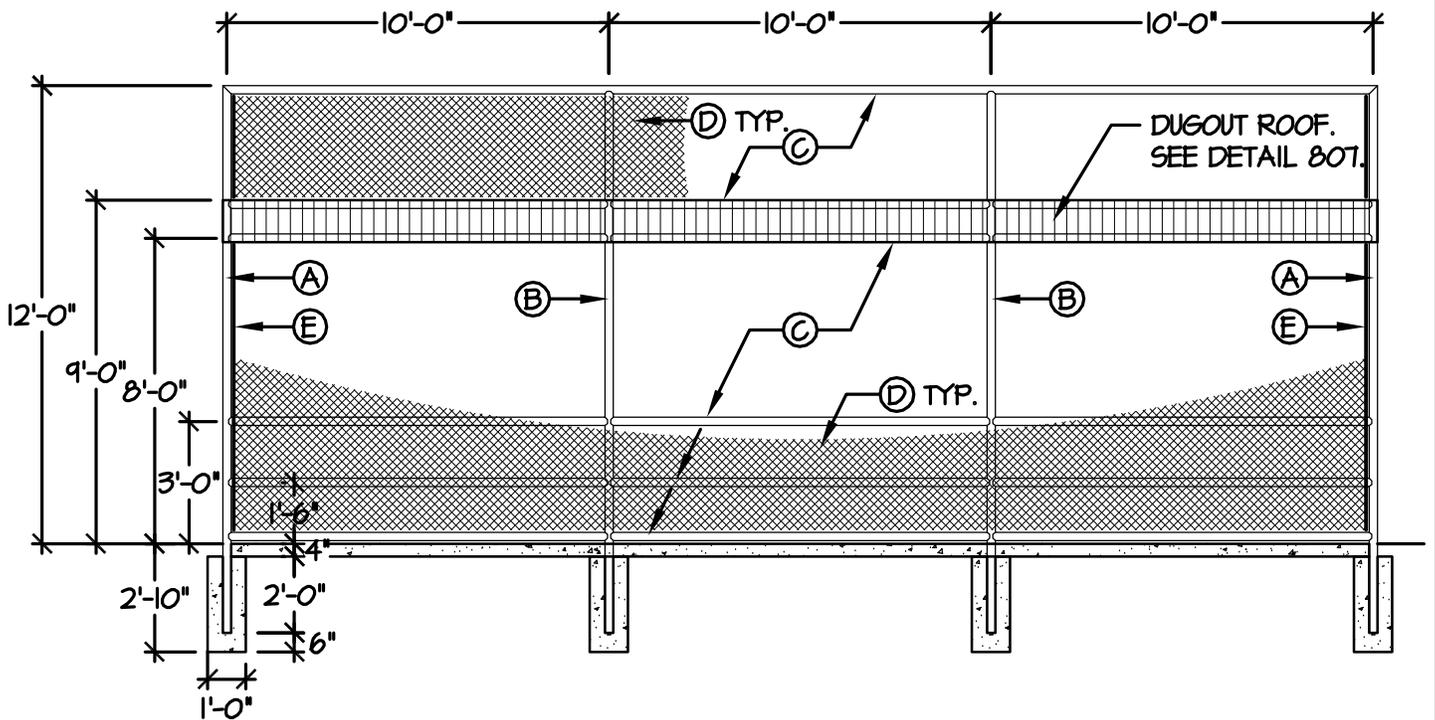
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-802</b>
REVISED:		DUGOUT: GATE END ELEVATION	



- (A) DUGOUT CORNER OR GATE POST (2.875" O.D.)
- (B) DUGOUT LINE POST (2.38" O.D.)
- (C) DUGOUT TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- (D) DUGOUT CHAIN LINK FABRIC (9 GA./2" WEAVE ON ENDS AND REAR. 6 GA./2" WEAVE ON FIELD SIDE.)
- (E) DUGOUT STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C., TYPICAL.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-803</b>
REVISED:		DUGOUT - FRONT (FIELD SIDE) ELEVATION	
			SHEET 1 OF 1

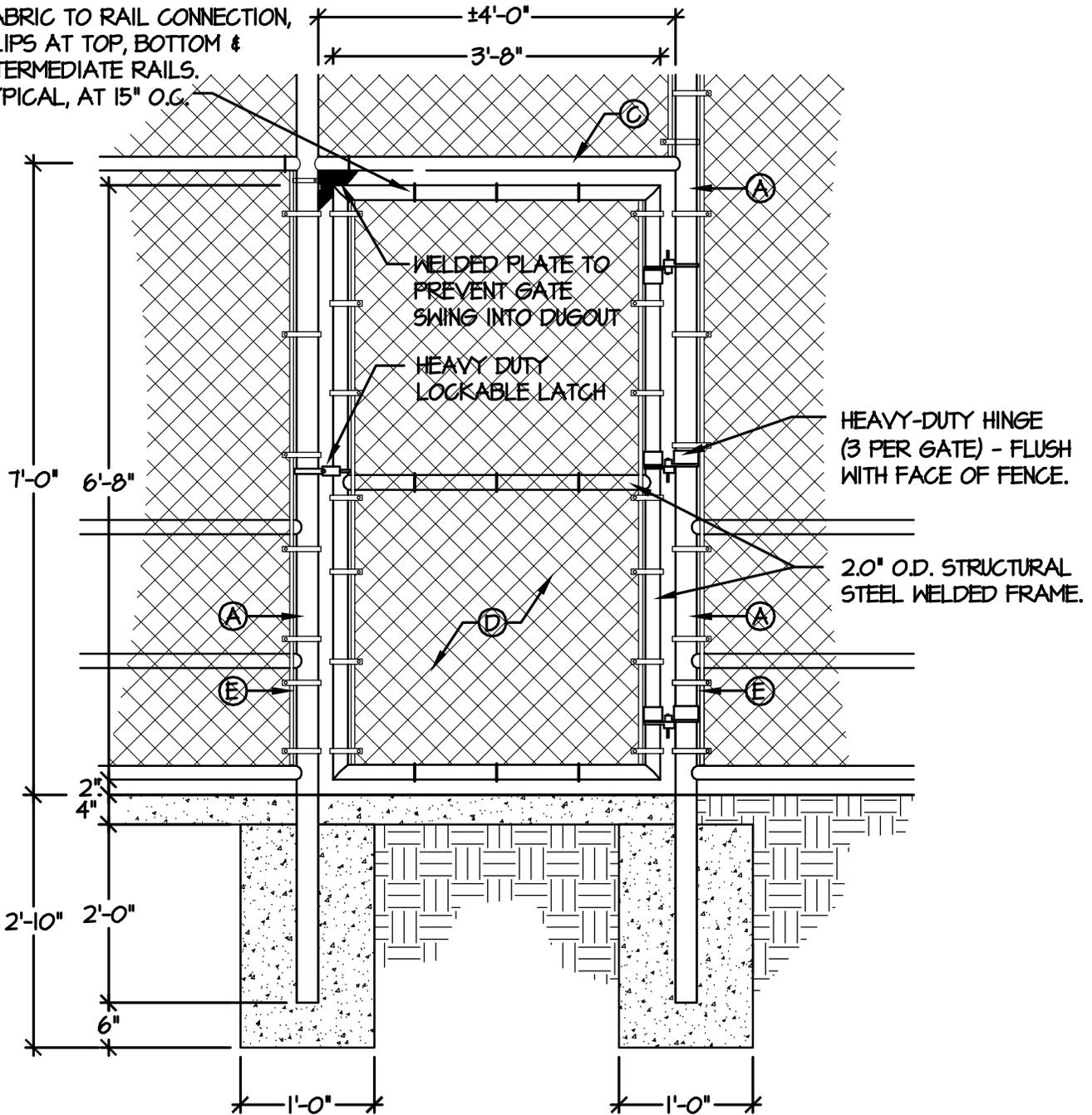


- Ⓐ DUGOUT CORNER OR GATE POST (2.875" O.D.)
- Ⓑ DUGOUT LINE POST (2.38" O.D.)
- Ⓒ DUGOUT TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- Ⓓ DUGOUT CHAIN LINK FABRIC (9 GA./2" WEAVE ON ENDS AND REAR. 6 GA./2" WEAVE ON FIELD SIDE.)
- Ⓔ DUGOUT STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C., TYPICAL.

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-804</b>
REVISED:		DUGOUT - REAR (SPECTATOR SIDE) ELEVATION	
			SHEET 1 OF 1

FABRIC TO RAIL CONNECTION,  
CLIPS AT TOP, BOTTOM &  
INTERMEDIATE RAILS.  
TYPICAL, AT 15" O.G.



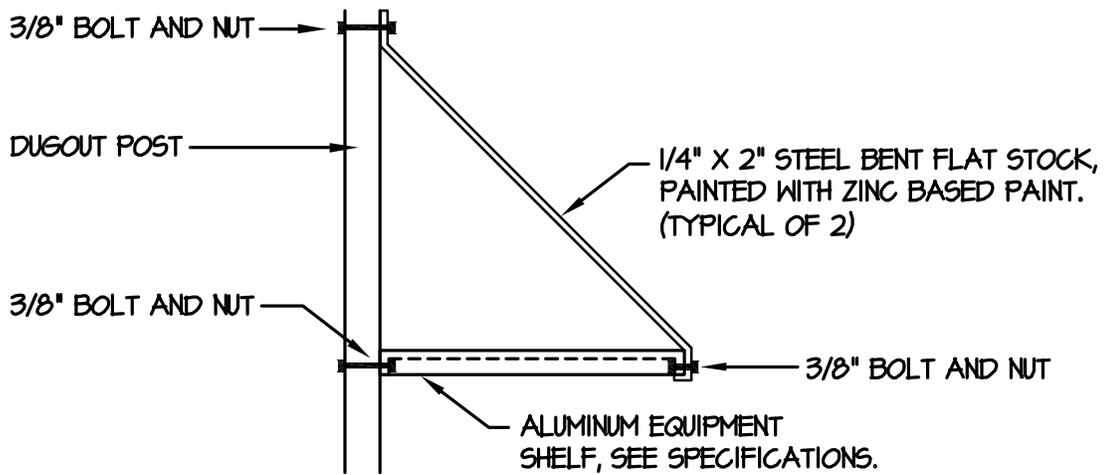
- (A) DUGOUT CORNER OR GATE POST (2.875" O.D.)
- (B) DUGOUT LINE POST (2.38" O.D.)
- (C) DUGOUT TOP, BOTTOM AND INTERMEDIATE RAIL (1.9" O.D.)
- (D) DUGOUT CHAIN LINK FABRIC (9 GA./2" WEAVE ON ENDS AND REAR. 6 GA./2" WEAVE ON FIELD SIDE.)
- (E) DUGOUT STRETCHER BAR W/ STRETCHER BAR BANDS AT 12" O.C., TYPICAL.

SCALE: N.T.S.

ISSUED:		<b>STANDARD DETAIL</b> <b>BASEBALL / SOFTBALL</b> <b>DUGOUTS:</b> <b>DUGOUT GATE</b>		DETAIL NO.	
11/05				<b>P-805</b>	
REVISED:					SHEET 1 OF 1
MO/YR					

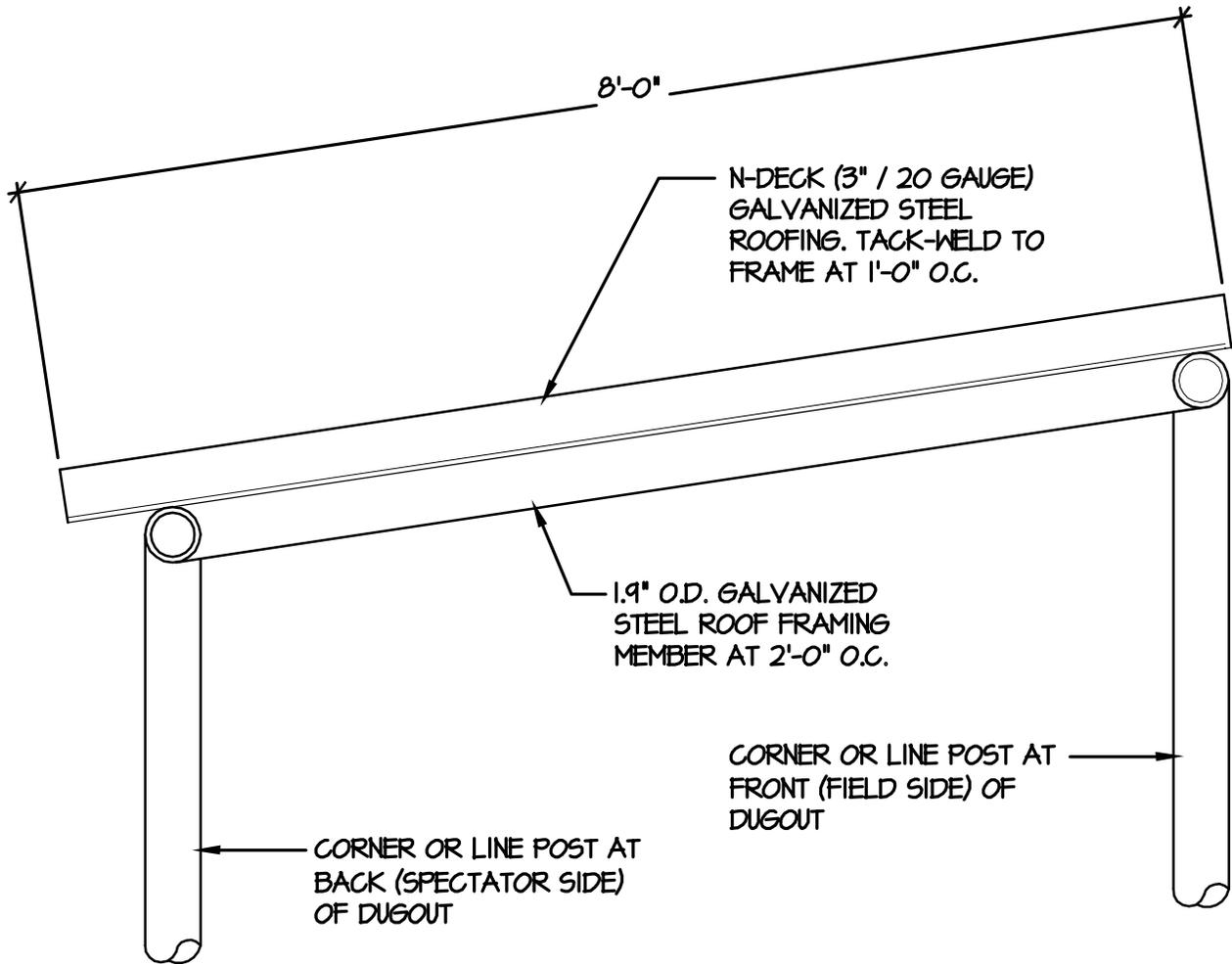
**NOTES:**

1. NUTS TO BE INSTALLED BELOW SHELF. CUT EXCESS BOLT AT NUT AND GRIND SMOOTH, TYPICAL.
2. TACK WELD ALL NUTS AFTER INSTALLATION TO PREVENT UNAUTHORIZED REMOVAL.
3. INSTALL ONE 12'-0" LONG SHELF. CENTERED ON BACK SIDE OF DUGOUT.
4. INSTALL SHELF AT 6'-0" ABOVE DUGOUT FLOOR.



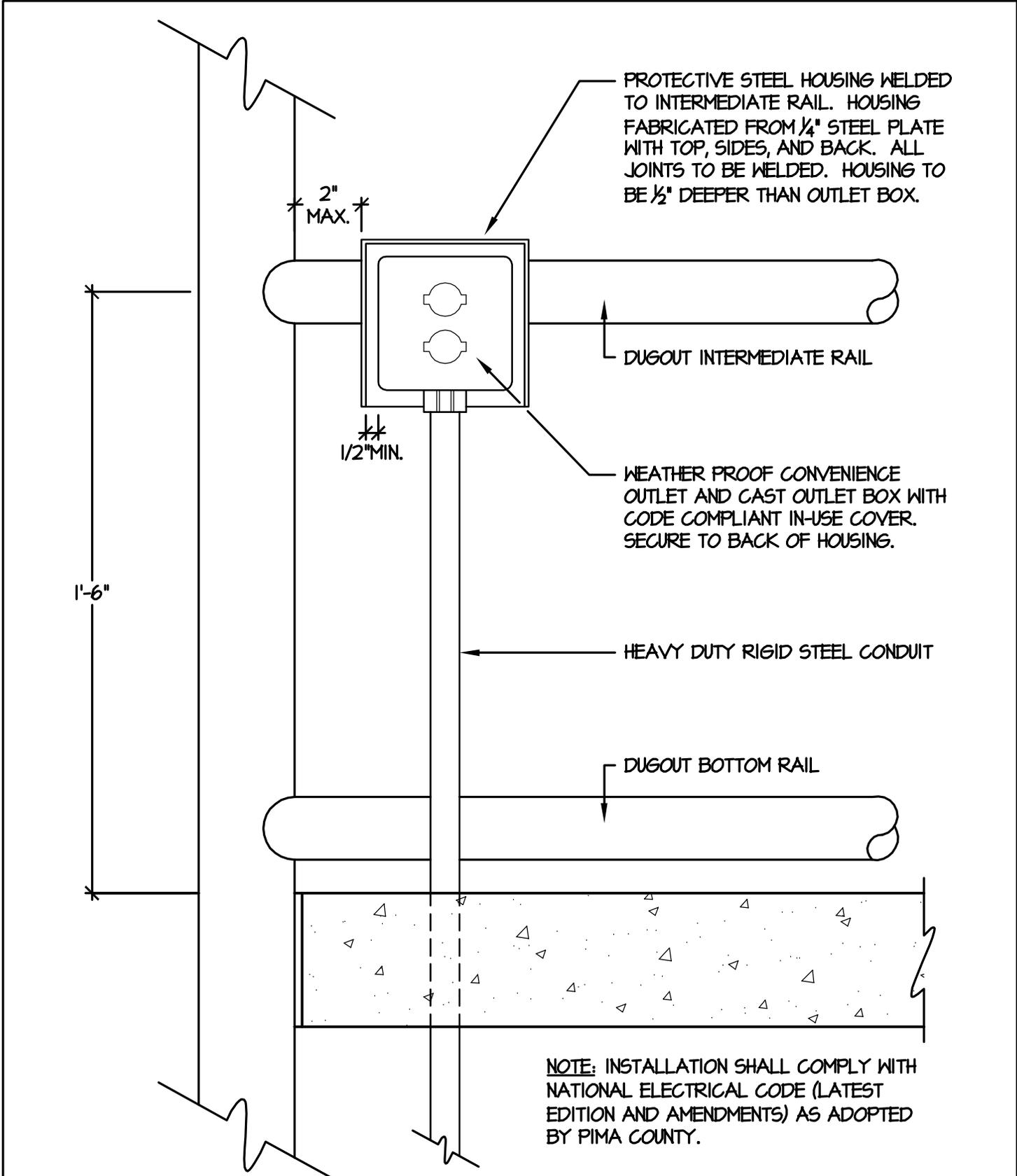
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-806</b>
REVISED:		DUGOUT EQUIPMENT SHELF	



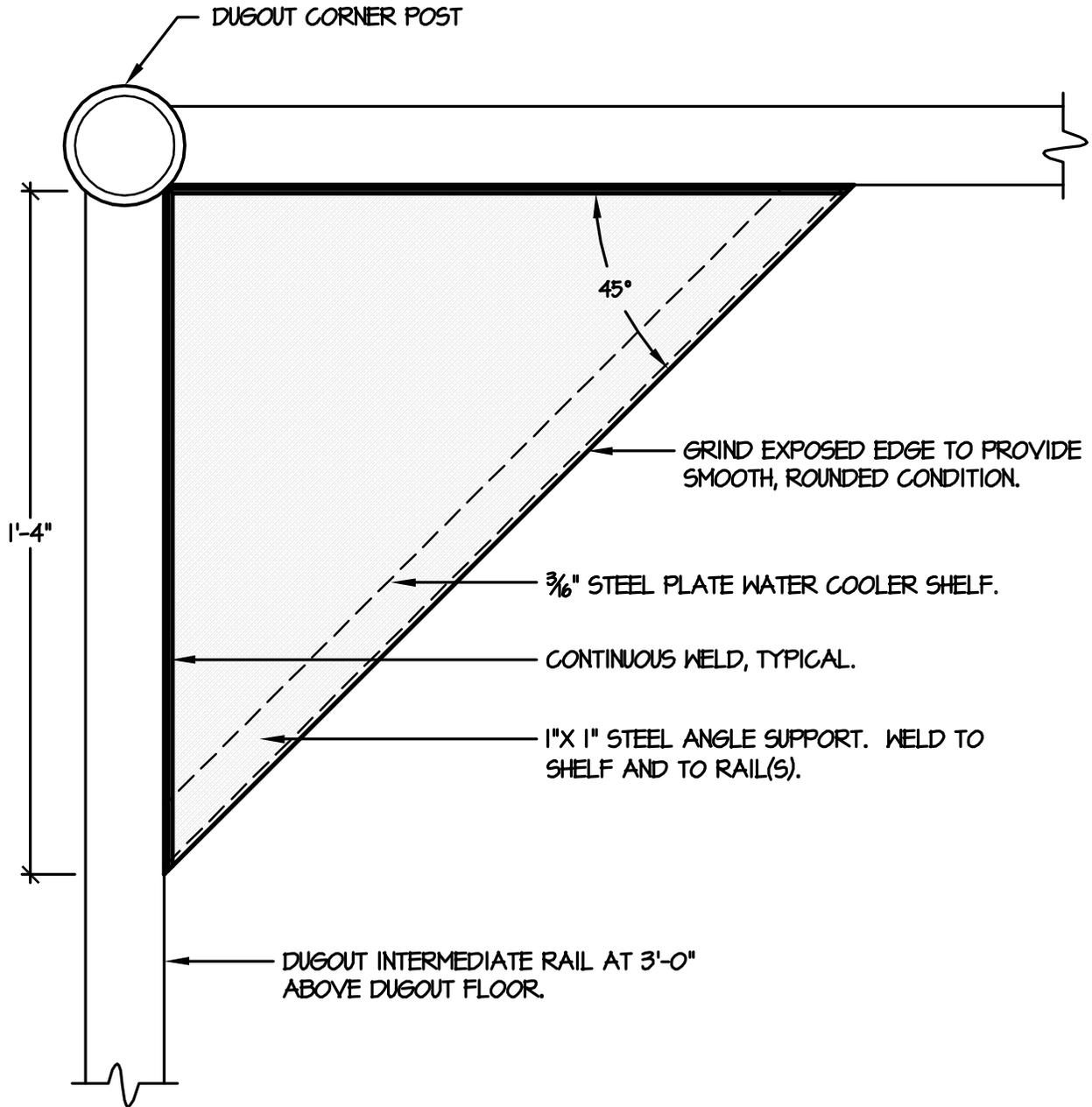
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-807</b>
REVISED:		DUGOUT ROOF	
			SHEET 1 OF 1



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-808</b>
REVISED:		DUGOUT ELECTRICAL OUTLET	
			SHEET 1 OF 1



**NOTES:**

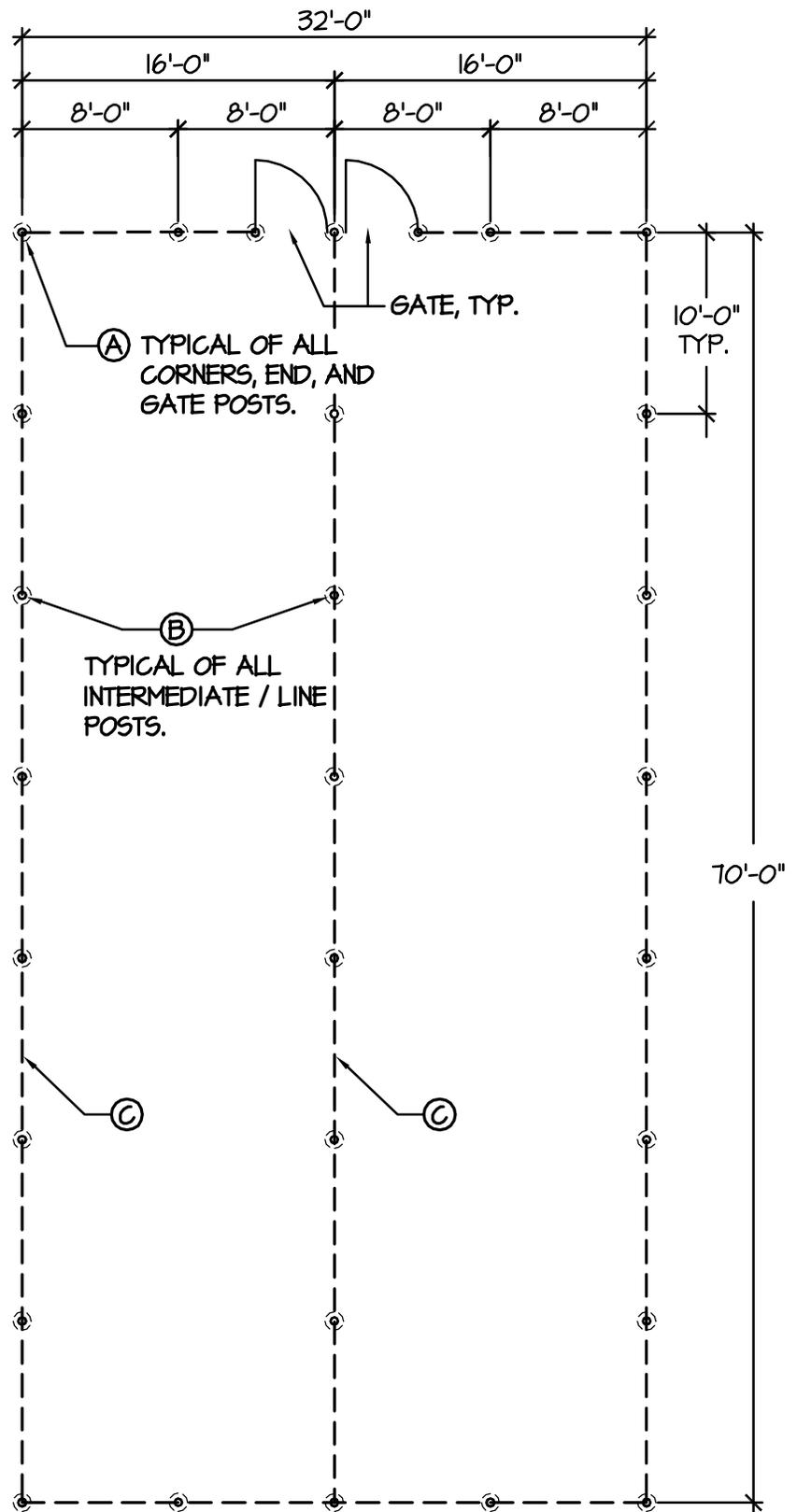
- I. PAINT ALL EXPOSED SURFACES OF SHELF WITH INDUSTRIAL GRADE EXTERIOR PAINT. COLOR TO BE LIGHT GRAY TO APPROXIMATE COLOR OF GALVANIZED DUGOUT FRAMING MEMBERS.

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-809</b>
REVISED:		WATER COOLER SHELF	
			SHEET 1 OF 1

○ NOTES

- Ⓐ CORNER GATE AND END POSTS, 2.875" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
- Ⓑ INTERMEDIATE AND LINE POSTS, 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
- Ⓒ CHAIN LINK FABRIC. 9 GA./2" WEAVE. (SEE P-810B AND P-810C).

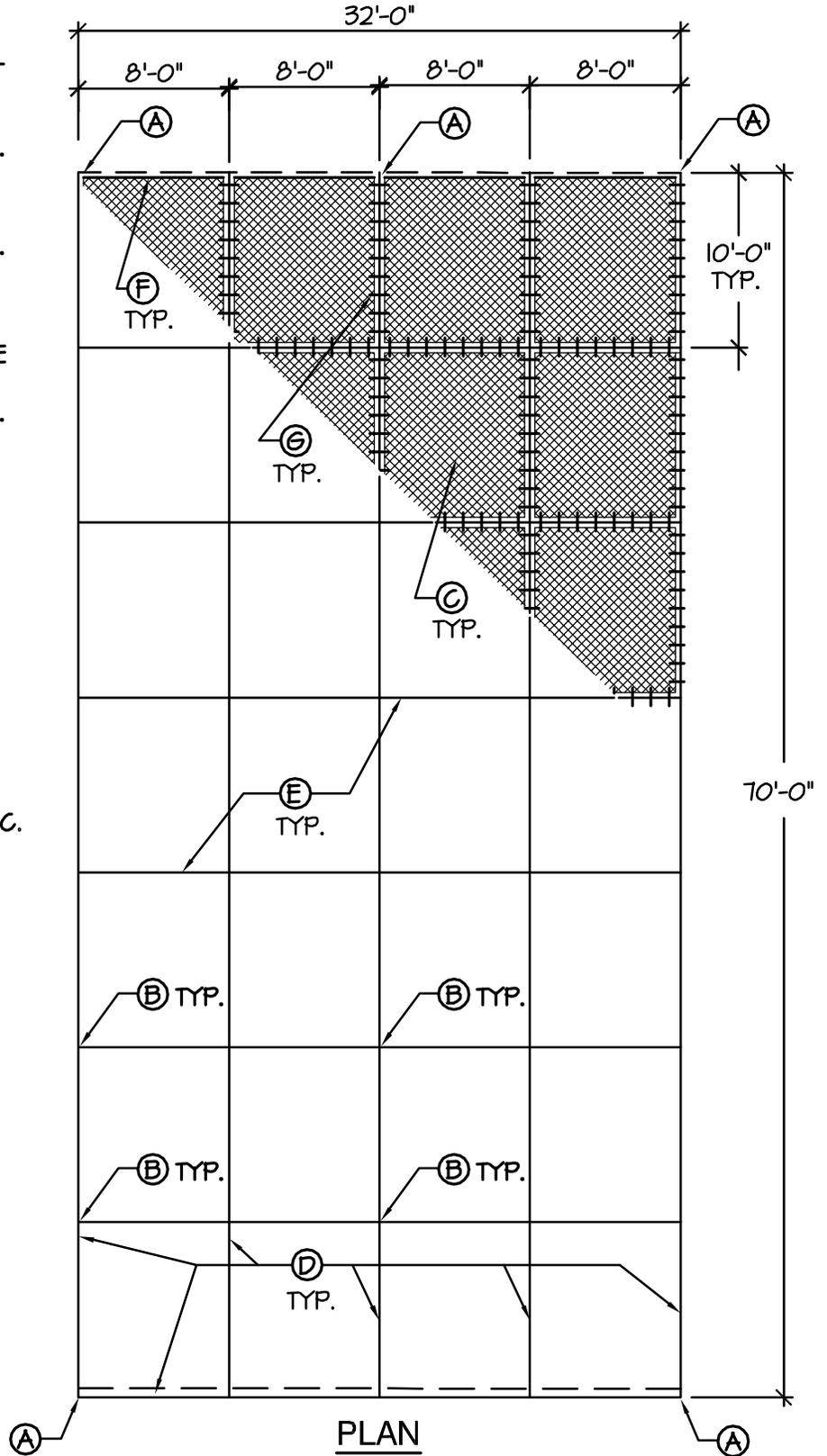


PLAN

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-810A</b>
REVISED:		BATTING CAGE - PLAN	
		SHEET 1 OF 1	

- NOTES
- Ⓐ CORNER GATE AND END POSTS, 2.875" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
  - Ⓑ INTERMEDIATE AND LINE POSTS, 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
  - Ⓒ CHAIN LINK FABRIC. 9 GA./2" WEAVE.
  - Ⓓ TOP, BOTTOM, AND INTERMEDIATE RAIL. 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE. (SEE P-810A).
  - Ⓔ INTERMEDIATE ROOF FRAME MEMBER, 2.875" AND 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE(S) AS DETAILED.
  - Ⓕ STRETCHER BAR. 3/4" X 3/8" GALVANIZED STEEL STRETCHER BAR WITH 3/4" X 0.078" GALVANIZED STEEL ANCHORING BANDS AT 12" O.C.
  - Ⓖ GALVANIZED STEEL FABRIC-TO-RAIL CLIPS AT 12" O.C.



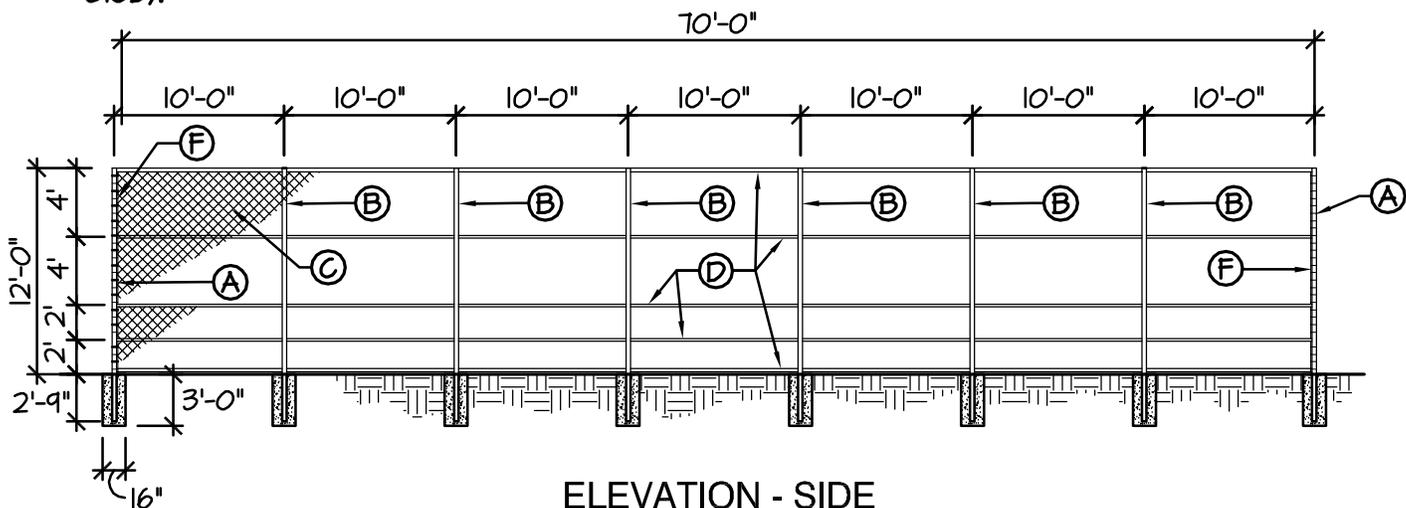
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-810B</b>
REVISED:		BATTING CAGE - ROOF PLAN	

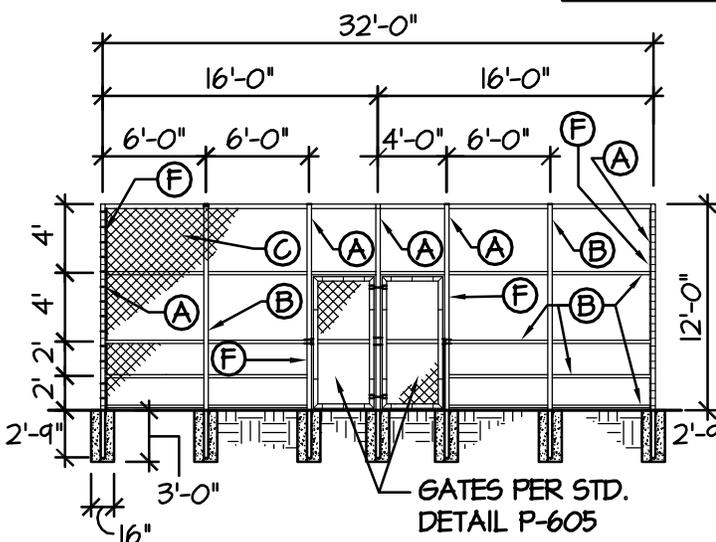
○ NOTES

- (A) CORNER GATE AND END POSTS, 2.875" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
- (B) INTERMEDIATE AND LINE POSTS, 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
- (C) CHAIN LINK FABRIC. 9 GA./2" WEAVE.
- (D) TOP, BOTTOM, AND INTERMEDIATE RAIL. 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE.
- (E) INTERMEDIATE ROOF FRAME MEMBER, 2.875" AND 1.9" O.D. SCHEDULE 40, GALVANIZED, ROUND STEEL TUBE(S) AS DETAILED. (SEE 810D).

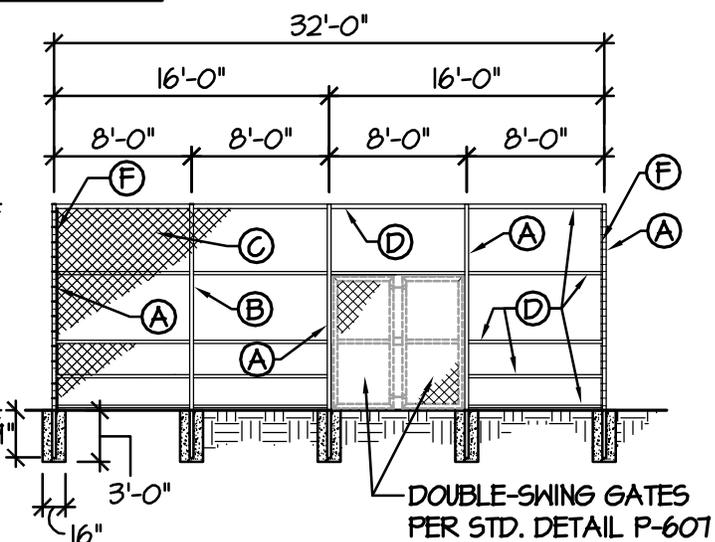
- (F) STRETCHER BAR. 3/4" X 3/8" GALVANIZED STEEL STRETCHER BAR WITH 3/4" X 0.078" GALVANIZED STEEL ANCHORING BANDS AT 12" O.C.
- (G) GALVANIZED STEEL FABRIC-TO-RAIL CLIPS AT 12" O.C. TYPICAL AT ALL LOCATIONS WHERE FABRIC CONTACTS POST OR RAIL, EXCLUSIVE OF STRETCHER BAR LOCATIONS.



**ELEVATION - SIDE**



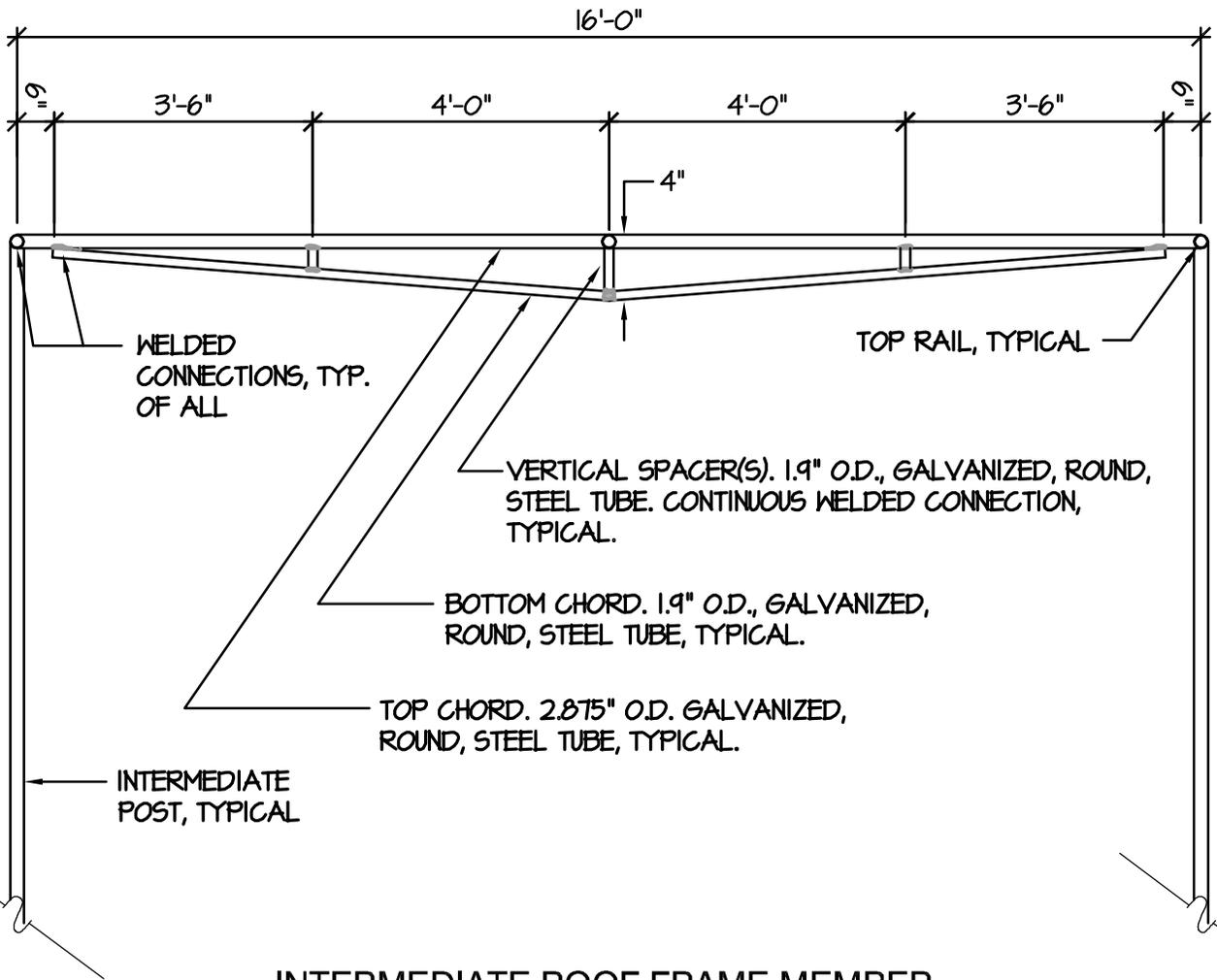
**ELEVATION - FRONT**



**ELEVATION - BACK W/OPTIONAL SERVICE GATE**

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-810C</b>
REVISED:		BATING CAGE - ELEVATIONS	
			SHEET 1 OF 1



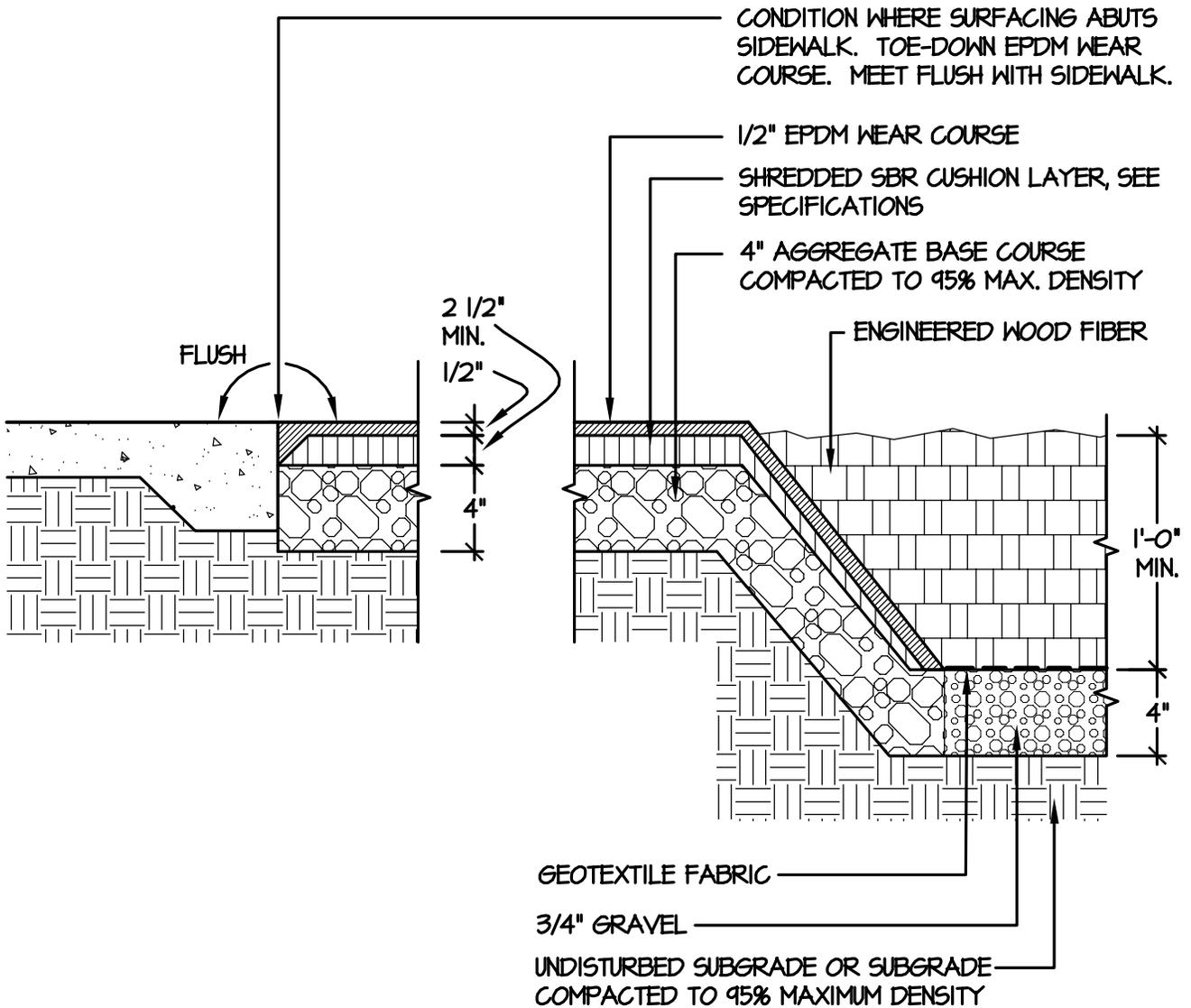
INTERMEDIATE ROOF FRAME MEMBER

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		BASEBALL / SOFTBALL DUGOUTS:	<b>P-810D</b>
REVISED:		BATTING CAGE - INTERMEDIATE ROOF FRAME MEMBER	
			SHEET 1 OF 1

**NOTES:**

1. ENGINEERED WOOD FIBER SURFACING TO BE INSTALLED OVER ENTIRE PLAYGROUND AREA EXCEPT WHERE POURED IN PLACE RUBBERIZED RESILIENT SURFACING OCCURS.
2. RUBBERIZED RESILIENT SURFACING'S WEAR COURSE COLOR SHALL BE 50% BLACK AND 50% COLORS AS SELECTED BY THE OWNER'S REPRESENTATIVE.
3. SEE SPECIFICATIONS FOR ADDITIONAL SAFETY SURFACING REQUIREMENTS.
4. CONTRACTOR TO CONFIRM REQUIRED DEPTH OF RUBBERIZED RESILIENT SURFACING FOR EQUIPMENT INSTALLED AND SHALL INCREASE DEPTH IF REQUIRED.

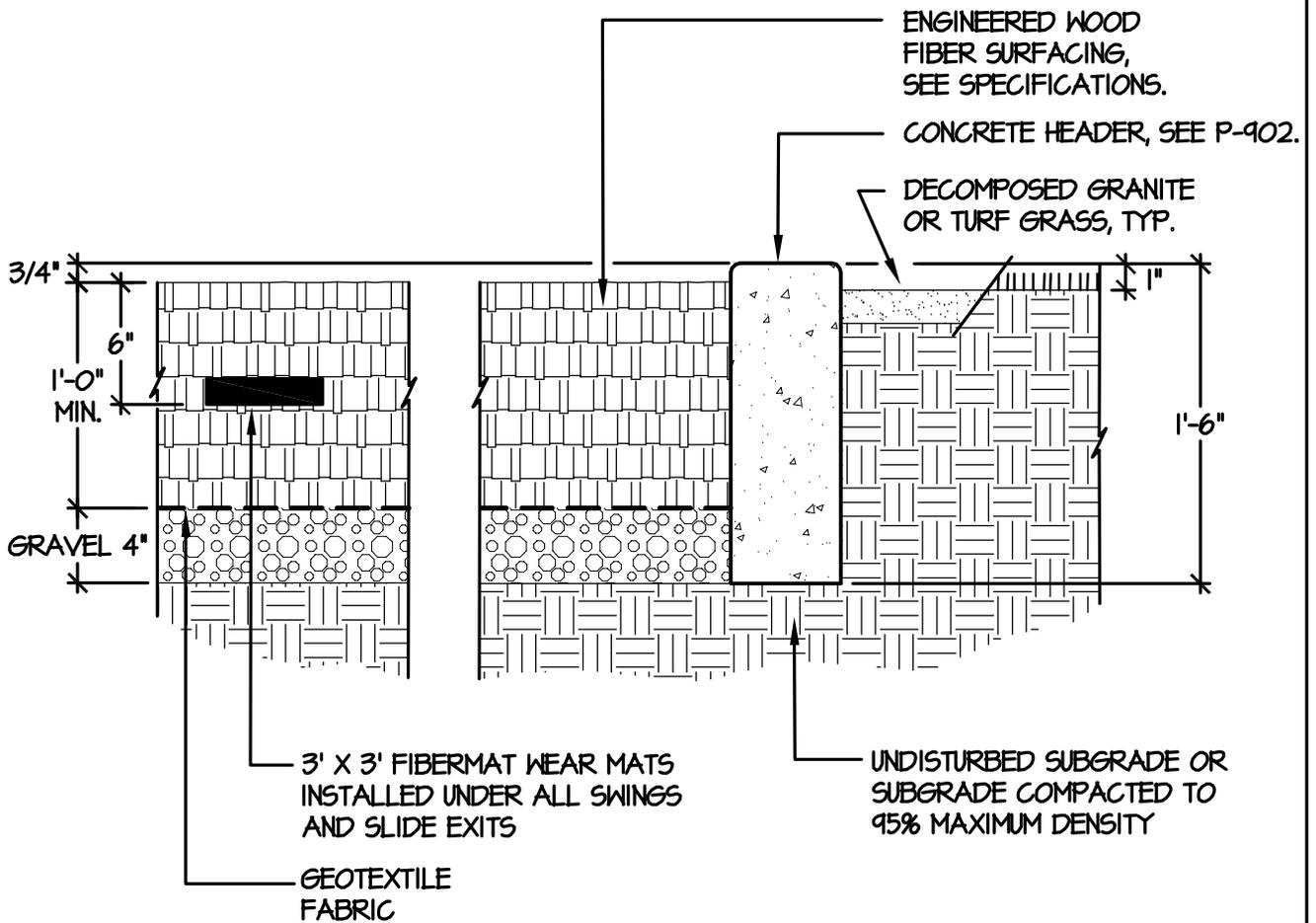


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL		DETAIL NO.
11/05		PLAYGROUND HEADERS		P-900
REVISED:		AND SURFACING:		
MO/YR		RUBBERIZED RESILIENT SURFACING		SHEET 1 OF 1

**NOTES:**

1. ENGINEERED WOOD FIBER SURFACING TO BE INSTALLED OVER ENTIRE PLAYGROUND AREA EXCEPT WHERE POURED IN PLACE RUBBERIZED RESILIENT SURFACING OCCURS.
2. SEE SPECIFICATIONS FOR ADDITIONAL SAFETY SURFACING REQUIREMENTS.
3. CONTRACTOR TO CONFIRM REQUIRED DEPTH OF ENGINEERED WOOD FIBER SURFACING FOR EQUIPMENT INSTALLED AND SHALL INCREASE DEPTH IF REQUIRED.

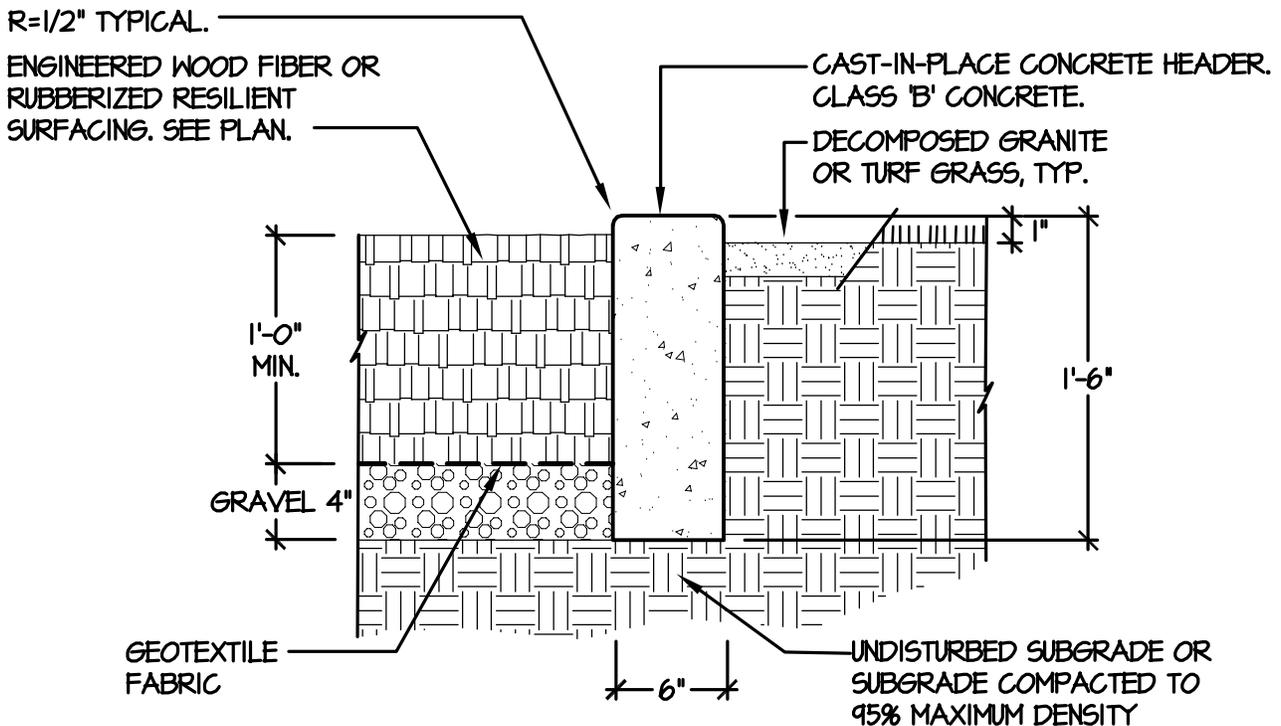


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL		DETAIL NO.
11/05		PLAYGROUND HEADERS AND SURFACING:		P-901
REVISED:		ENGINEERED WOOD FIBER SURFACING		
MO/YR				SHEET 1 OF 1

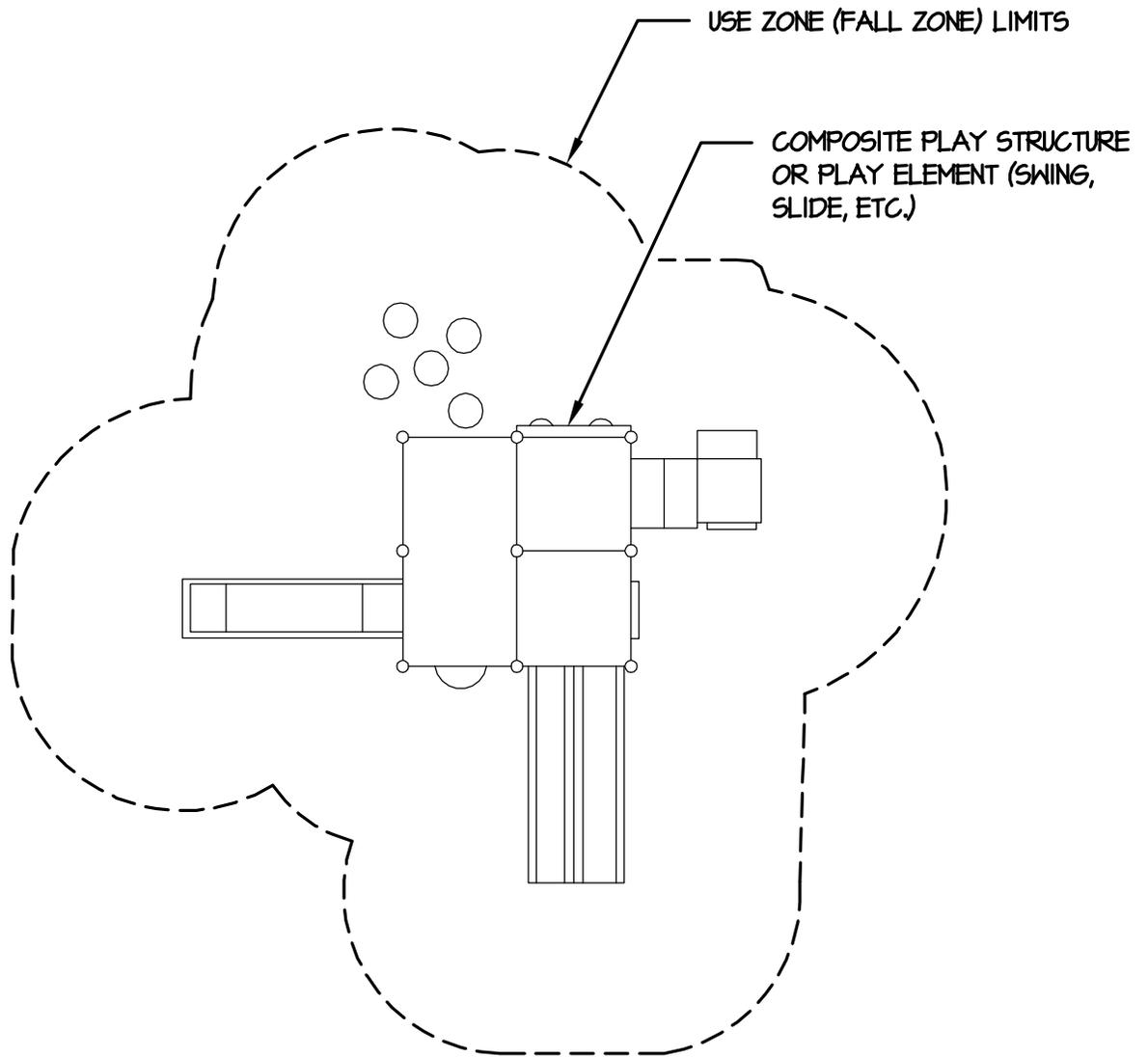
**NOTES:**

1. PROVIDE EXPANSION JOINTS EVERY 40' MAX. AND CONTROL JOINTS EVERY 10' MAX. IN CONCRETE HEADER.
2. TOP OF CONCRETE HEADER SHALL MEET FLUSH WHEREVER IT CONTACTS OTHER PAVEMENT OR CURBS. PROVIDE 1/2" BITUMINOUS JOINT FILLER WERE HEADER MEETS NEW SIDEWALK.



SCALE: N.T.S.

ISSUED:		STANDARD DETAIL		DETAIL NO.
11/05		PLAYGROUND HEADERS AND SURFACING:		P-902
REVISED:		PLAYGROUND HEADER		
MO/YR				SHEET 1 OF 1



**NOTES:**

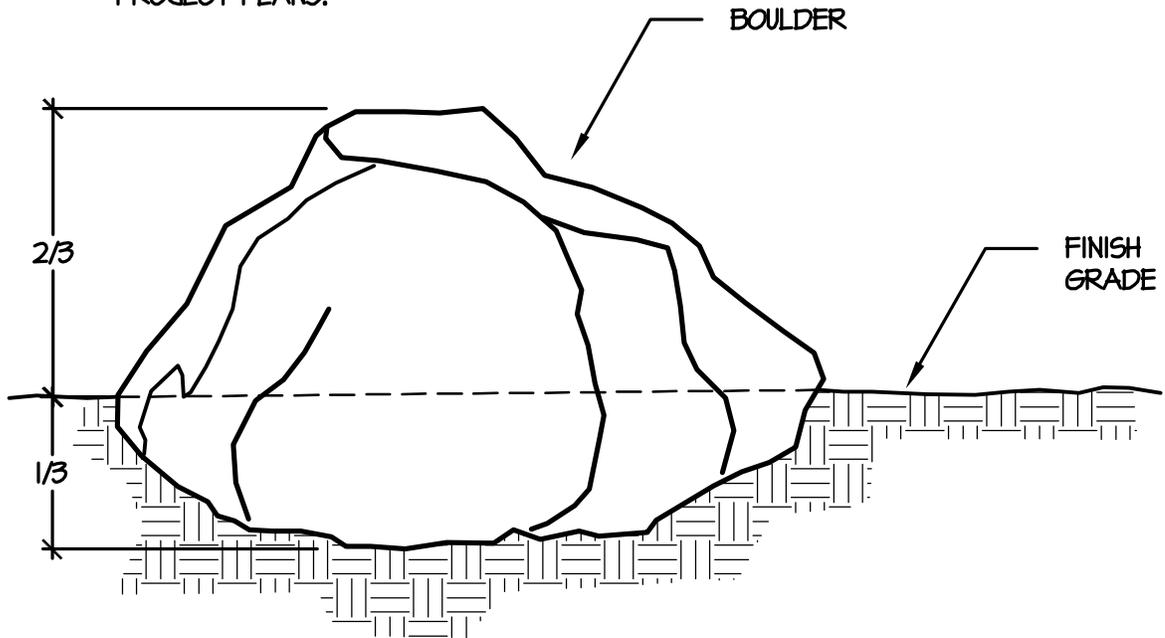
1. USE ZONE (FALL ZONE) IS THE AREA UNDER AND AROUND PLAYGROUND EQUIPMENT WHERE PROTECTIVE SURFACING IS REQUIRED.
2. USE ZONES SHALL BE FREE OF OBSTACLES THAT EQUIPMENT USERS COULD RUN INTO OR FALL ON TOP OF (INCLUDING, BUT NOT LIMITED TO, POSTS FOR SHADE STRUCTURES AND PLAYGROUND AREA HEADER CURBS).
3. SEE STANDARD SPECIFICATIONS FOR REQUIREMENT TO SUBMIT PLAYGROUND EQUIPMENT MANUFACTURER'S USE ZONE DIAGRAM.

SCALE: N.T.S.

ISSUED: 11/05		STANDARD DETAIL PLAYGROUND HEADERS AND SURFACING:		DETAIL NO.  P-903
REVISED: MO/YR		PLAY EQUIPMENT USE ZONE DIAGRAM		SHEET 1 OF 1

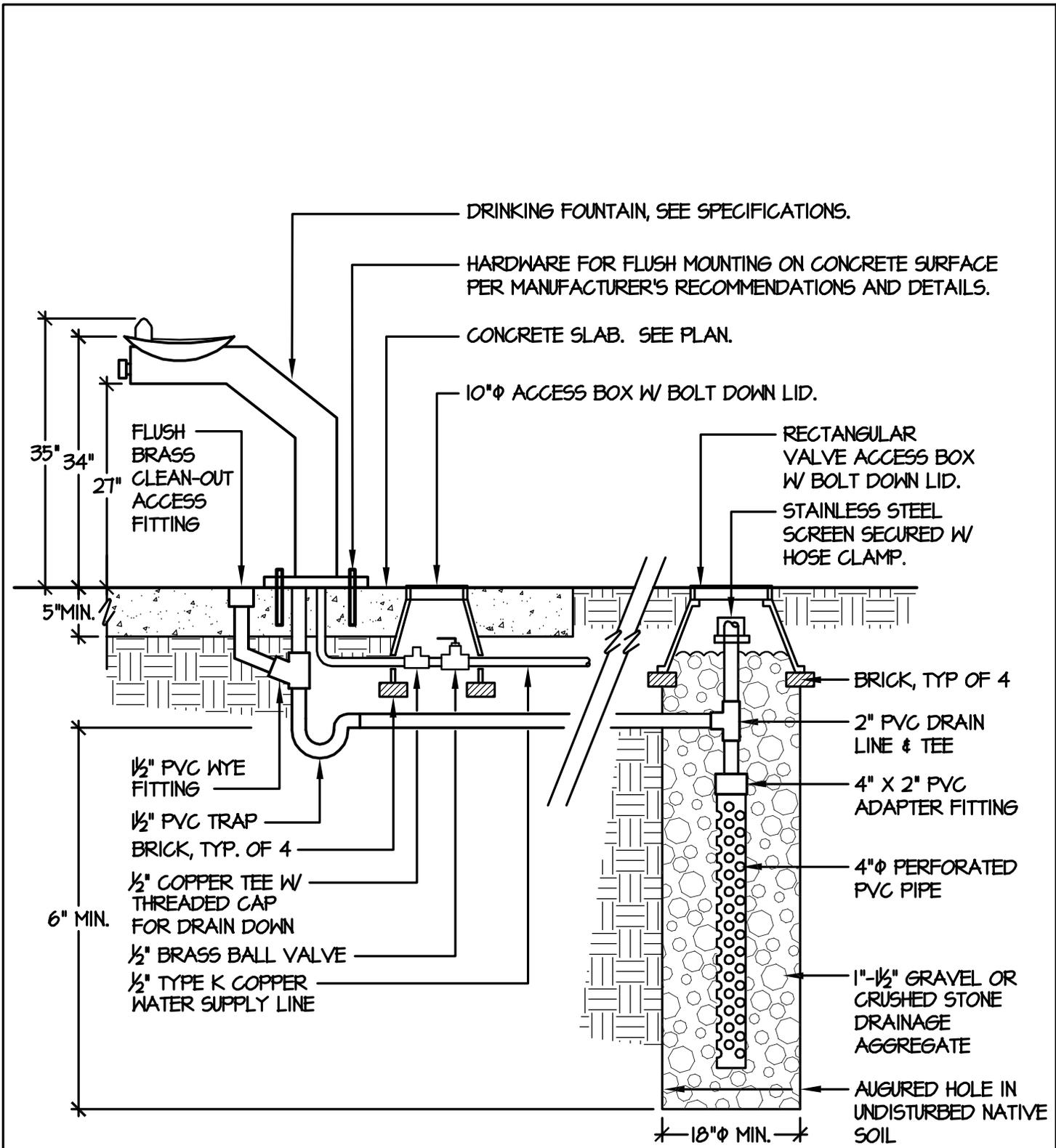
**NOTE:**

1. BOULDER TO BE SET WITH MINIMUM  $\frac{1}{3}$  MASS BELOW FINISH GRADE.
2. ALL BOULDERS TO BE FROM SURFACE LOCATIONS, WEATHERED AND UNBROKEN.
3. BOULDER SIZE(S) AS NOTED ON THE PROJECT PLANS.



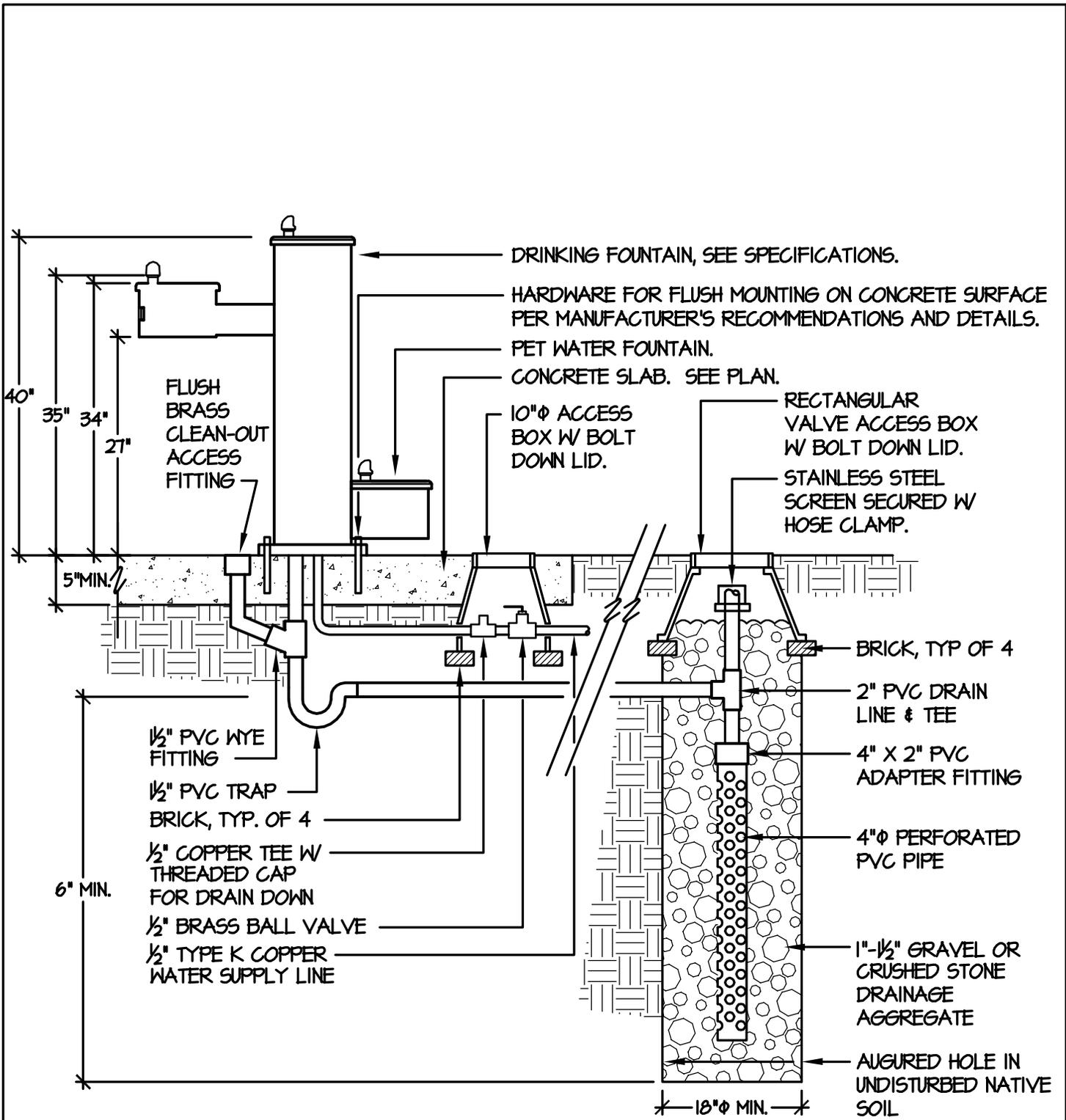
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	<b>P-1000</b>
REVISED:		BOULDER DETAIL	



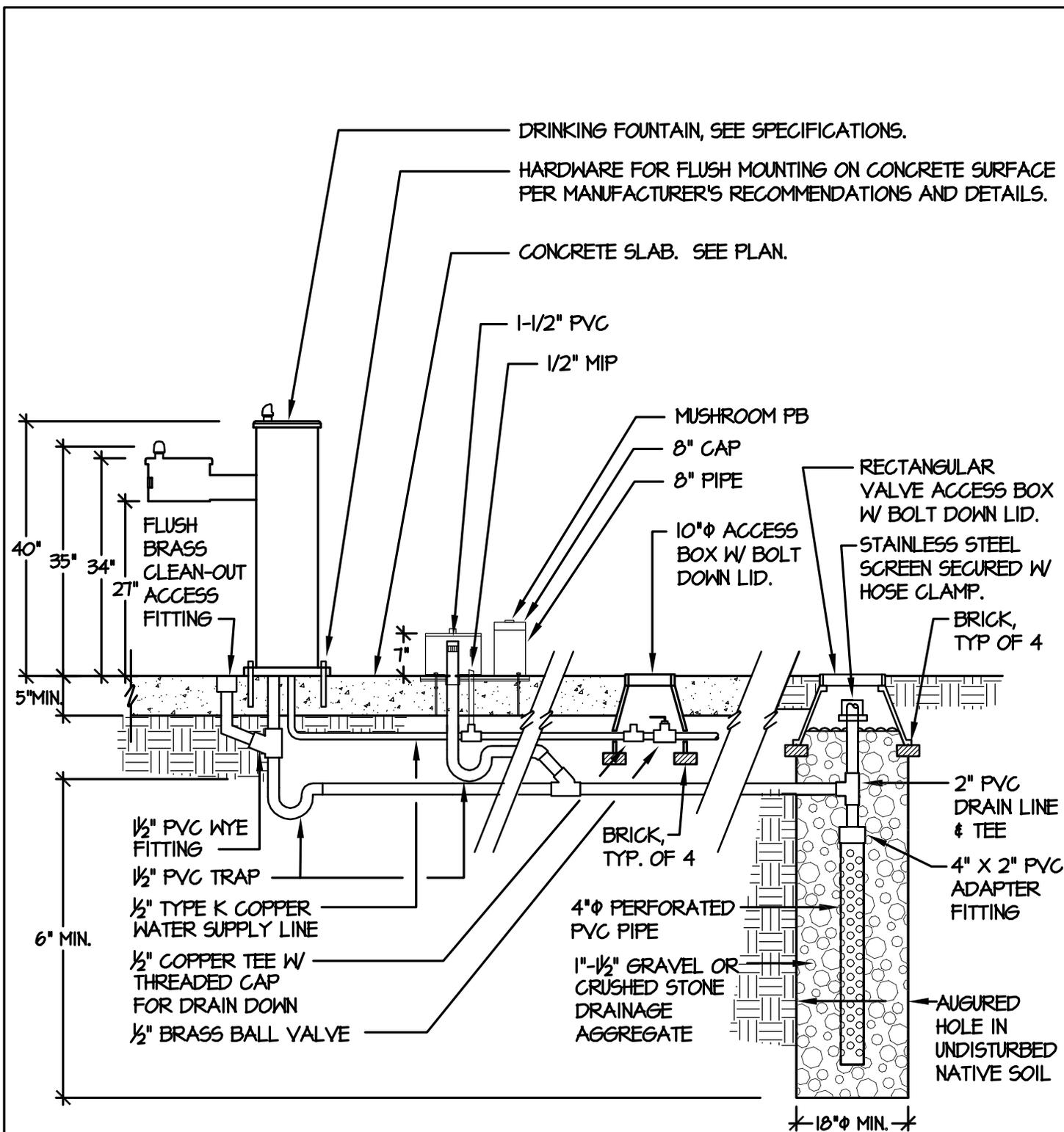
SCALE: N.T.S.

ISSUED:	 <p>PIMA COUNTY NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	P-1001
REVISED:		ACCESSIBLE DRINKING FOUNTAIN	
			SHEET 1 OF 1



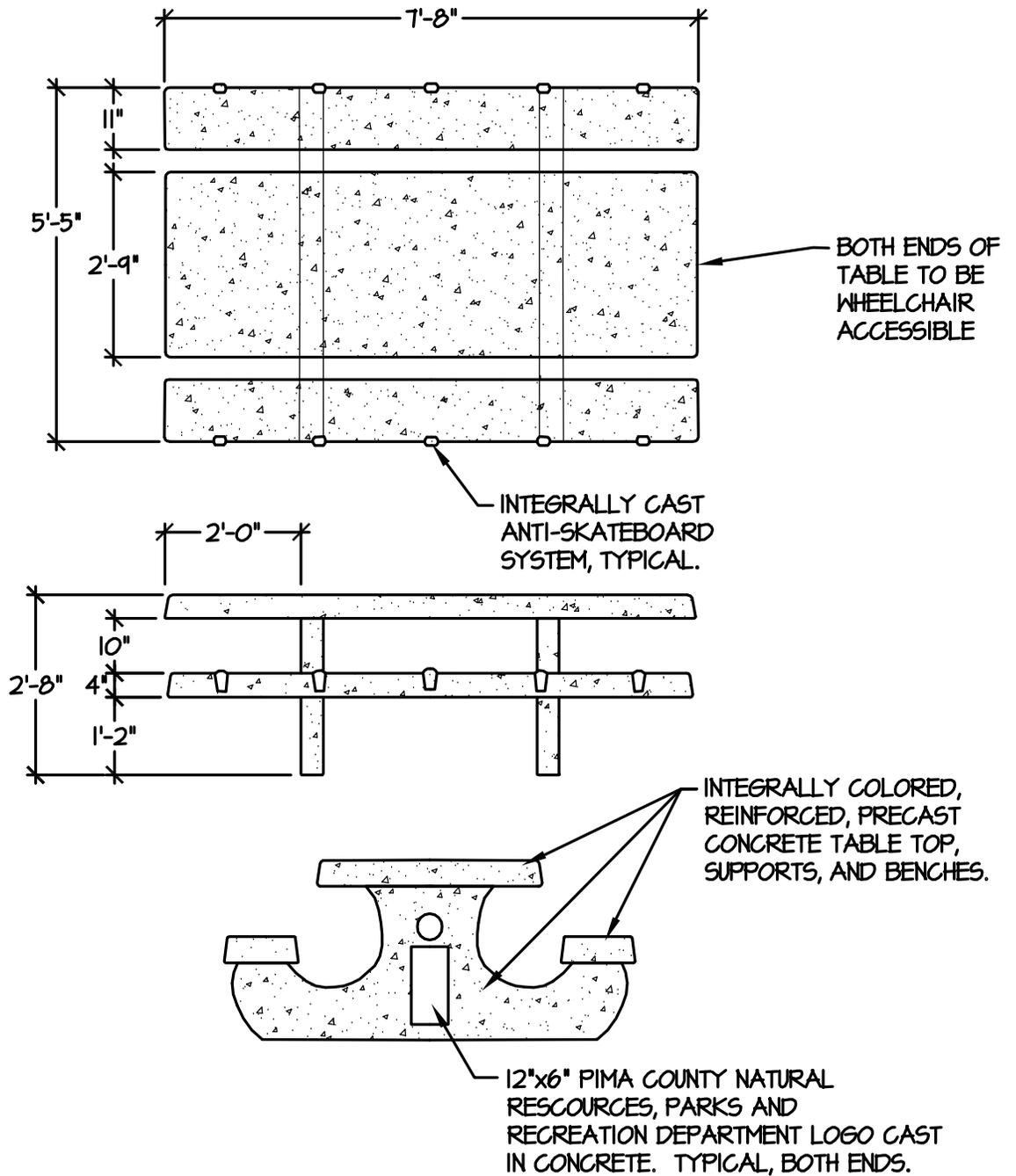
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	<b>P-1002</b>
REVISED:		ACCESSIBLE DRINKING FOUNTAIN WITH PET WATER FOUNTAIN	



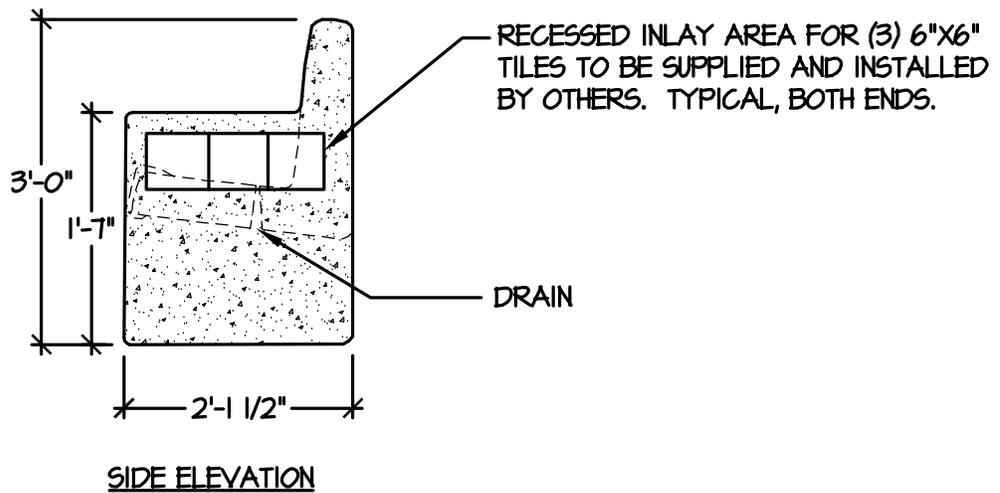
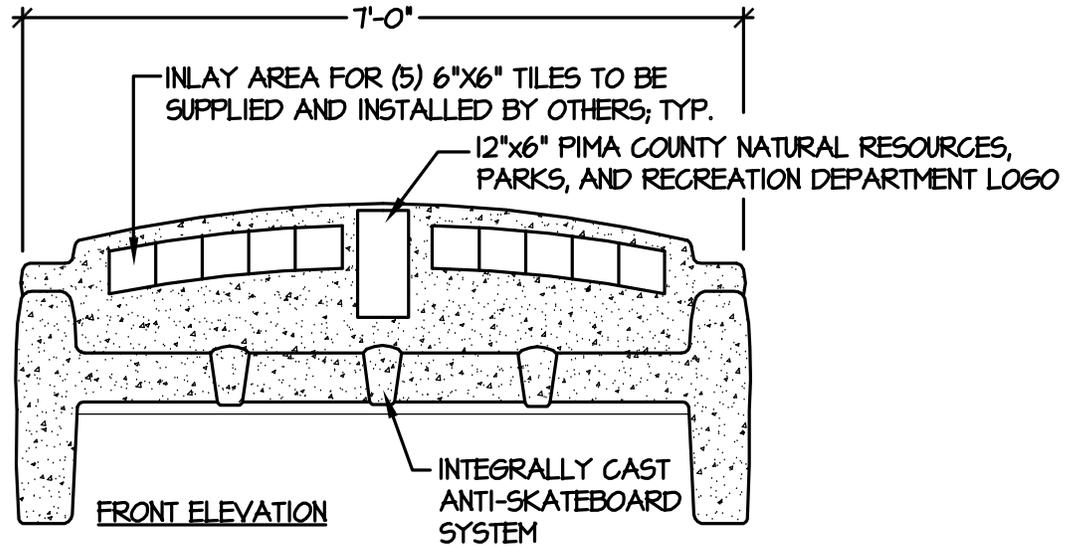
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	P-1002A
REVISED:		ACCESSIBLE DRINKING FOUNTAIN WITH DOG BOWL - TYPE 2	



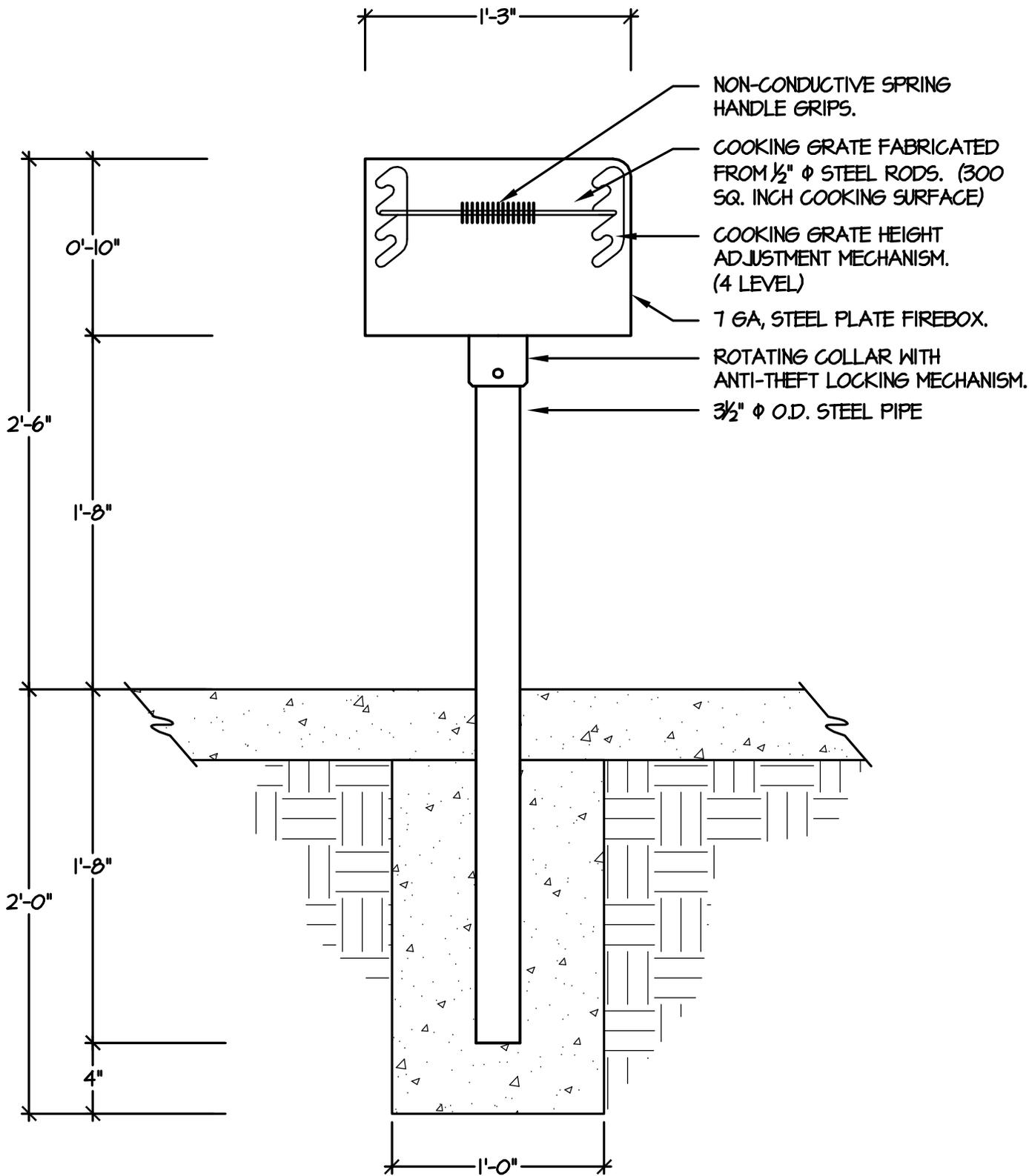
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	<b>P-1003</b>
REVISED:		PRECAST CONCRETE PICNIC TABLE	



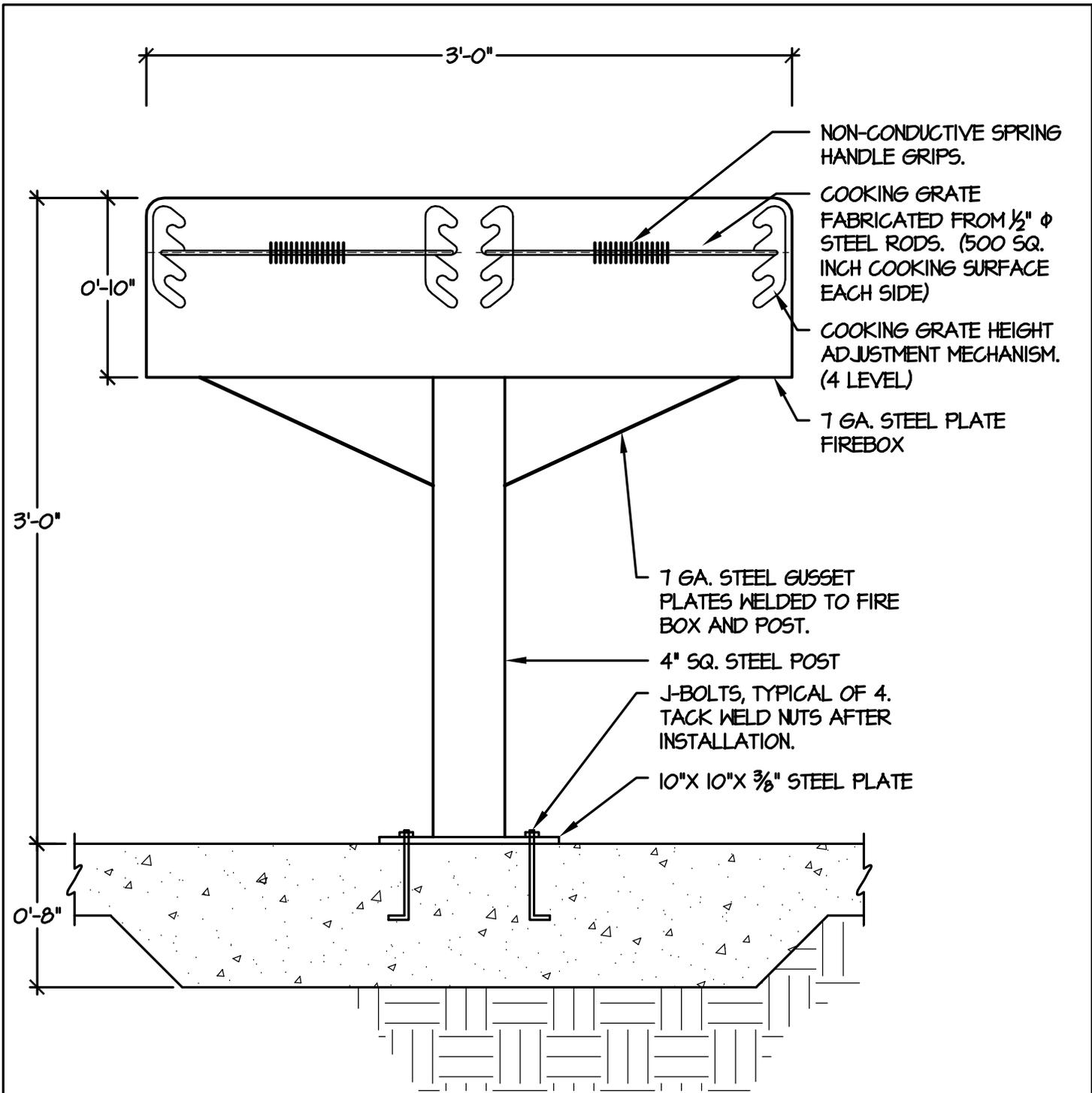
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	P-1004
REVISED:		PRECAST CONCRETE BENCH	



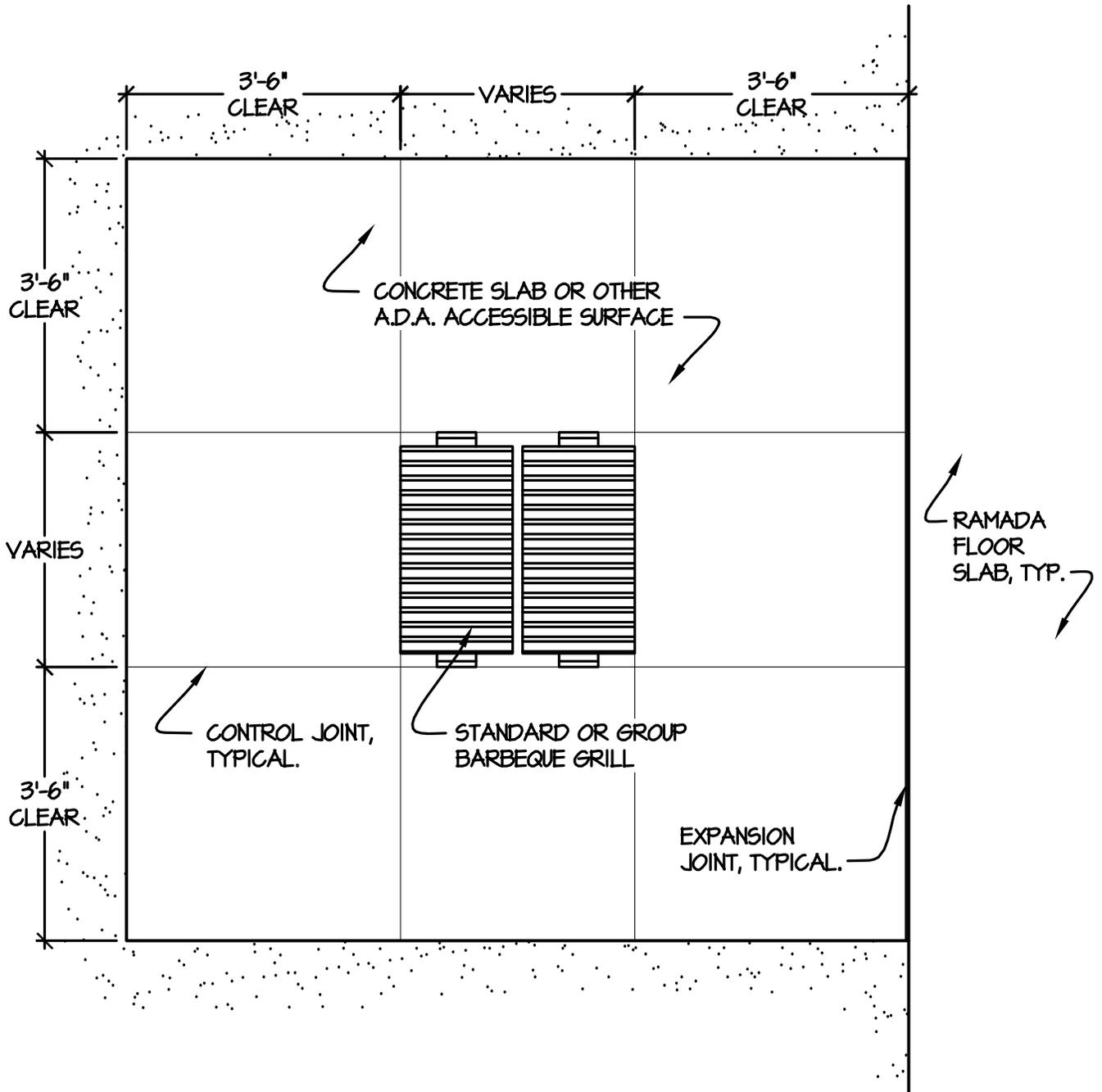
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ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	<b>P-1005</b>
REVISED:		STANDARD BARBEQUE GRILL	



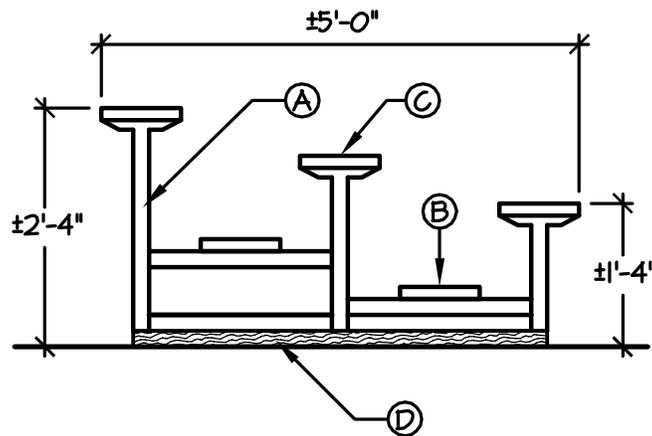
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	<b>P-1006</b>
REVISED:		GROUP BARBEQUE GRILL	



SCALE: N.T.S.

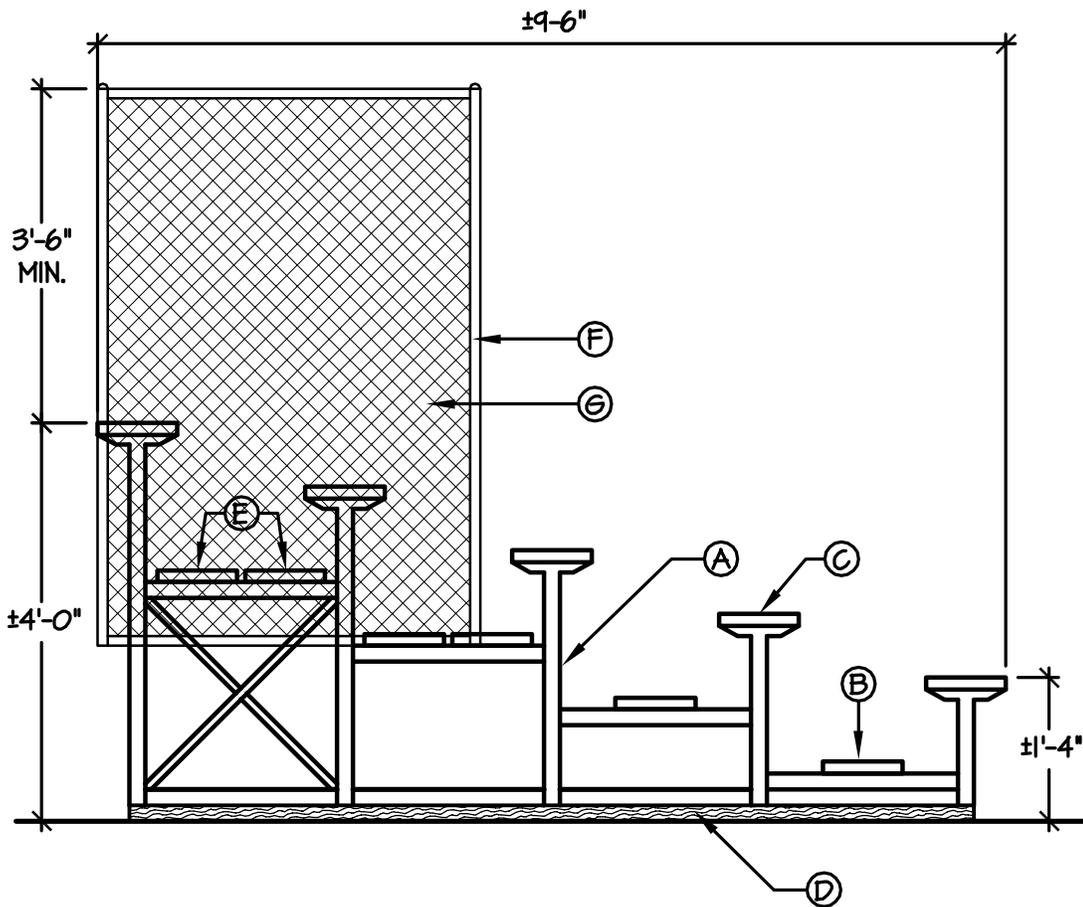
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.	
01/16		SITE FURNITURE:	<b>P-1007</b>	
REVISED:		BARBEQUE GRILL LAYOUT		SHEET 1 OF 1



- Ⓐ GALVANIZED STEEL ANGLE FRAME AND CROSS BRACING WITH HEAVY DUTY GALVANIZED STEEL HARDWARE.
- Ⓑ 10" WIDE X 2" DEEP EXTRUDED ANODIZED ALUMINUM FOOT PLANK WITH CONCEALED FASTENERS AND EXTRUDED ALUMINUM END CAPS.
- Ⓒ 10" WIDE X 2" DEEP EXTRUDED ANODIZED ALUMINUM SEAT WITH CONCEALED FASTENERS AND EXTRUDED ALUMINUM ENDCAPS.
- Ⓓ 2X6 PRESSURE TREATED LUMBER GROUND SILL, TYPICAL.

SCALE: N.T.S.

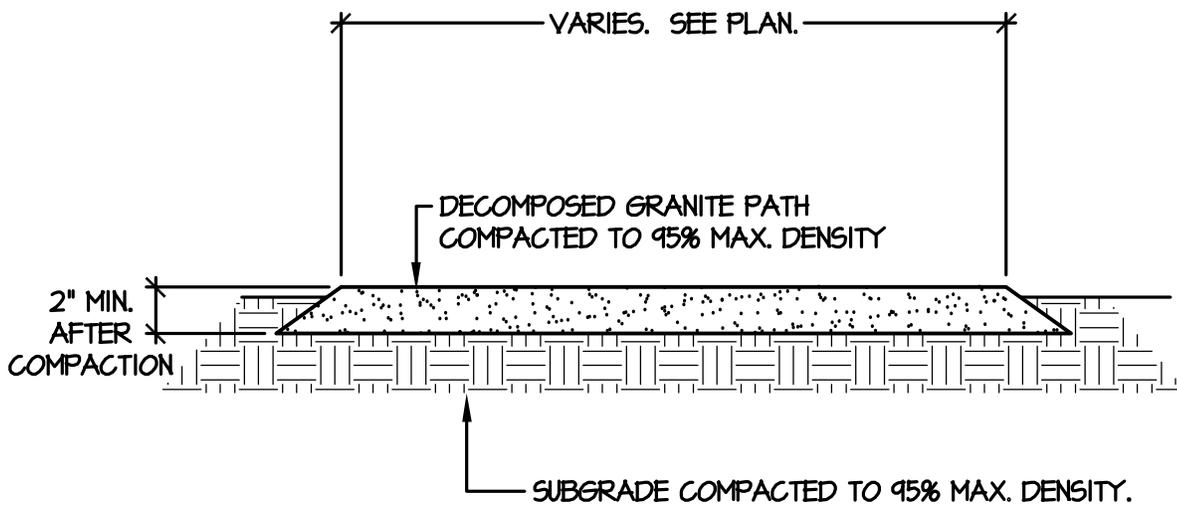
ISSUED:		STANDARD DETAIL	DETAIL NO.	
01/16		SITE FURNITURE:	P-1008	
REVISED:		3 TIER BLEACHERS		SHEET 1 OF 1



- (A) GALVANIZED STEEL ANGLE FRAME AND CROSS BRACING WITH HEAVY DUTY GALVANIZED STEEL HARDWARE.
- (B) 10" WIDE X 2" DEEP EXTRUDED ANODIZED ALUMINUM FOOT PLANK WITH CONCEALED FASTENERS AND EXTRUDED ALUMINUM END CAPS.
- (C) 10" WIDE X 2" DEEP EXTRUDED ANODIZED EXTRUDED ALUMINUM SEAT WITH CONCEALED FASTENERS AND EXTRUDED ALUMINUM ENDCAPS.
- (D) 2X6 PRESSURE TREATED LUMBER GROUND SILL, TYPICAL.
- (E) DOUBLE FOOT PLANKS FOR 4TH AND 5TH ROWS.
- (F) GALVANIZED STEEL TUBE GAURDRAIL FRAME BOLTED AND/OR WELDED TO BLEACHER FRAME.
- (G) CHAIN LINK FABRIC OR VERTICAL BAR SAFETY BARRIER PER CODE REQUIREMENTS.

SCALE: N.T.S.

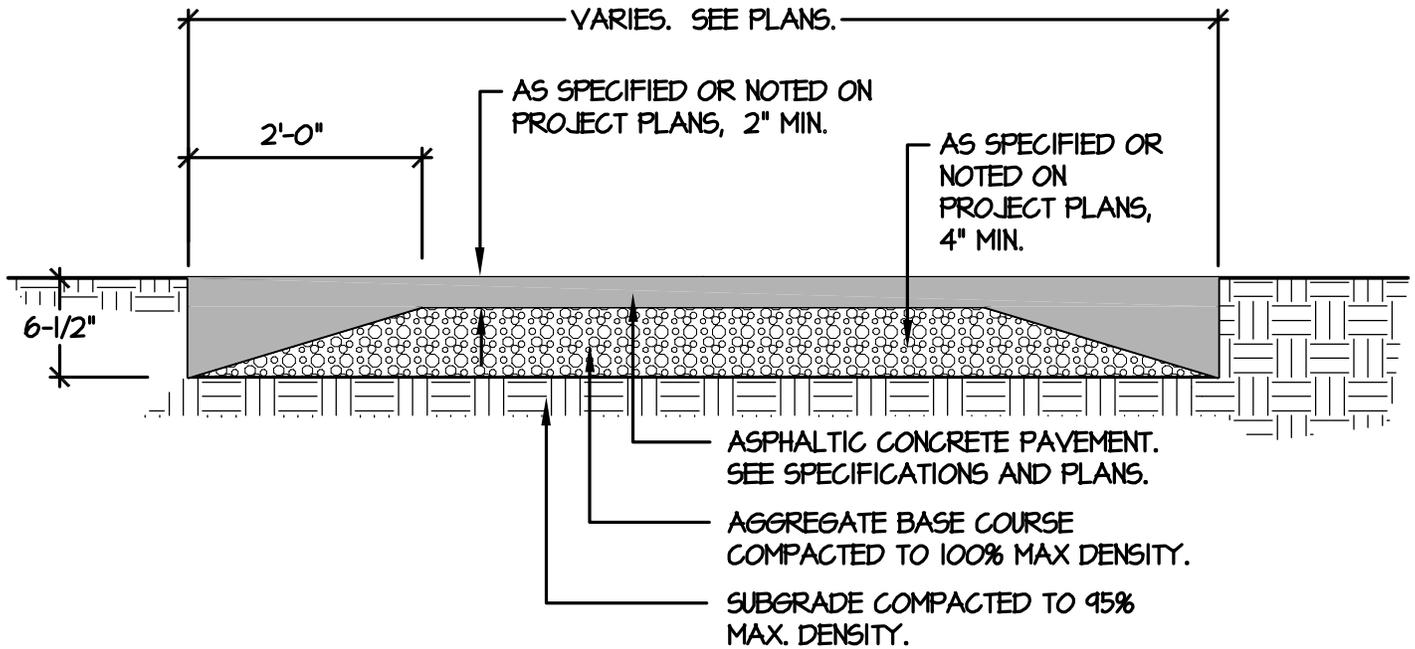
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		SITE FURNITURE:	P-1009
REVISED:		5 TIER BLEACHERS	



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.	
01/16		PATHWAY AND TRAIL PAVING:	<b>P-1100</b>	
REVISED:		DECOMPOSED GRANITE PATH		SHEET 1 OF 1

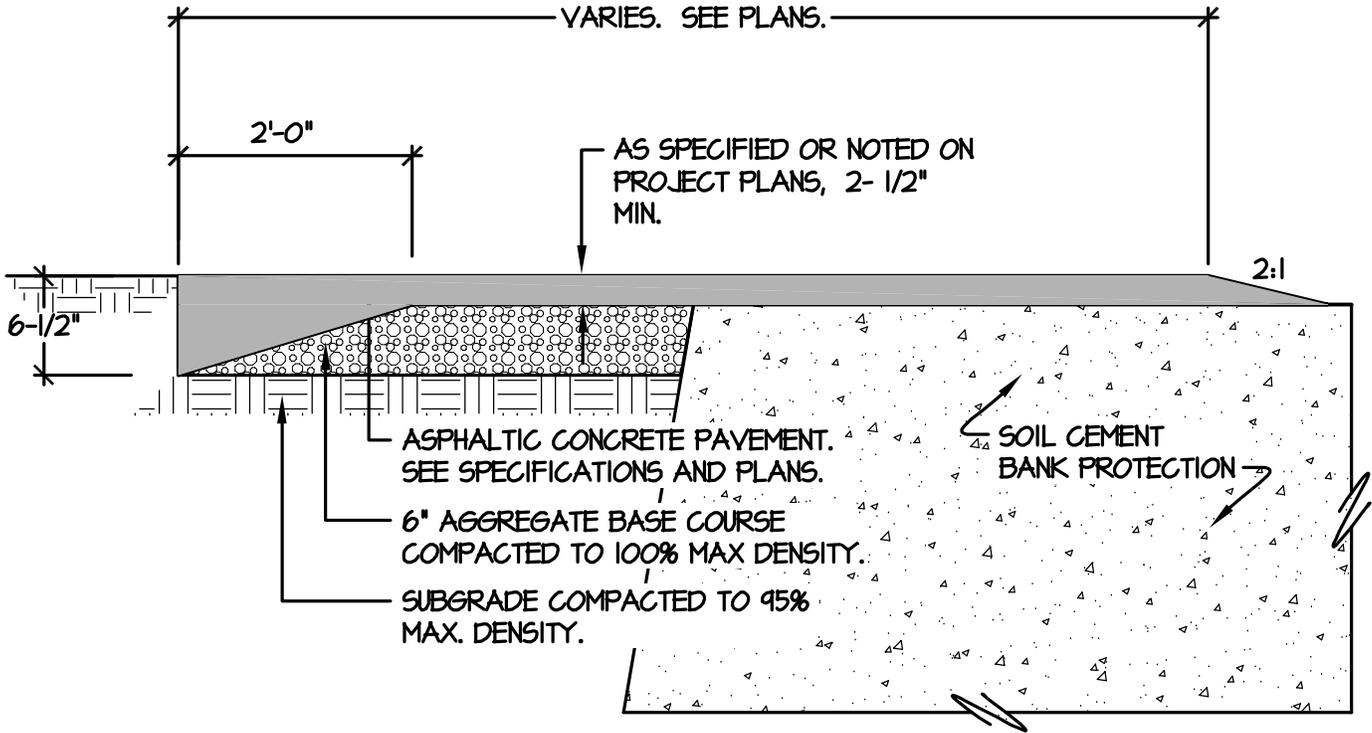
**NOTE:**  
 ASPHALTIC CONCRETE SHALL BE P.A.G. MIX #3  
 EXCEPT AS OTHERWISE SPECIFIED OR NOTED.



SCALE: N.T.S.

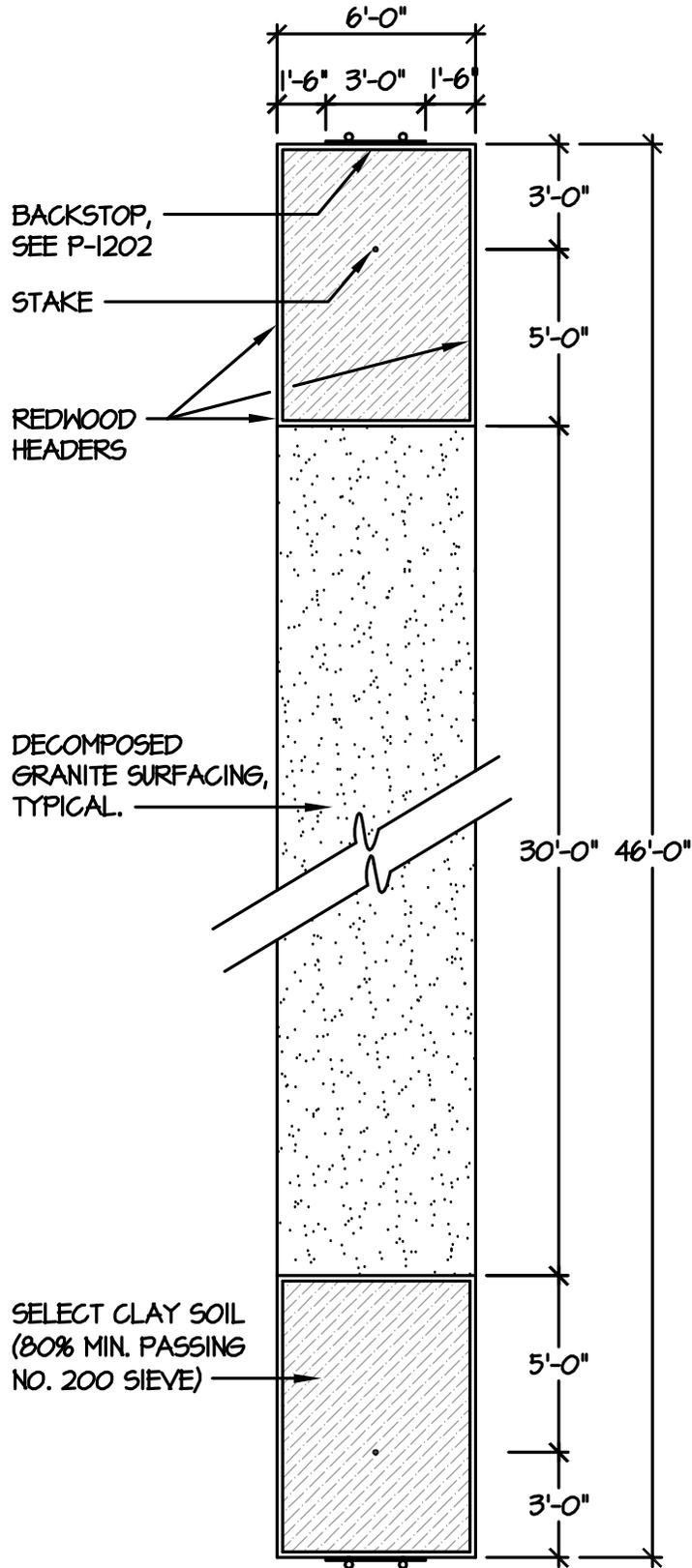
ISSUED:	 <p><b>PIMA COUNTY</b>          NATURAL RESOURCES          PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PATHWAY AND TRAIL PAVING:	P-1101
REVISED:		ASPHALTIC CONCRETE PATH	
			SHEET 1 OF 1

**NOTE:**  
 ASPHALTIC CONCRETE SHALL BE P.A.G. MIX #3  
 EXCEPT AS OTHERWISE SPECIFIED OR NOTED.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b>          NATURAL RESOURCES          PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PATHWAY AND TRAIL PAVING:	P-1102
REVISED:		ASPHALTIC CONCRETE PATH AT BANK PROTECTION	
			SHEET 1 OF 1

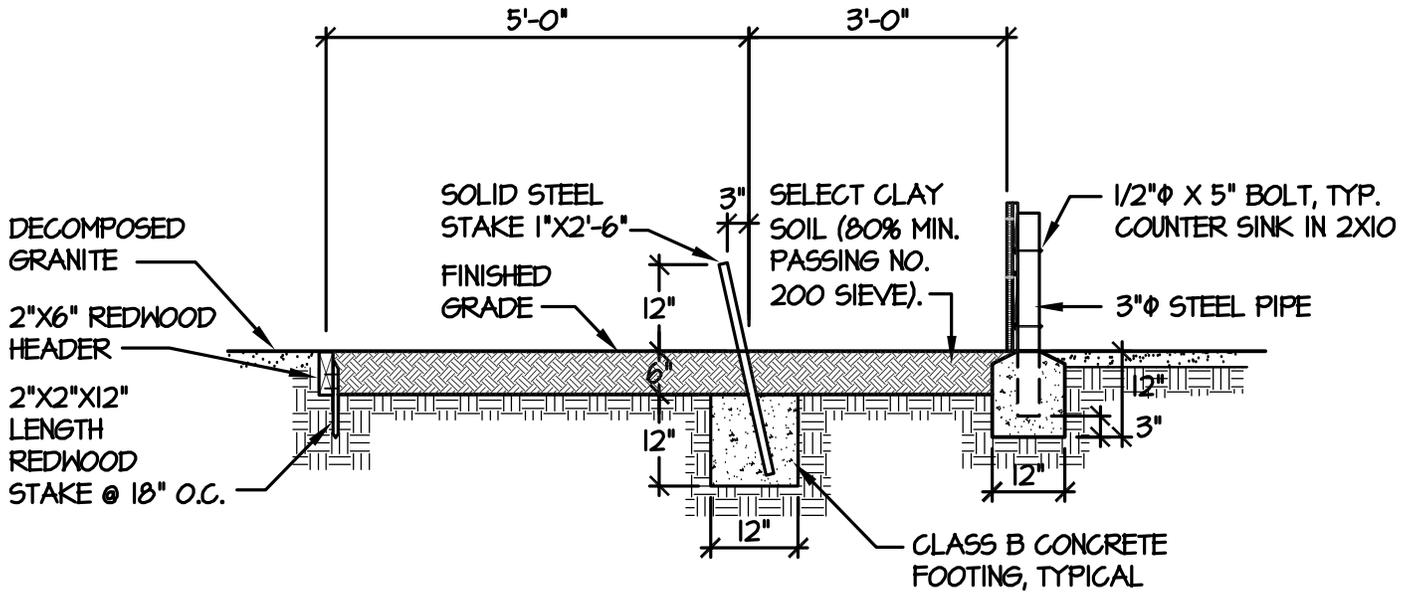


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.	
01/16		MISCELLANEOUS PARK FACILITIES:	<b>P-1200</b>	
REVISED:		HORSESHOE PIT LAYOUT		SHEET 1 OF 1

**NOTES:**

- I. BACKSTOP AND POSTS TO BE PRIMED AND PAINTED AS SPECIFIED OR AS NOTED ON THE PROJECT PLANS. FINISH COLOR AS SPECIFIED, NOTED OR SELECTED BY OWNER.



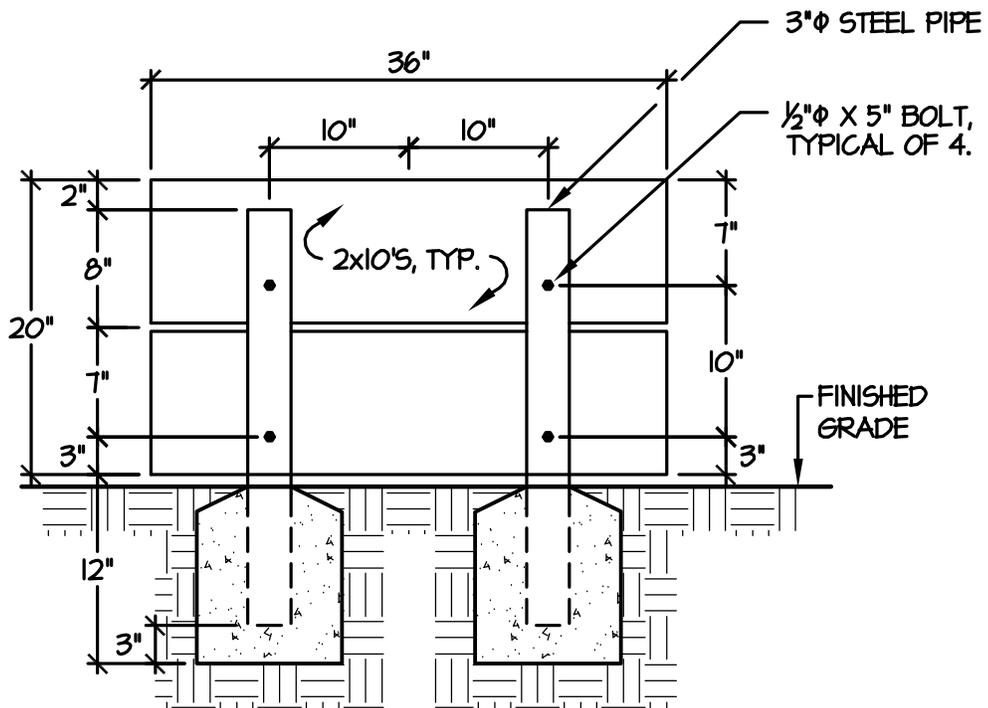
**NOTE:** ALL REDWOOD SHALL BE CONSTRUCTION HEART GRADE

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		MISCELLANEOUS PARK FACILITIES:	<b>P-1201</b>
REVISED:		HORSESHOE PIT SECTION THROUGH PIT AND BACKSTOP	

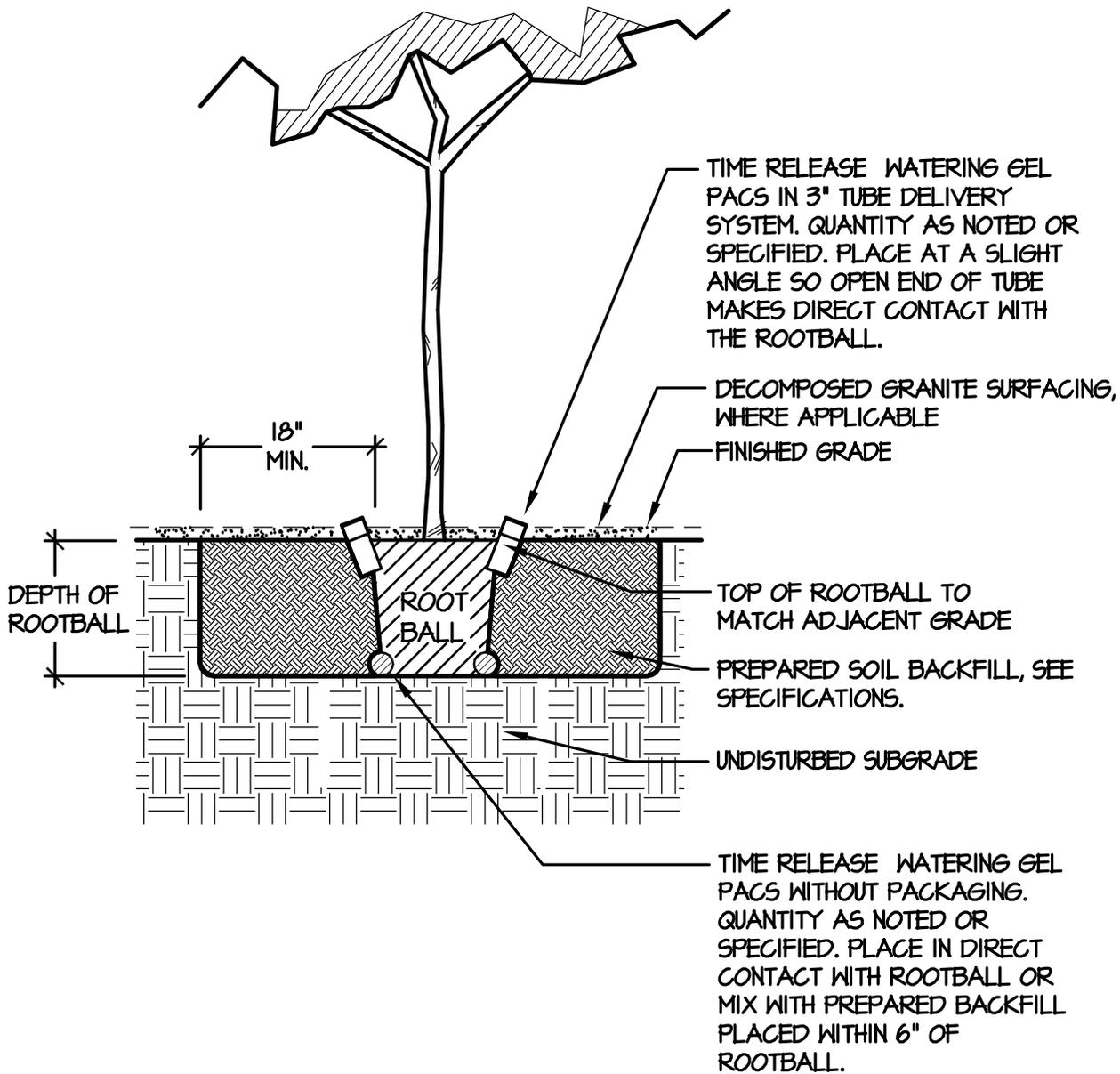
**NOTES:**

- I. BACKSTOP AND POSTS TO BE PRIMED AND PAINTED AS SPECIFIED OR AS NOTED ON THE PROJECT PLANS. FINISH COLOR AS SPECIFIED, NOTED OR SELECTED BY OWNER.



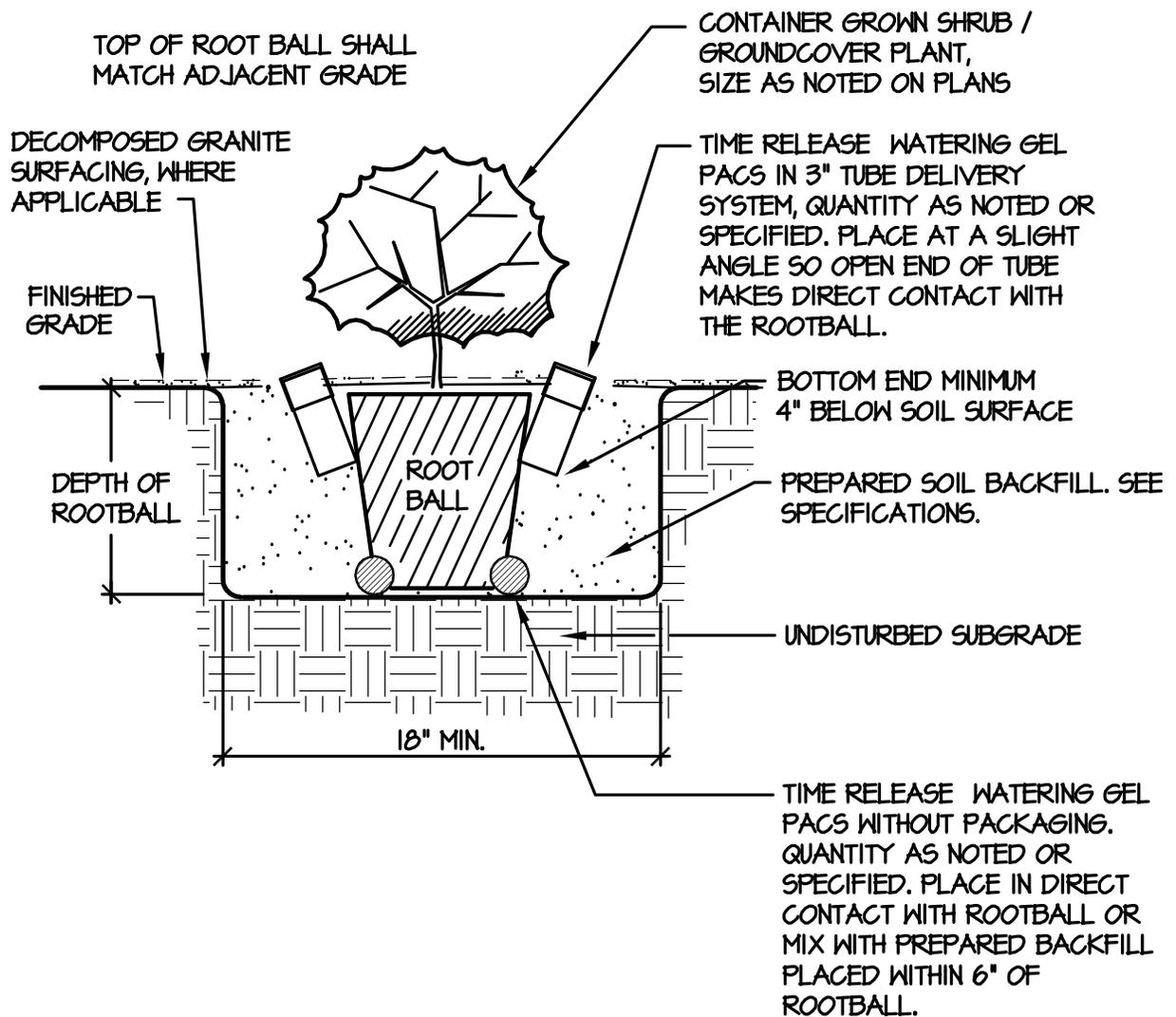
SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		MISCELLANEOUS PARK FACILITIES:	<b>P-1202</b>
REVISED:		HORSESHOE PIT BACKSTOP ELEVATION	
			SHEET 1 OF 1



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	P-1300
REVISED:		DROUGHT TOLERANT TREE PLANTING WITH WATERING GEL (NO PERMANENT IRRIGATION)	

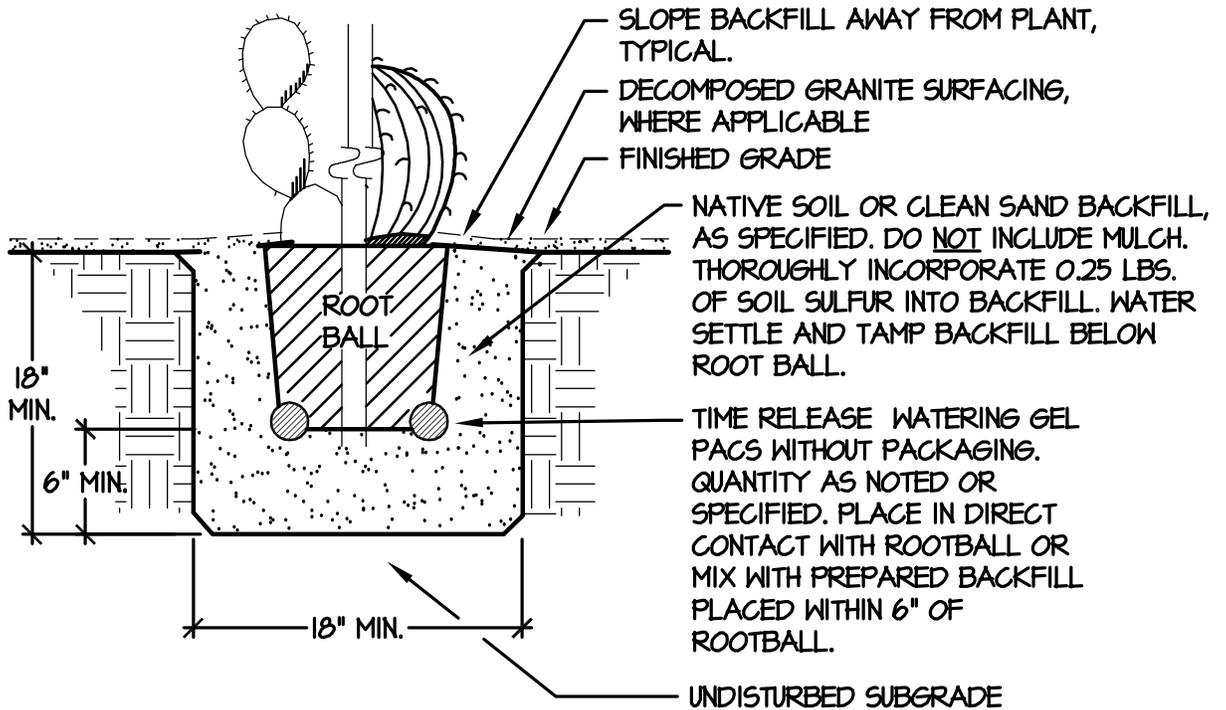


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1301</b>
REVISED:		DROUGHT TOLERANT SHRUB PLANTING WITH WATERING GEL (NO PERMANENT IRRIGATION)	

**NOTES:**

1. DO NOT CREATE A BASIN AT BASE OF CACTUS. SLOPE BACKFILL AWAY FROM STEM.
2. SET CACTUS SO THAT TOP OF ROOT BALL MATCHES ADJACENT GRADE.

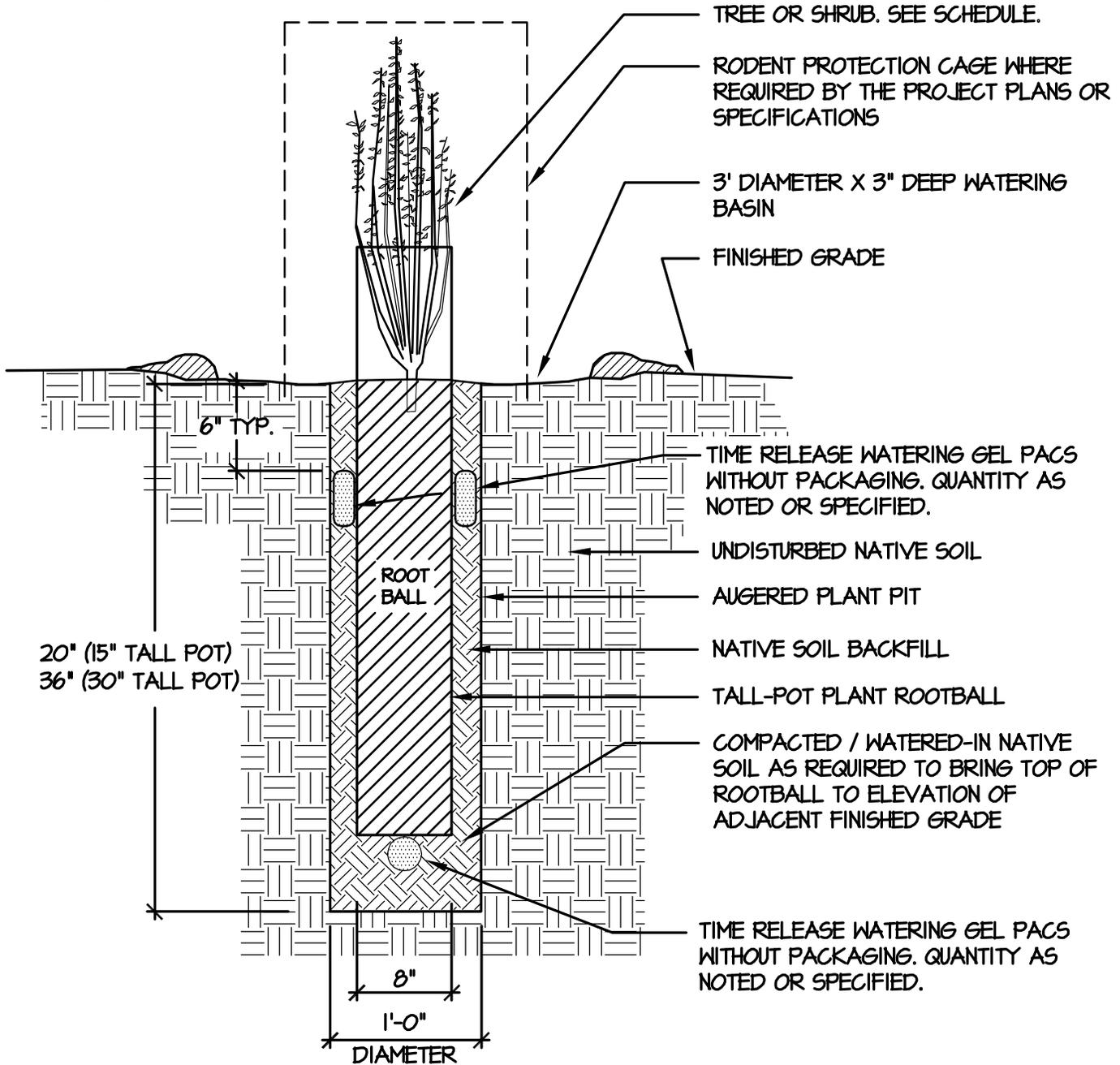


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1302</b>
REVISED:		CACTUS AND SUCCULENT PLANTING WITH WATERING GEL (NO PERMANENT IRRIGATION)	

**NOTES:**

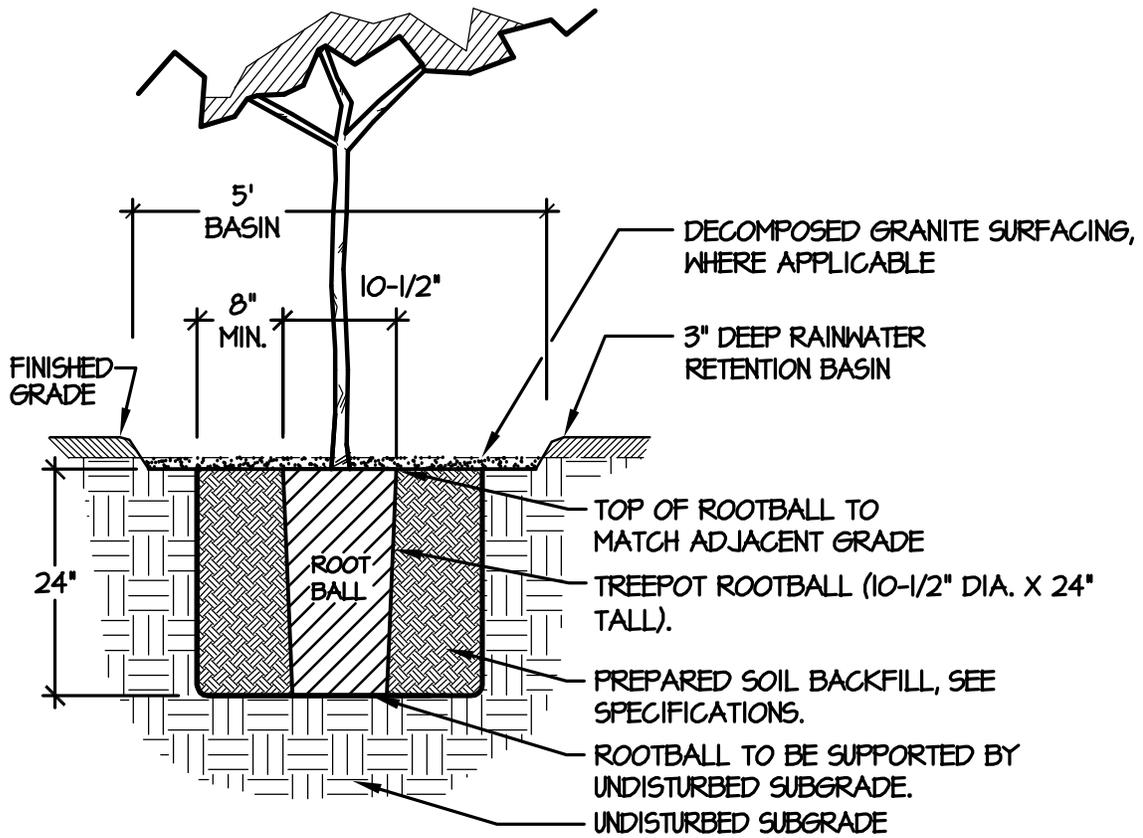
1. EXCAVATED PLANT PITS SHALL BE FILLED WITH WATER AND ALLOWED TO DRAIN THREE TIMES PRIOR TO THE PLANTING OF THE TALL-POT NURSERY STOCK.
2. REMOVE TALL-POT BOTTOM SCREEN PRIOR TO THE START OF PLANTING OPERATIONS.
3. THE PLANT ROOTBALL AND TALL-POT CONTAINER SHALL BE INSERTED INTO THE EXCAVATED HOLE PRIOR TO REMOVAL OF THE CONTAINER.
4. AFTER INSTALLATION IN THE PIT, THE TALL-POT CONTAINER SHALL BE CAREFULLY REMOVED FROM THE ROOTBALL BY RAISING THE CONTAINER WITH HAY-HOOKS OR OTHER APPROPRIATE EQUIPMENT.
5. AFTER REMOVAL FROM THE CONTAINER, THE PLANT SHALL BE BACKFILLED WITH NATIVE SOIL AND WATERED-IN TO PREVENT SETTLEMENT.
6. THE TALL-POT CONTAINERS AND SCREENS SHALL BE RETURNED UNDAMAGED TO THE OWNER.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1303</b>
REVISED:		TALL-POT PLANTING	SHEET 1 OF 1

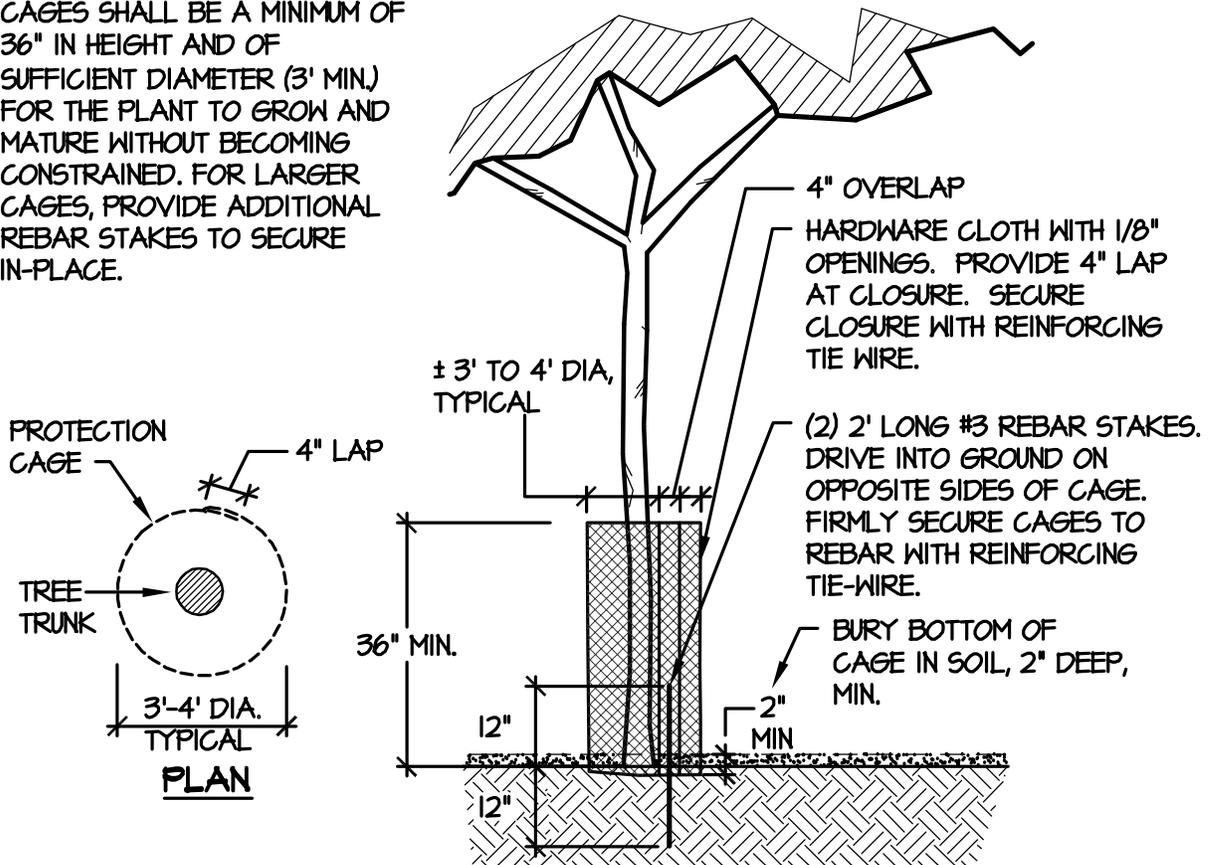
**NOTE:** SEE DETAIL P-201 FOR TREE STAKE AND GUYING INSTALLATION, IF REQUIRED.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1304</b>
REVISED:		TREE POT PLANTING	SHEET 1 OF 1

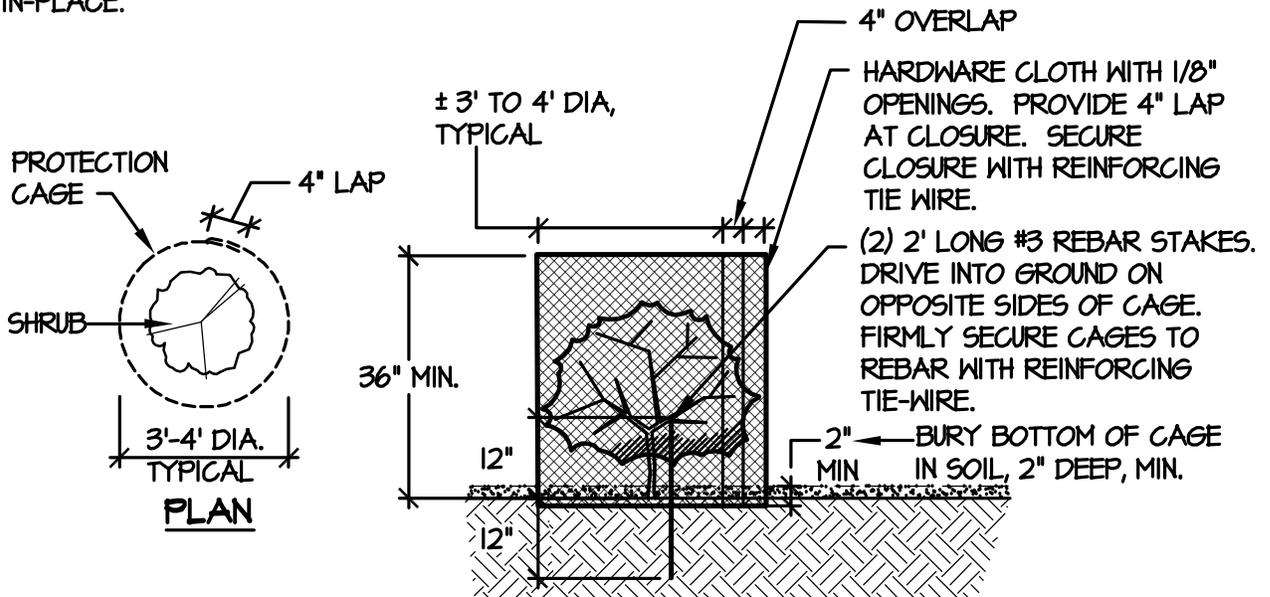
NOTE:  
 CAGES SHALL BE A MINIMUM OF 36" IN HEIGHT AND OF SUFFICIENT DIAMETER (3' MIN.) FOR THE PLANT TO GROW AND MATURE WITHOUT BECOMING CONSTRAINED. FOR LARGER CAGES, PROVIDE ADDITIONAL REBAR STAKES TO SECURE IN-PLACE.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b>          NATURAL RESOURCES          PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1305</b>
REVISED:		RODENT PROTECTION CAGE FOR TREES	SHEET 1 OF 1

NOTE:  
 CAGES SHALL BE A MINIMUM OF  
 36" IN HEIGHT AND OF  
 SUFFICIENT DIAMETER (3' MIN.)  
 FOR THE PLANT TO GROW AND  
 MATURE WITHOUT BECOMING  
 CONSTRAINED. FOR LARGER  
 CAGES, PROVIDE ADDITIONAL  
 REBAR STAKES TO SECURE  
 IN-PLACE.

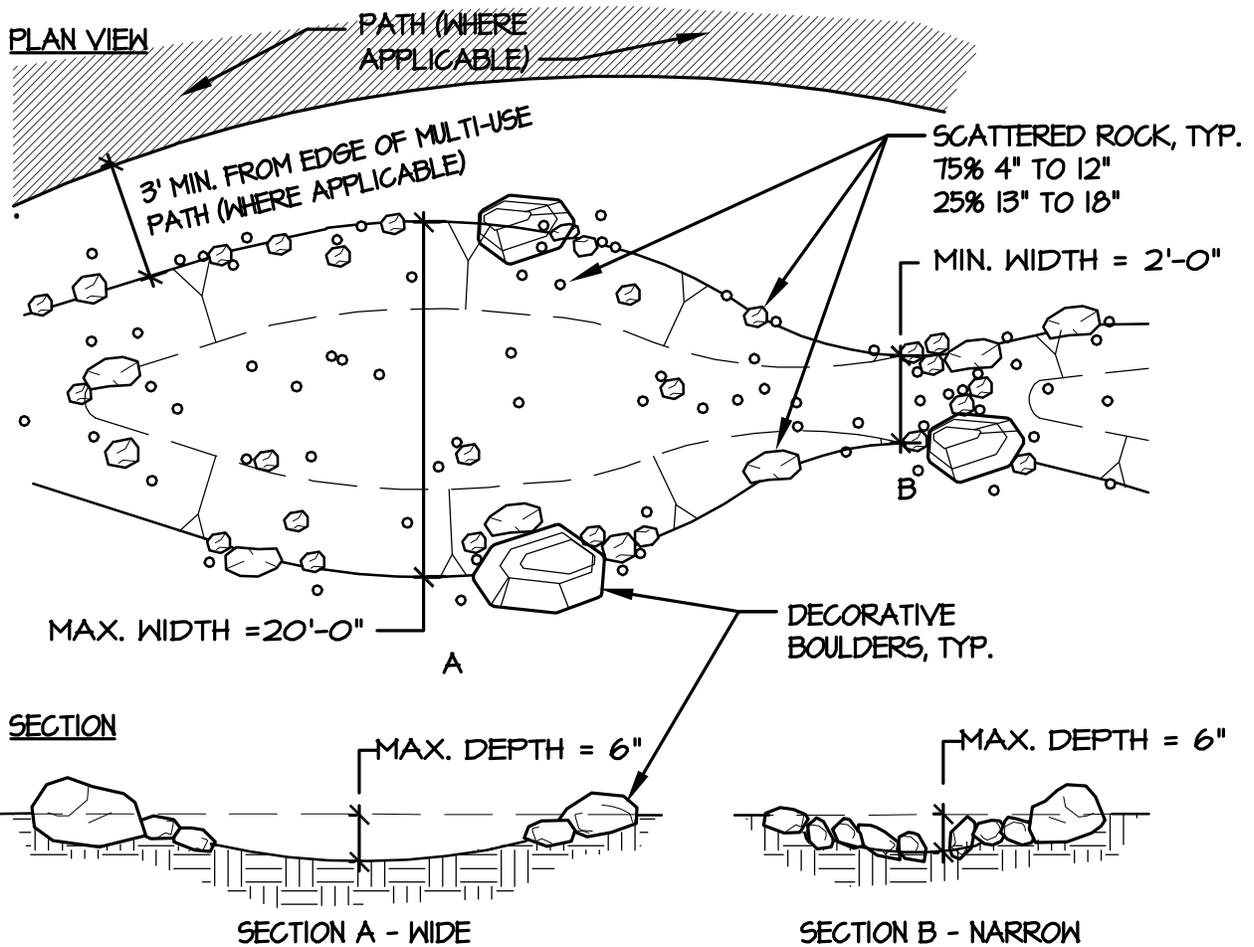


SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	P-1306
REVISED:		RODENT PROTECTION CAGE FOR SHRUBS	SHEET 1 OF 1

**NOTES:**

1. DEPTH OF BASIN SHALL BE 6" MAX.
2. THE BASIN SHAPE AND APPROXIMATE DIMENSIONS SHALL BE AS SHOWN ON THE PROJECT PLANS. THE CONTRACTOR SHALL STAKE THE LAYOUT OF EACH BASIN PRIOR TO CONSTRUCTION FOR APPROVAL BY THE OWNER'S REPRESENTATIVE.
3. SCATTERED ROCK SOURCE MAY BE SALVAGED NATIVE ROCK FROM THE PROJECT SITE OR CONTRACTOR PROVIDED GRANITE ROCK, COLOR AS NOTED OR SPECIFIED.

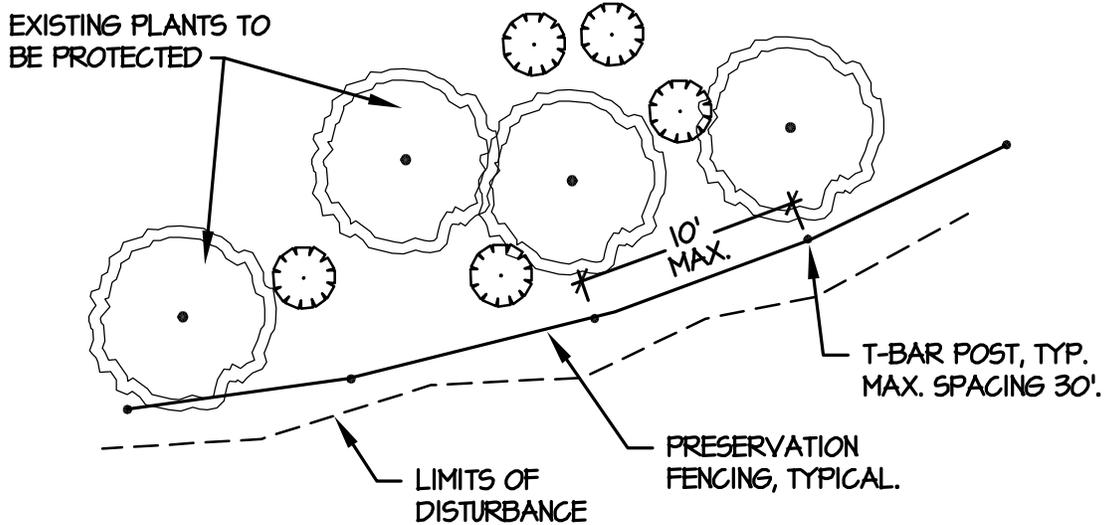
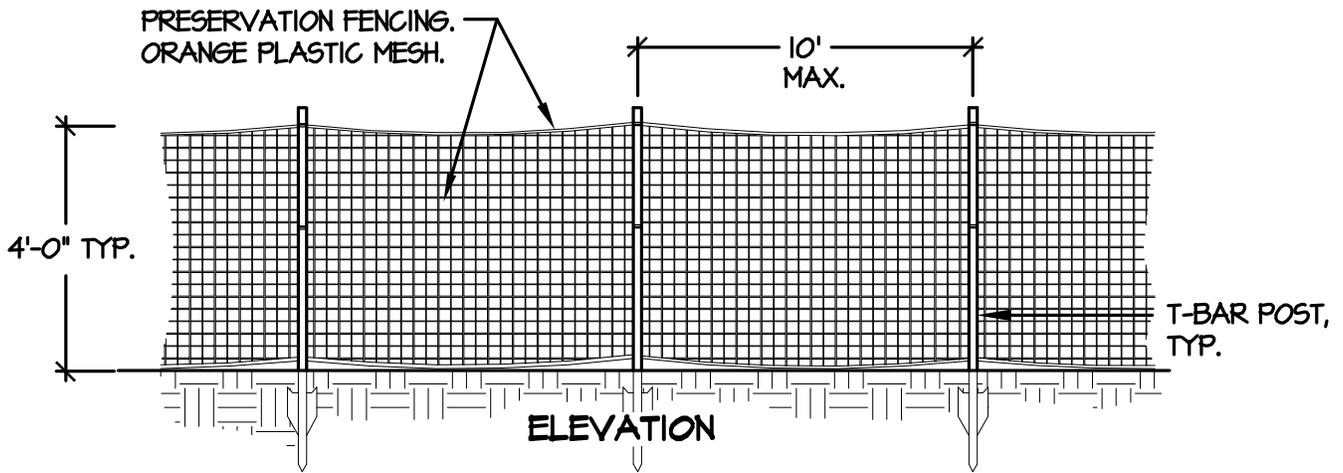


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1307</b>
REVISED:		WATER HARVESTING BASIN	SHEET 1 OF 1

**NOTE:**

1. PRESERVATION FENCING SHALL BE HEAVY-DUTY, UV RESISTANT, POLYPROPYLENE MESH FENCING. COLOR SHALL BE O.S.H.A. ORANGE.
2. POST SHALL BE STEEL TEE POSTS, 5'-0" LENGTH (MINIMUM).
3. EXCEPT AS APPROVED OR DIRECTED BY THE OWNER'S REPRESENTATIVE, PRESERVATION FENCING SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL COMPLETION OF THE WORK.
4. PRESERVATION FENCING SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE PROJECT PLANS OR AT LOCATIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

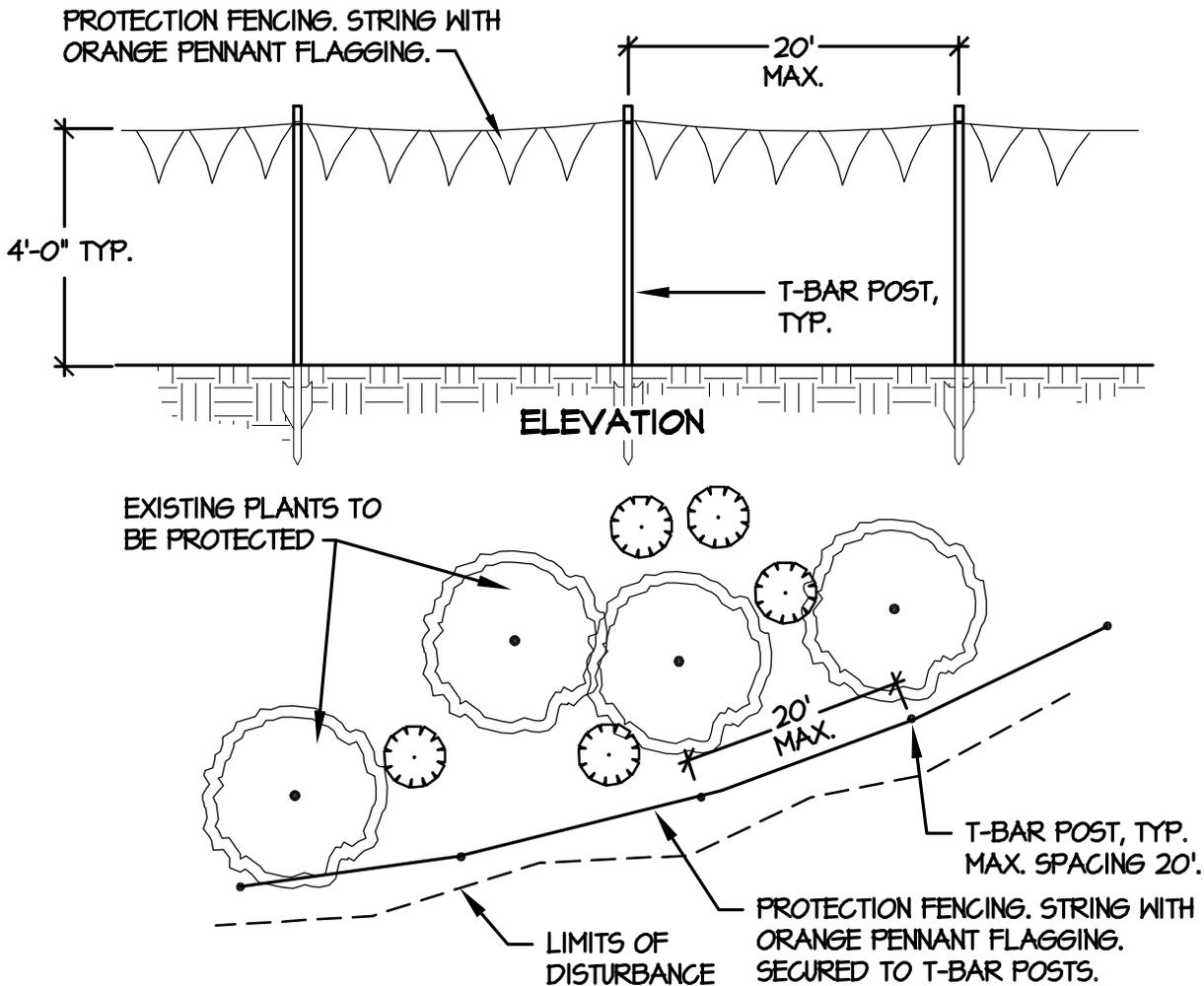


**SCALE: N.T.S.**

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		ECOSYSTEM RESTORATION AND PRESERVATION	<b>P-1308</b>
REVISED:		PRESERVATION FENCING - TYPE 1 - ORANGE MESH	SHEET 1 OF 1

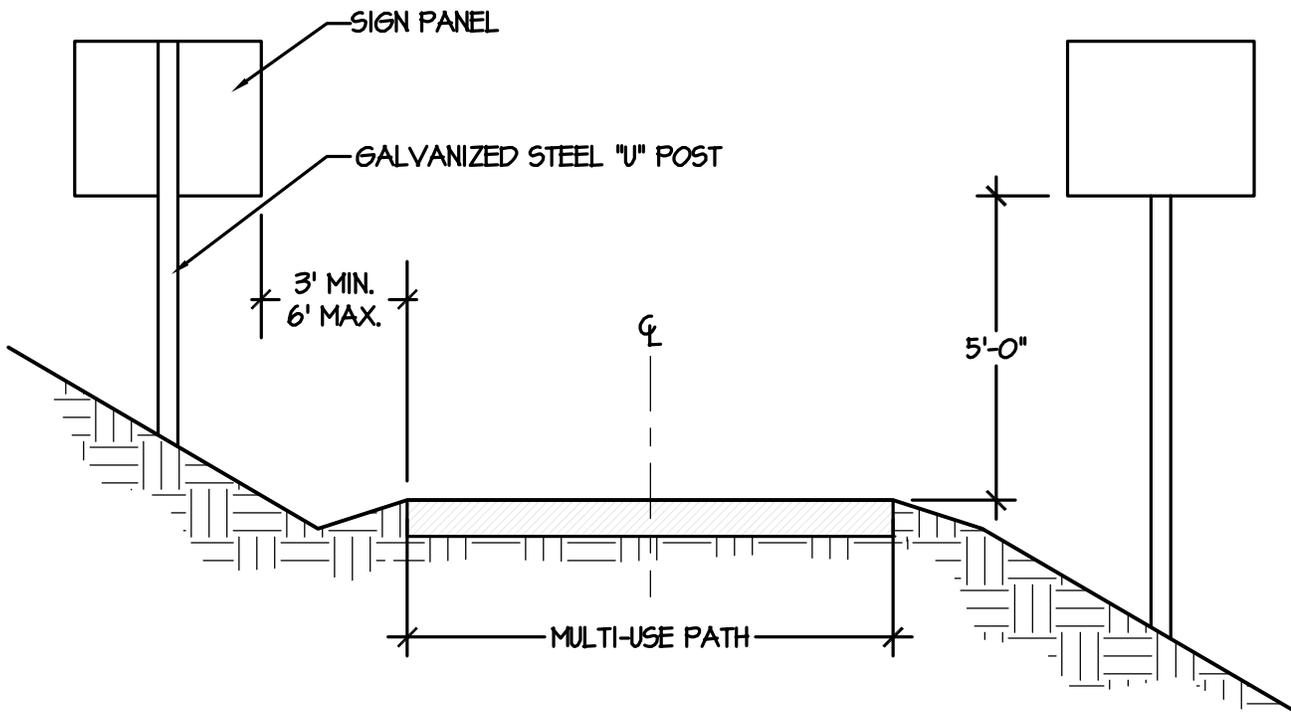
**NOTE:**

1. PRESERVATION FENCING SHALL BE HEAVY-DUTY ROPE OR FOLDED TAPE WITH 12" TALL X 9" WIDE PENNANTS SECURED TO THE ROPE AT INTERVALS NOT EXCEEDING 1'-6". COLOR OF PENNANTS SHALL BE O.S.H.A. ORANGE.
2. POST SHALL BE STEEL TEE POSTS, 5'-0" LENGTH (MINIMUM).
3. EXCEPT AS APPROVED OR DIRECTED BY THE OWNER'S REPRESENTATIVE, PRESERVATION FENCING SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL COMPLETION OF THE WORK.
4. PRESERVATION FENCING SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THE PROJECT PLANS OR AT LOCATIONS AS DIRECTED BY THE OWNER'S REPRESENTATIVE.



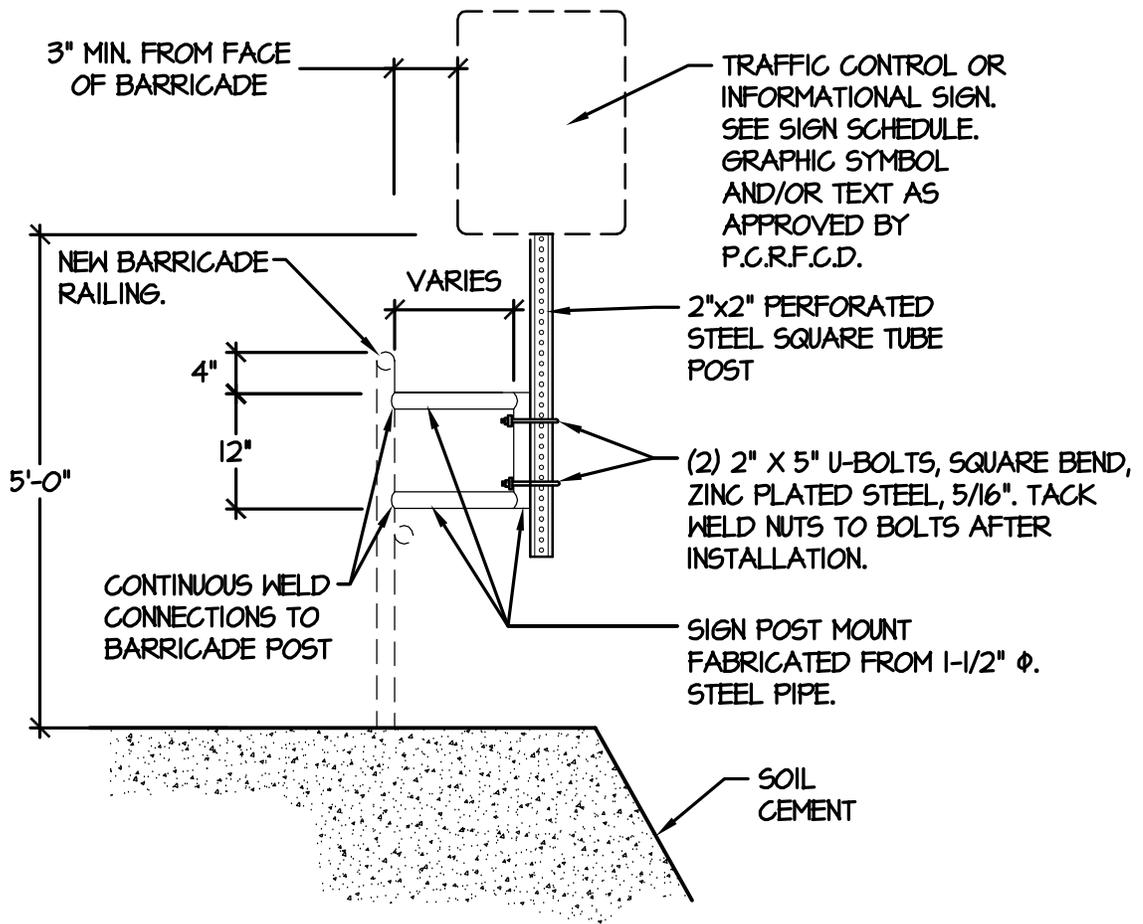
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PLANTING / NURSERY STOCK:	<b>P-1309</b>
REVISED:		PRESERVATION FENCING - TYPE 2 - ORANGE PENNANT (STRING WITH FLAGGING)	



SCALE: N.T.S.

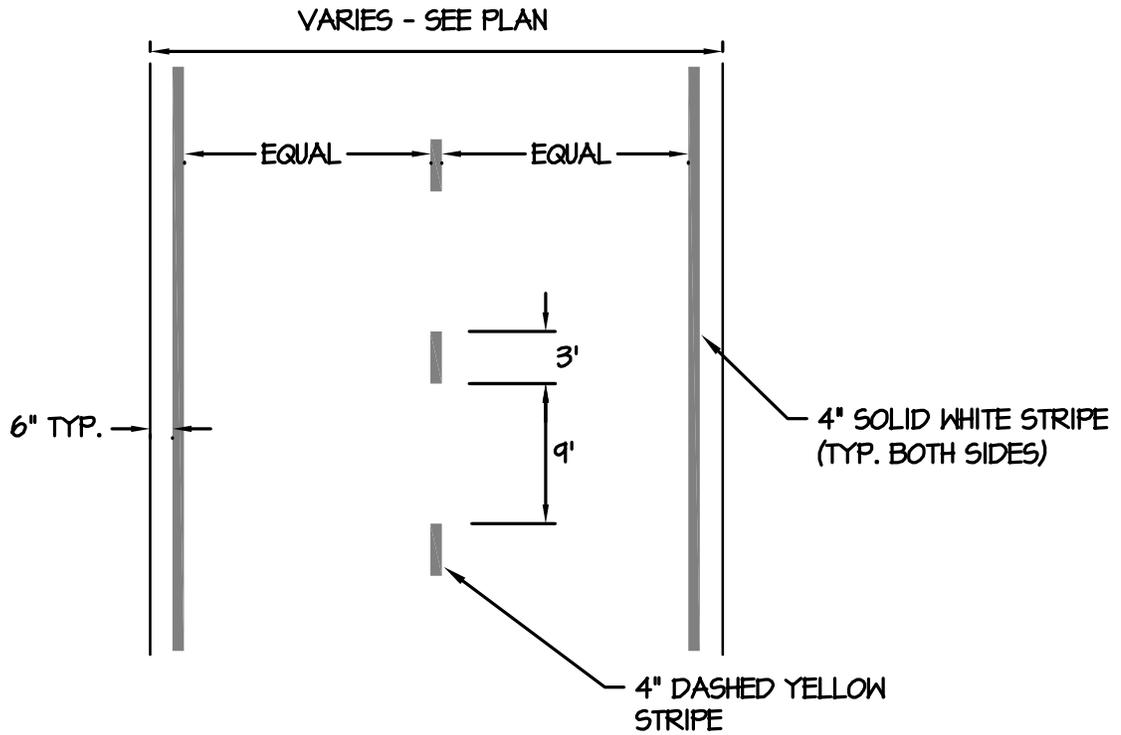
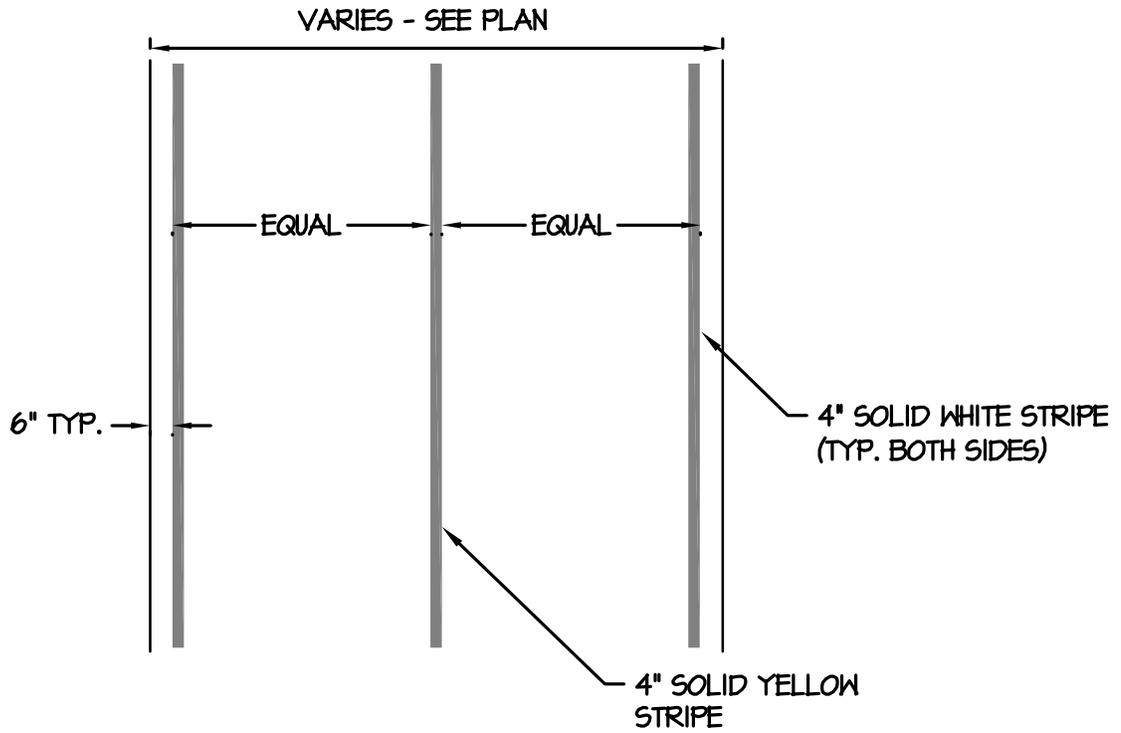
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		SIGNS AND PAVEMENT MARKINGS:	<b>P-1400</b>
REVISED:		MULTI-USE PATH SIGN LOCATION DETAIL	



SCALE: N.T.S.

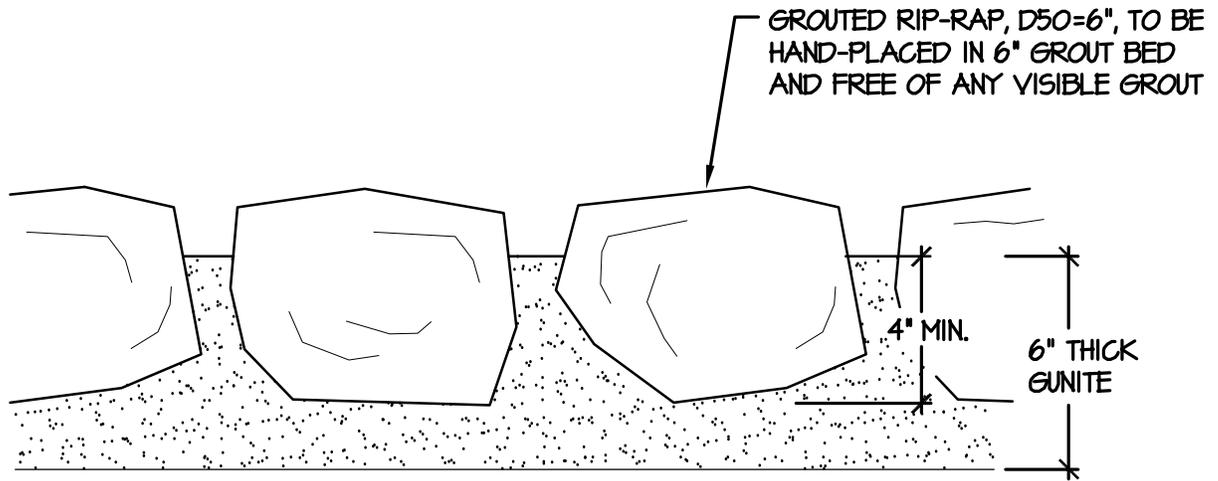
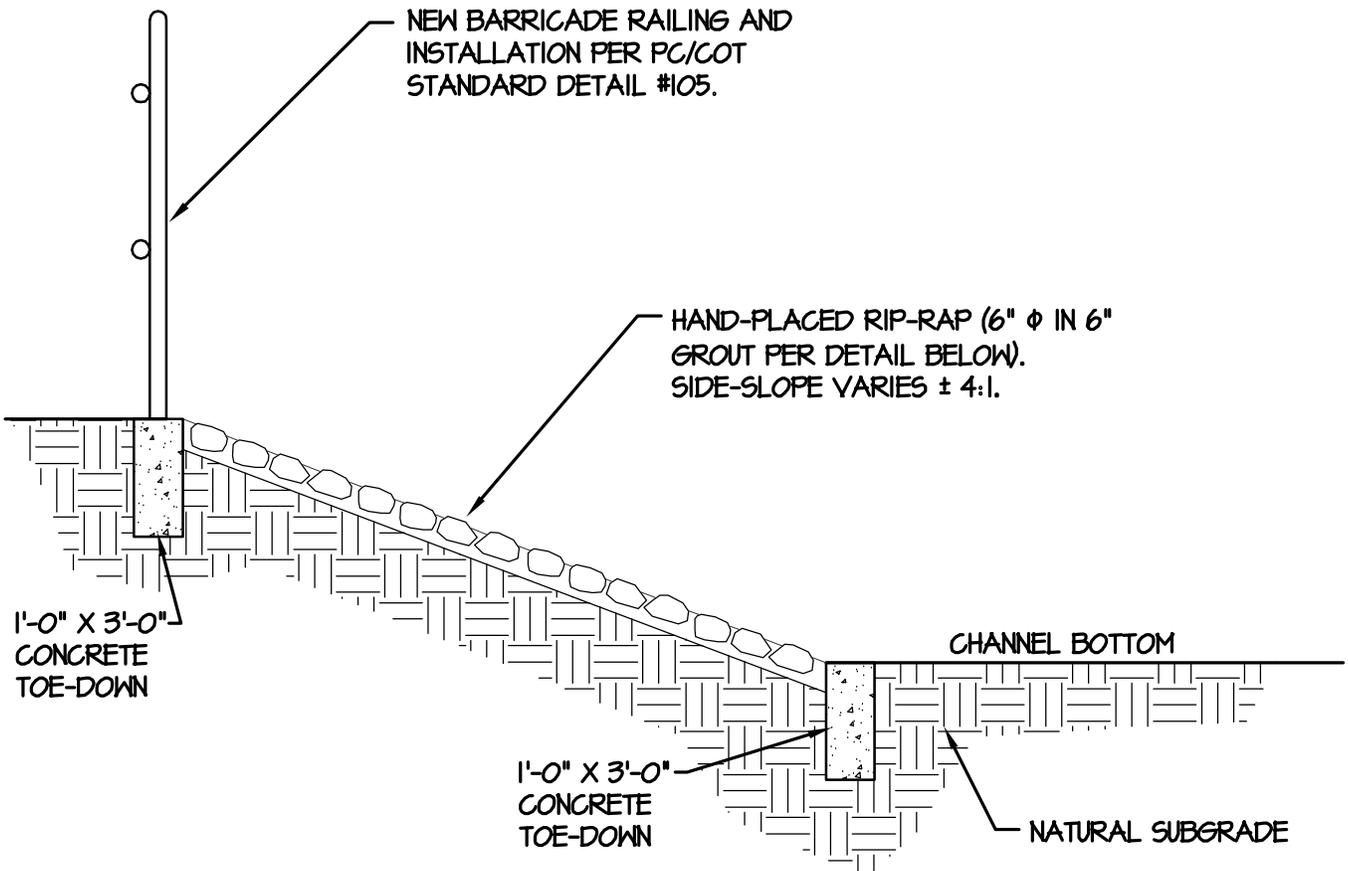
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		SIGNS AND PAVEMENT MARKINGS:	<b>P-1401</b>
REVISED:		SIGN MOUNTED ON BARRICADE RAILING	





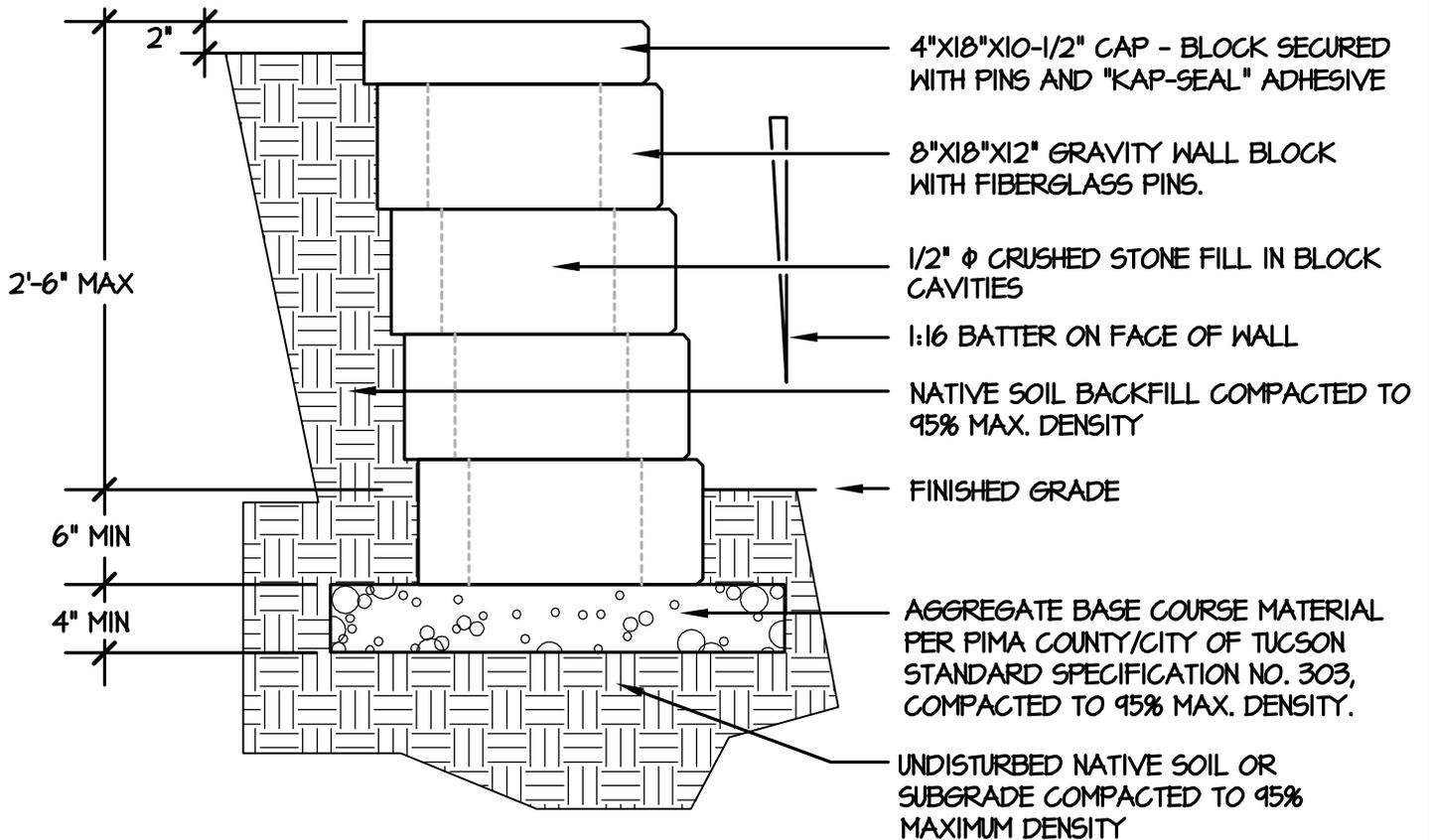
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		SIGNS AND PAVEMENT MARKINGS:	<b>P-1403</b>
REVISED:		MULTI-USE PATH STRIPING DETAILS	



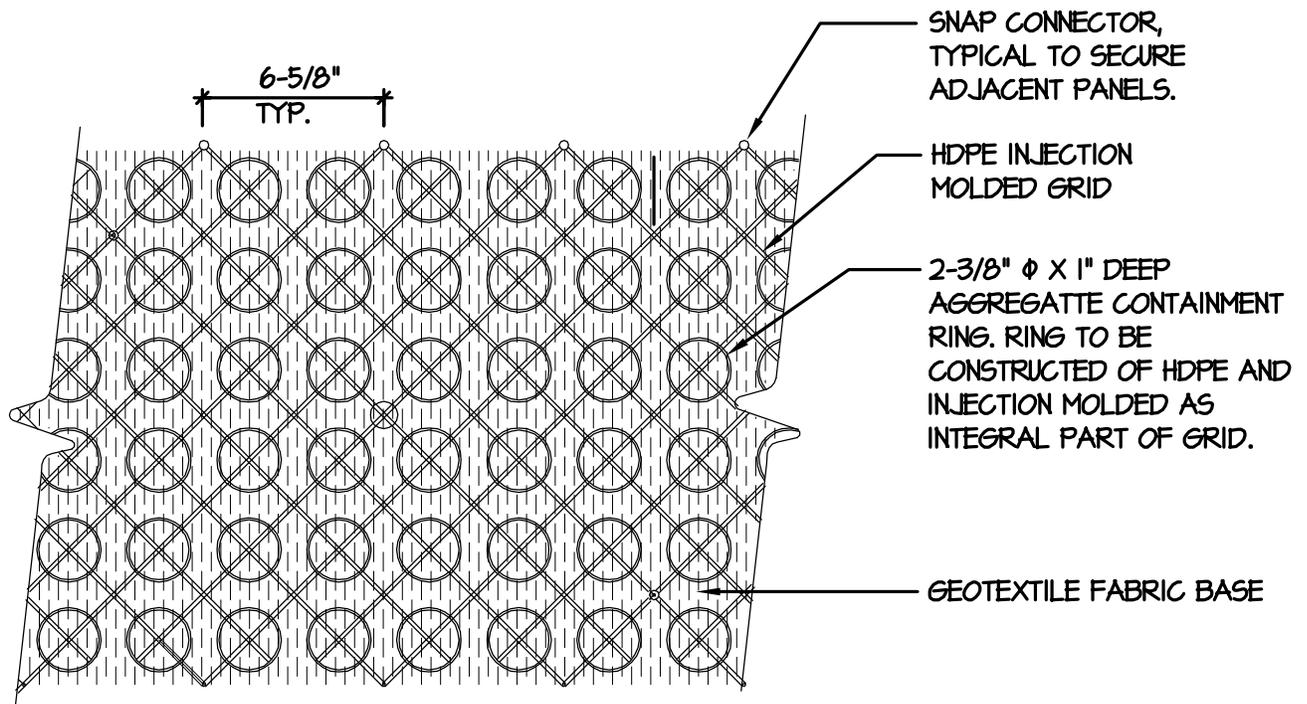
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		EROSION CONTROL AND RETAINING WALLS	<b>P-1500</b>
REVISED:		RIP-RAP BANK PROTECTION	

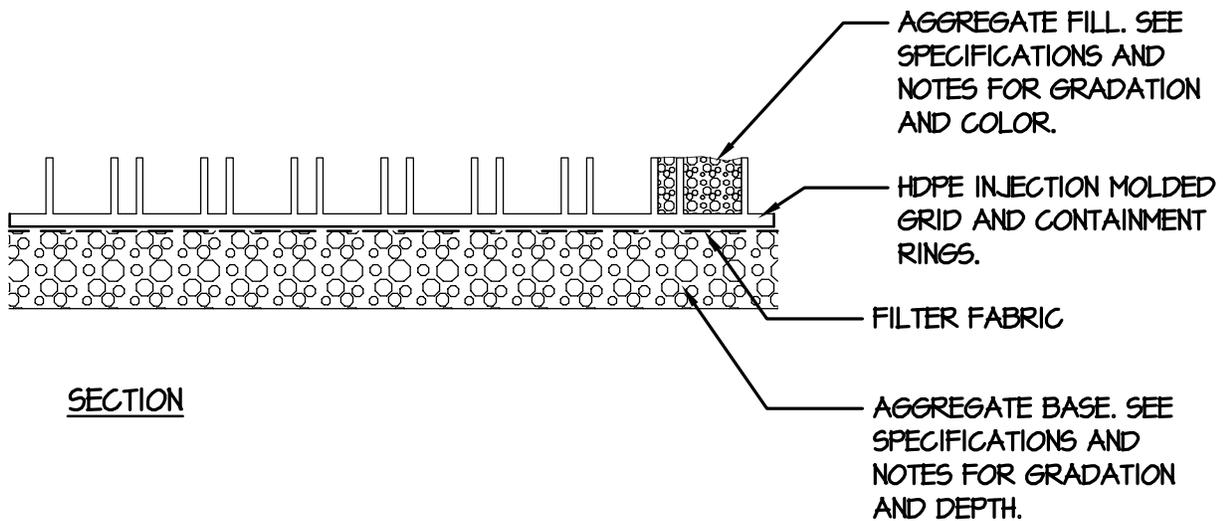


SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		EROSION CONTROL AND RETAINING WALLS	<b>P-1501</b>
REVISED:		GRAVITY RETAINING WALL	
			SHEET 1 OF 1



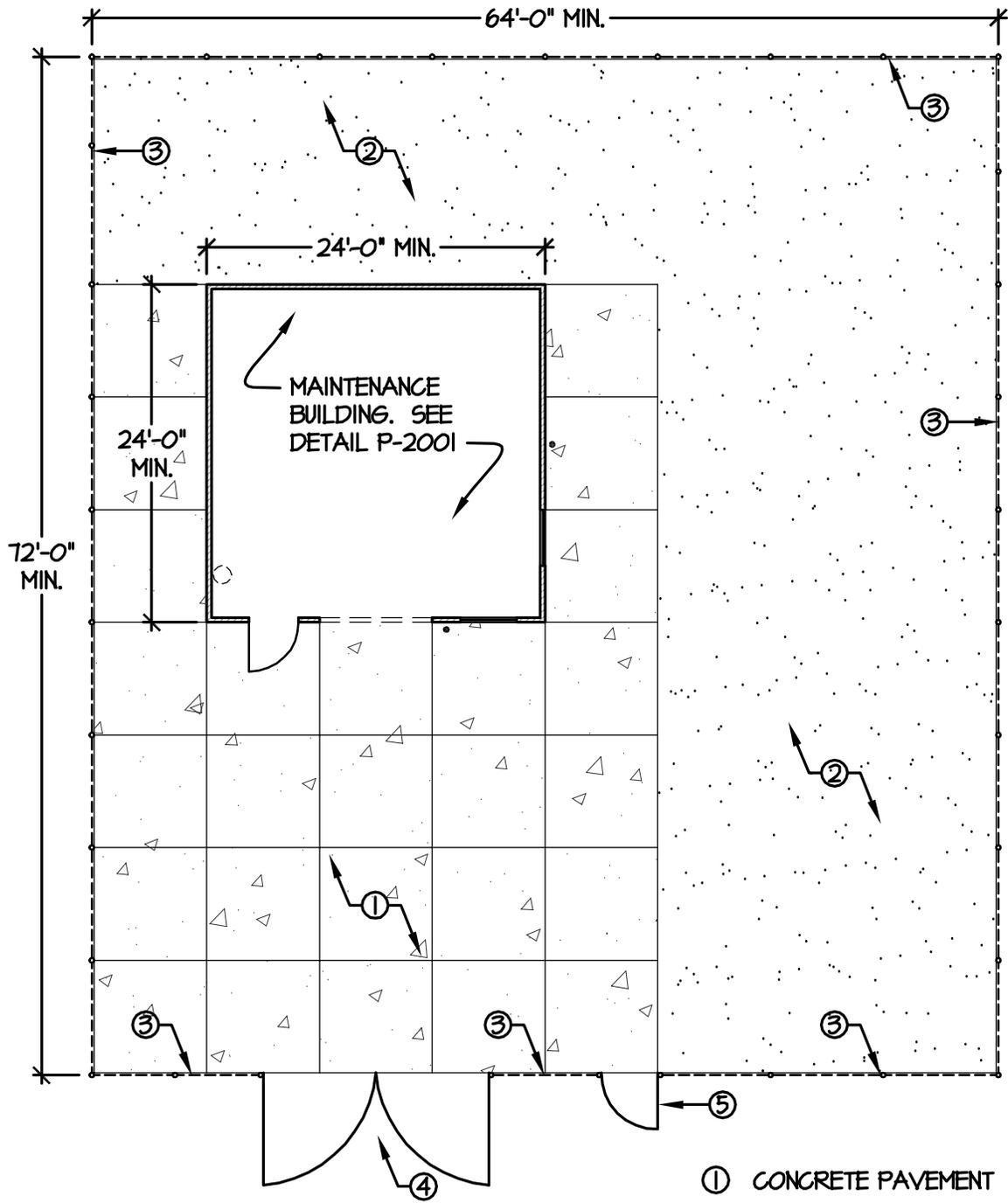
PLAN



SECTION

SCALE: N.T.S.

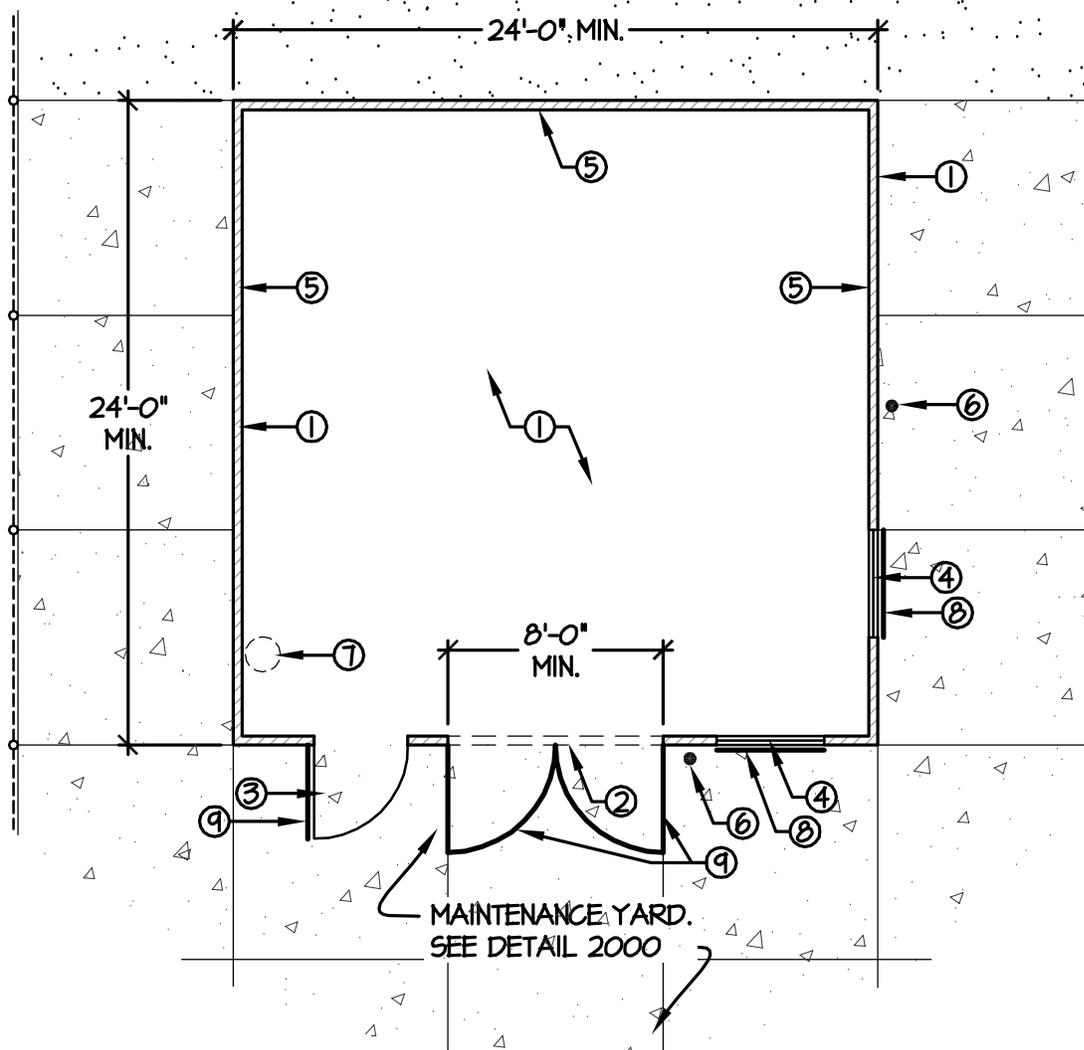
ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		EROSION CONTROL AND RETAINING WALLS	P-1502
REVISED:		AGGREGATE PAVING WITH REINFORCEMENT GRID	SHEET 1 OF 1



- ① CONCRETE PAVEMENT
- ② GRAVEL PAVEMENT
- ③ 10'-0" HIGH CHAIN LINK FENCE
- ④ 16'-0" WIDE X 10'-0" HIGH CHIAN LINK GATE
- ⑤ 4'-0" WIDE X 6'-8" HIGH CHAIN LINK PEDESTRIAN GATE IN 10'-0" FENCE

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2000</b>
REVISED:		MAINTENANCE YARD	



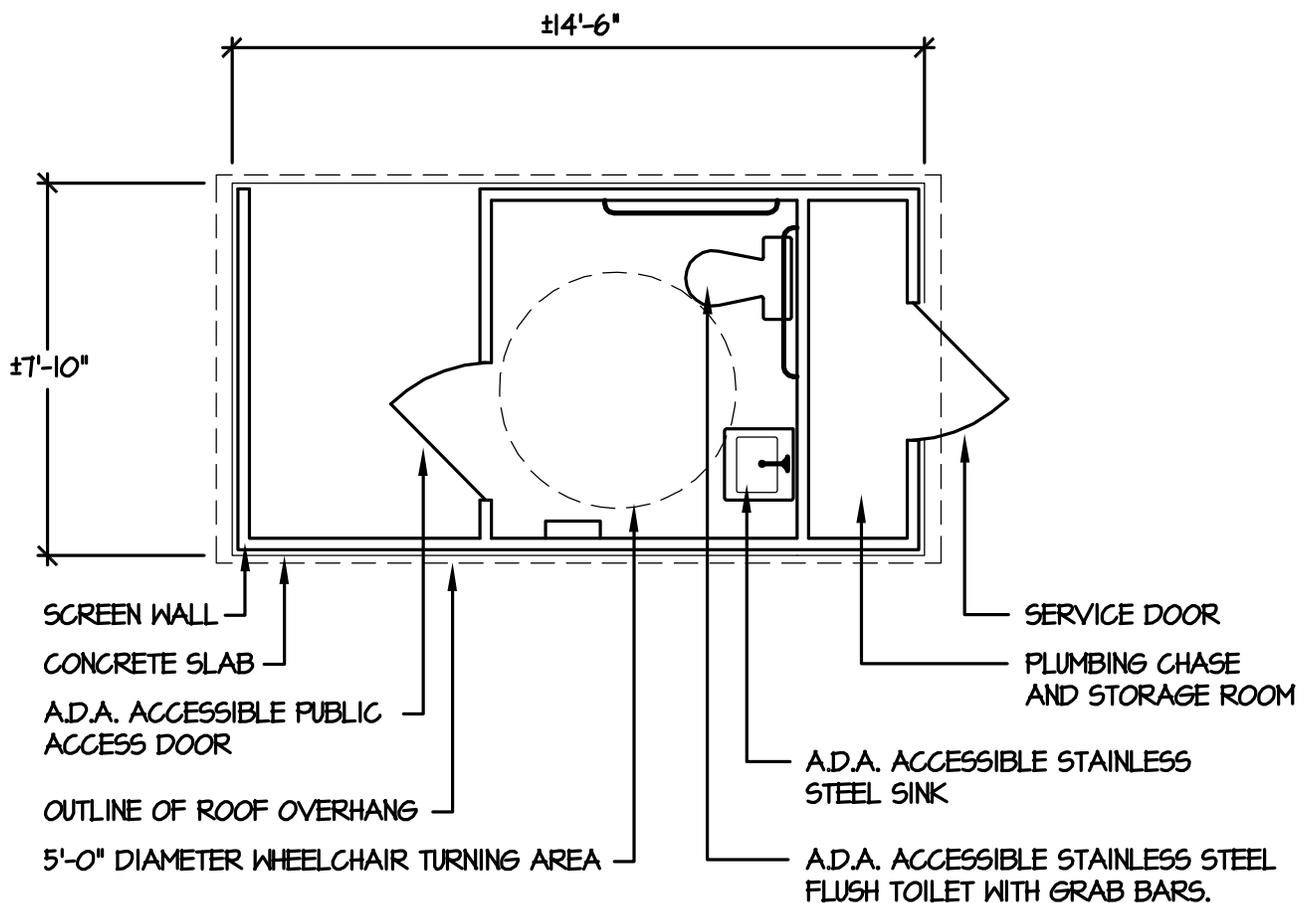
- ① CONCRETE MASONRY BUILDING WITH CONCRETE FLOOR
- ② HEAVY-DUTY OVERHEAD DOOR
- ③ HEAVY-DUTY STEEL STANDARD DOOR
- ④ WINDOWS
- ⑤ SCREENED VENTILATION PANELS
- ⑥ HOSE BIB
- ⑦ EMERGENCY EYE WASH/SHOWER
- ⑧ PAINTED STEEL SECURITY BARS
- ⑨ PAINTED STEEL BAR, SECURITY GATE

**NOTE:**

1. THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF MAINTENCE BUILDING. SEE PROJECT PLANS FOR STRUCTURAL, ARCHITECTURAL, ELECTRICAL, AND MECHANICAL PLANS AND DETAILS.

SCALE: N.T.S.

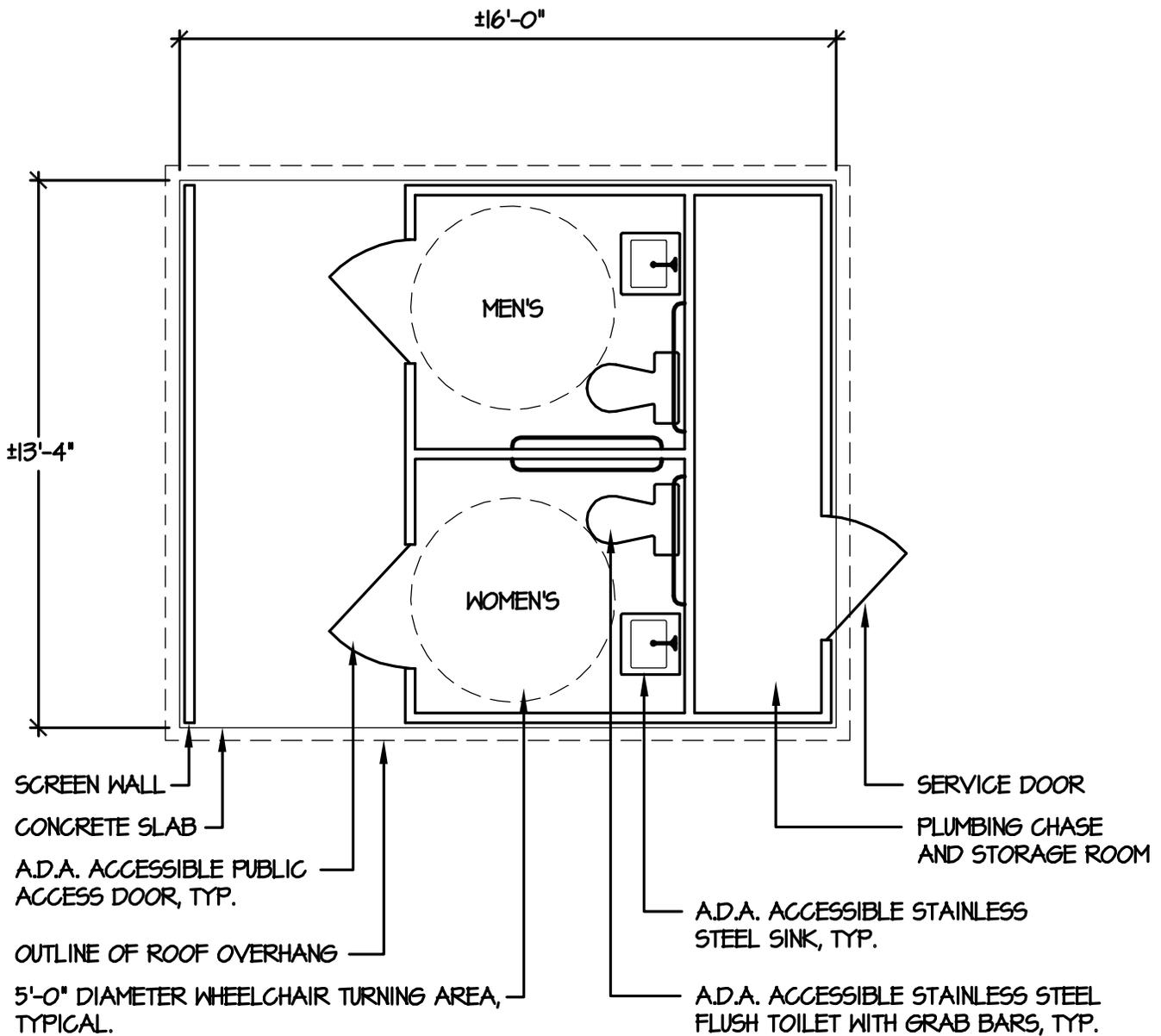
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2001</b>
REVISED:		MAINTENANCE BUILDING	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

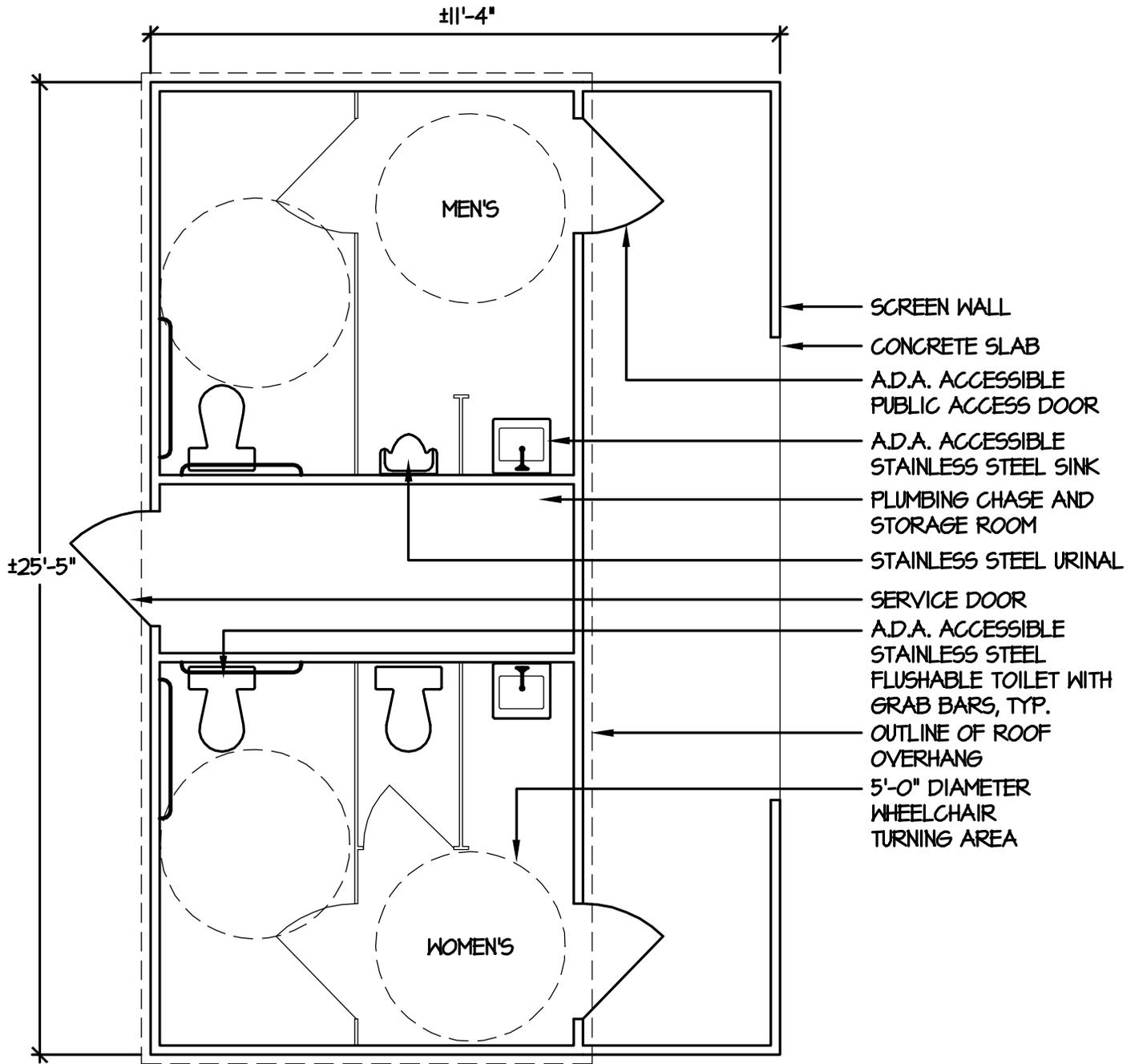
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2100</b>
REVISED:		RESTROOM BUILDING, TYPE 1	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

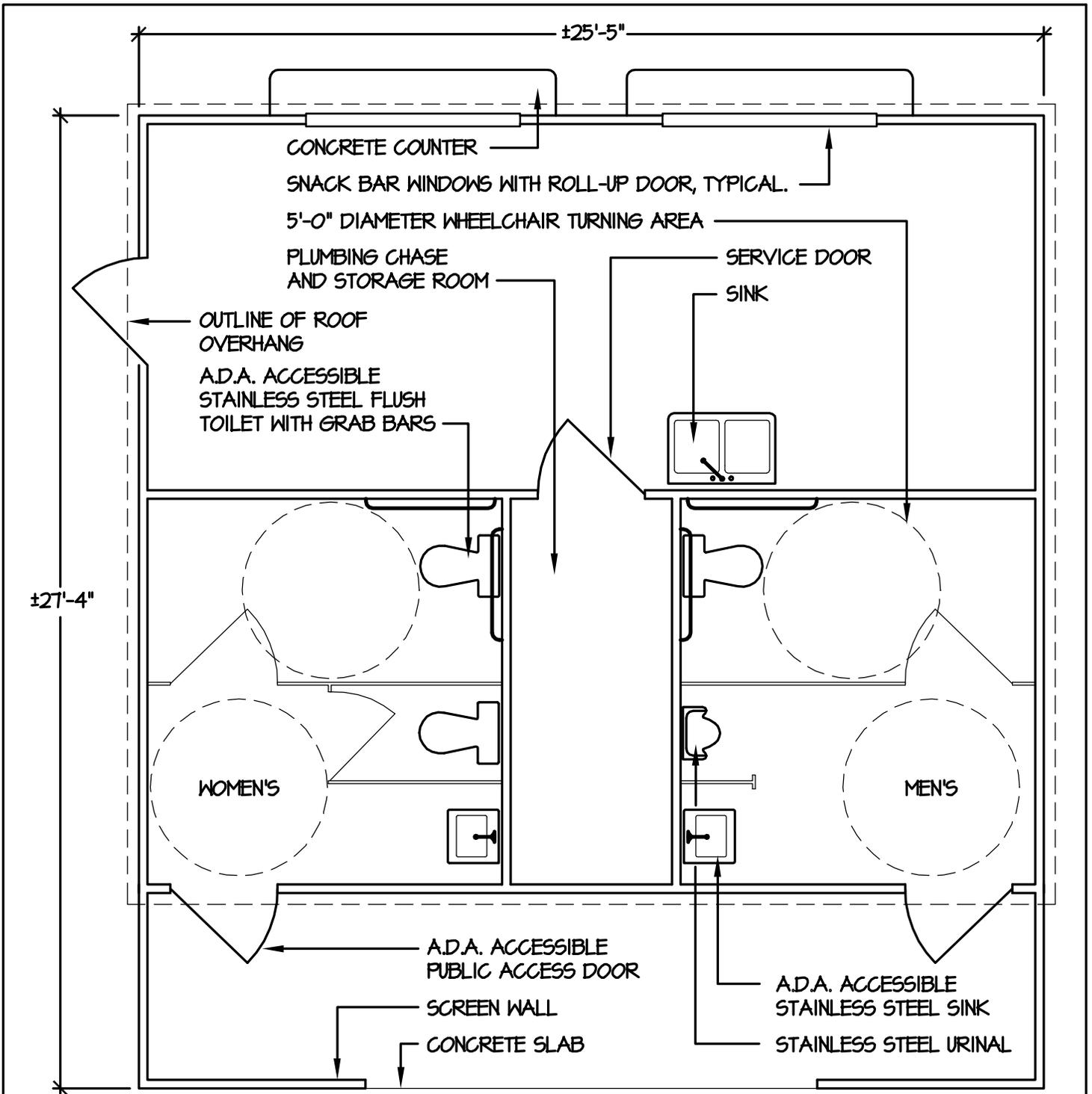
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2101</b>
REVISED:		RESTROOM BUILDING, TYPE 2	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

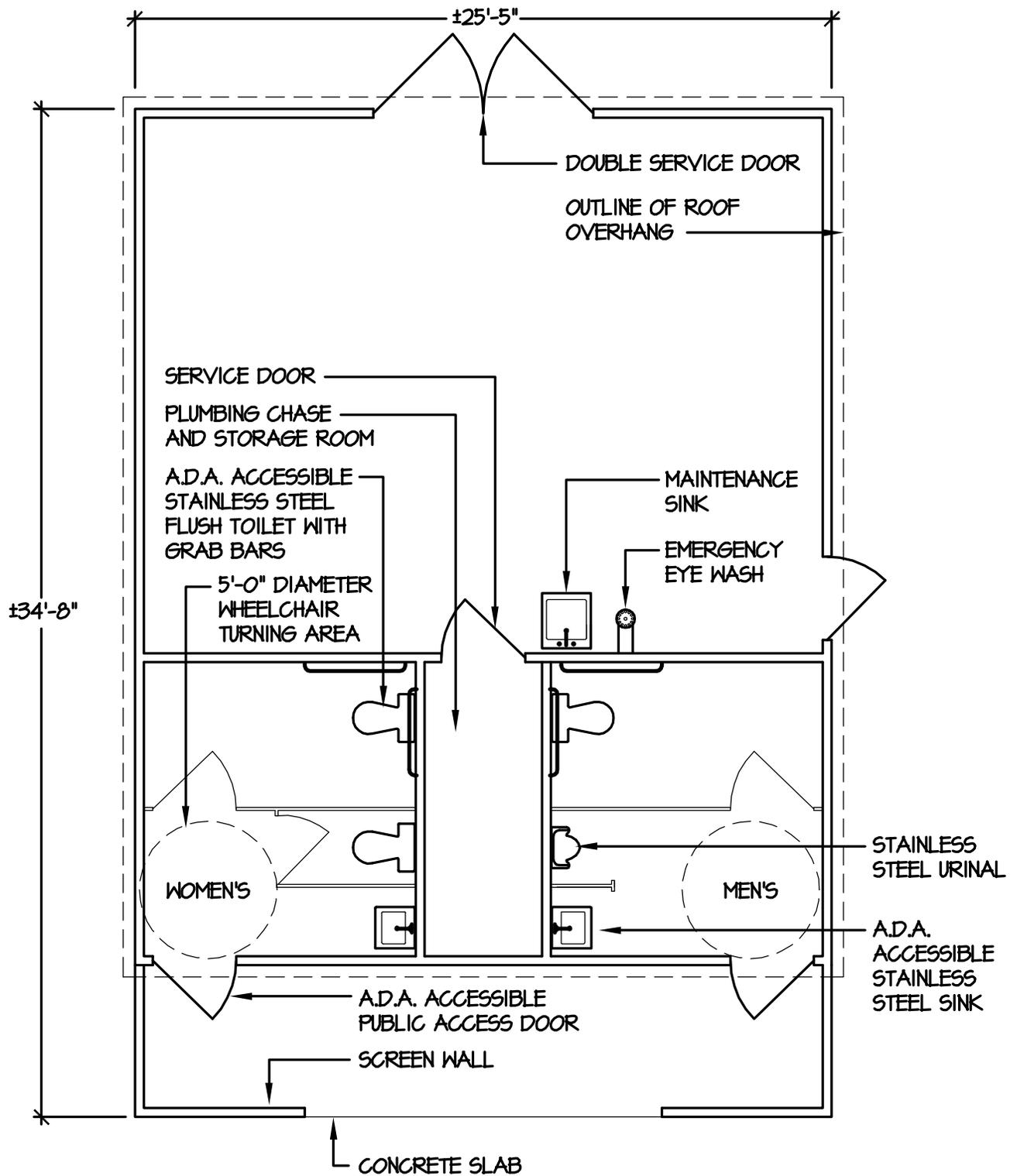
ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2102</b>
REVISED:		RESTROOM BUILDING, TYPE 3	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

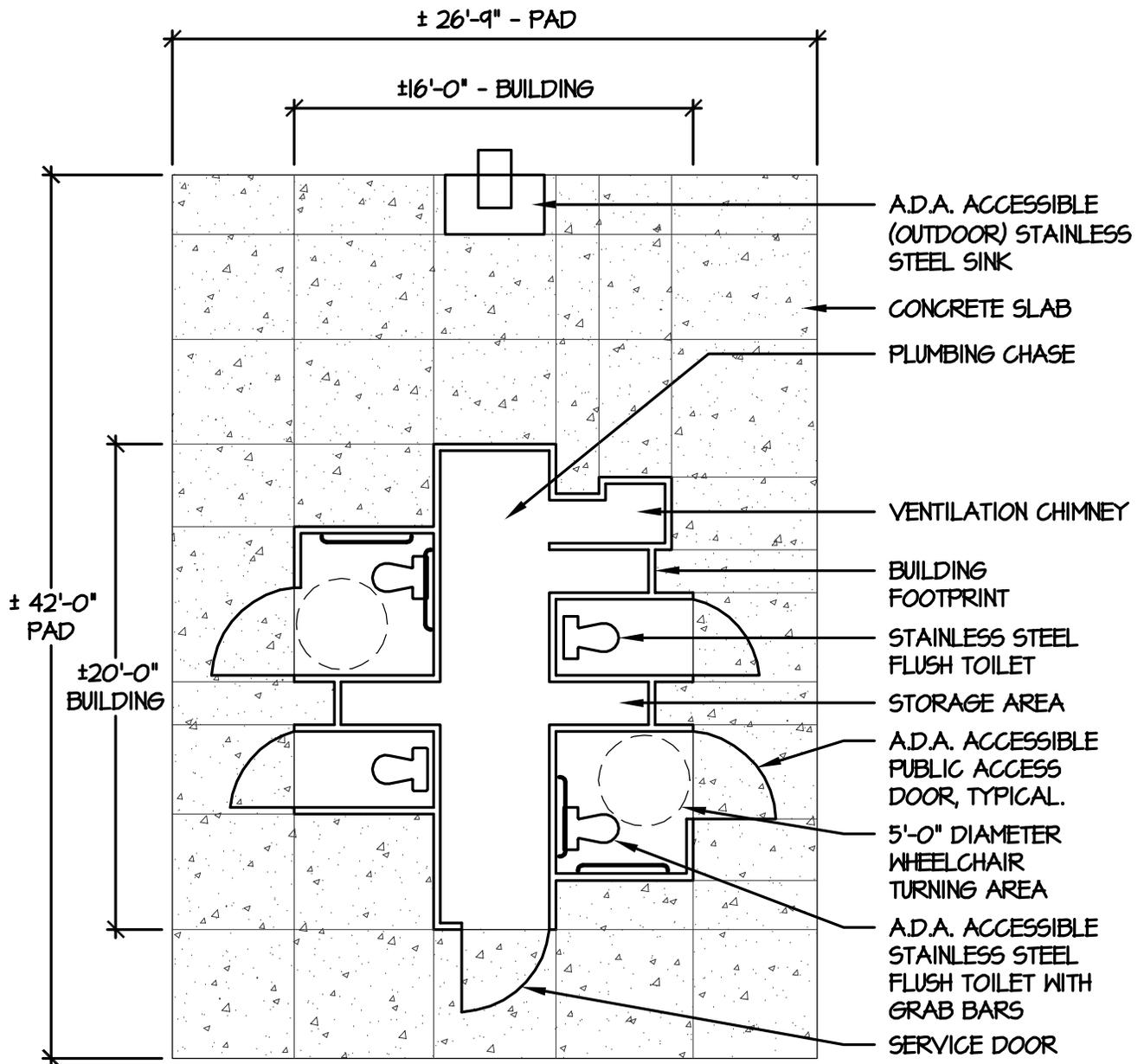
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2103</b>
REVISED:		RESTROOM BUILDING, TYPE 4 (WITH SNACK BAR)	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

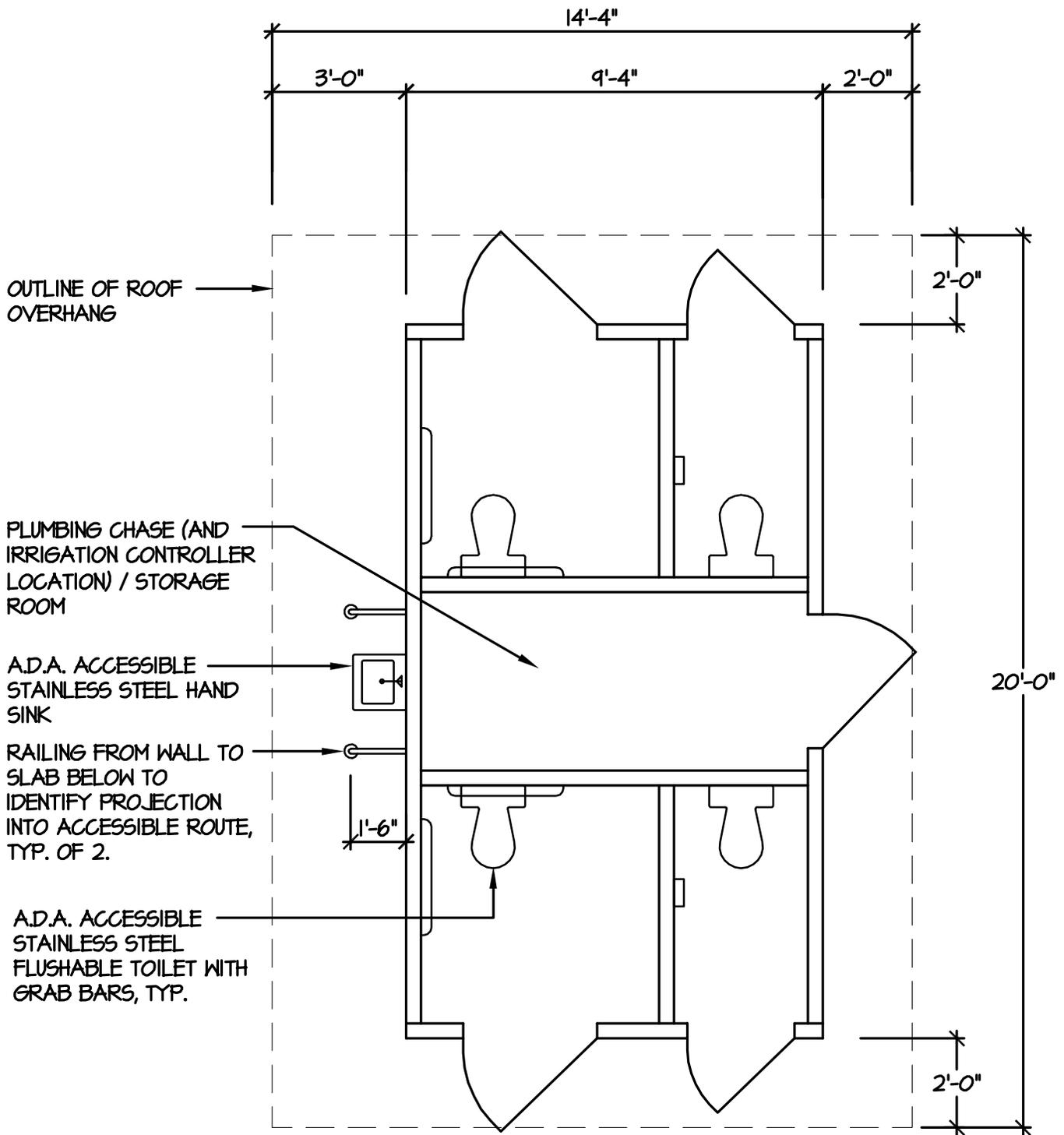
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2104</b>
REVISED:		RESTROOM BUILDING, TYPE 5 (WITH MAINTENANCE SHOP)	



**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

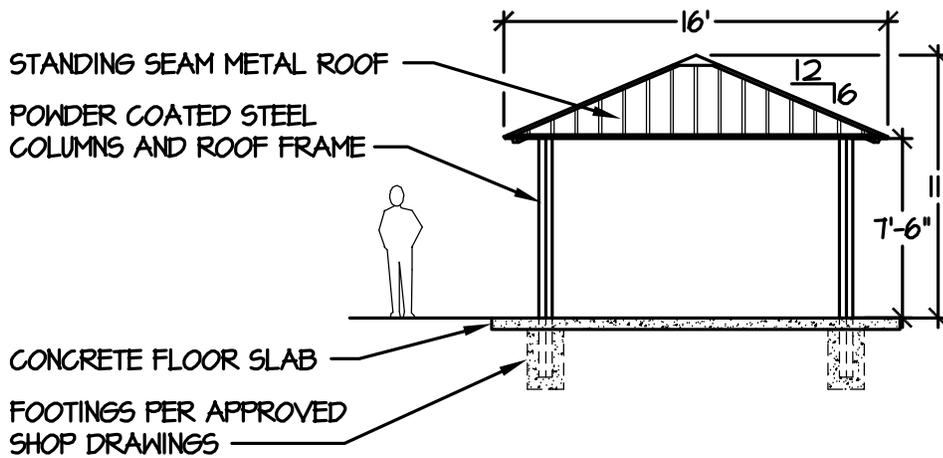
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2105</b>
REVISED:		RESTROOM BUILDING, TYPE 6	



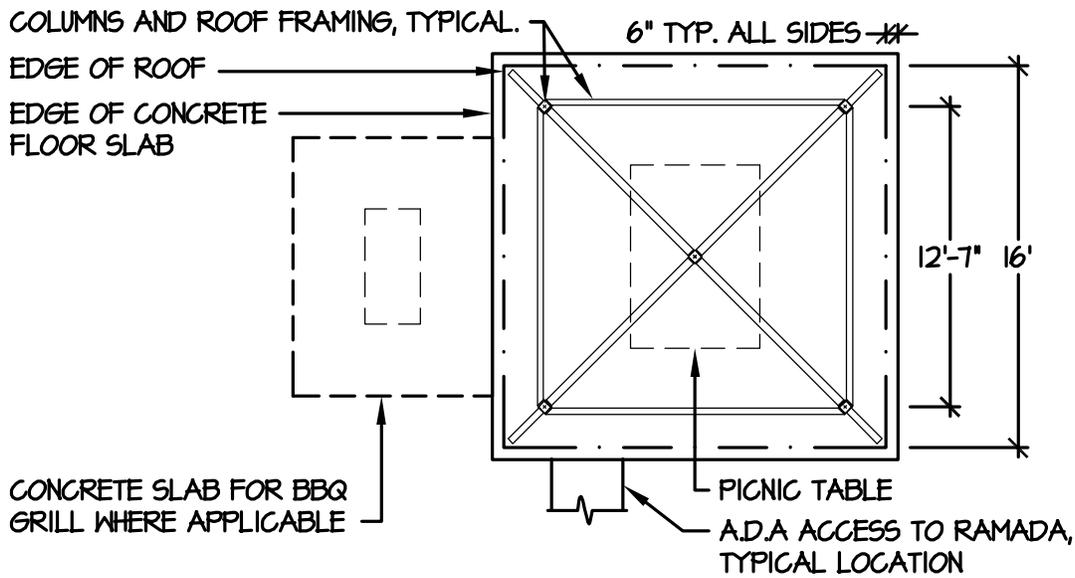
**NOTE:** THIS DETAIL IS INTENDED TO SHOW BASIC LAYOUT AND FEATURES OF THE PROPOSED RESTROOM BUILDING. SEE PROJECT PLANS FOR ADDITIONAL REQUIREMENTS. SEE STANDARD SPECIFICATIONS FOR SHOP DRAWING REQUIREMENTS.

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2106</b>
REVISED:		RESTROOM BUILDING, TYPE 7	



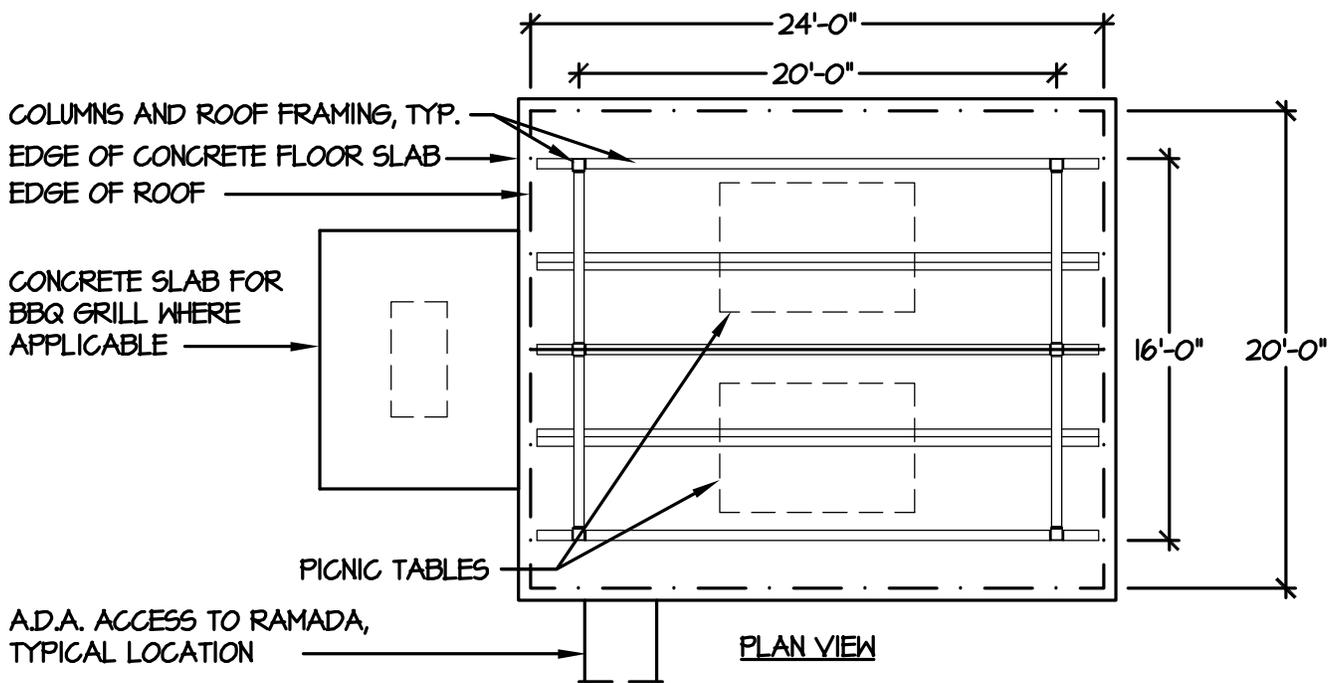
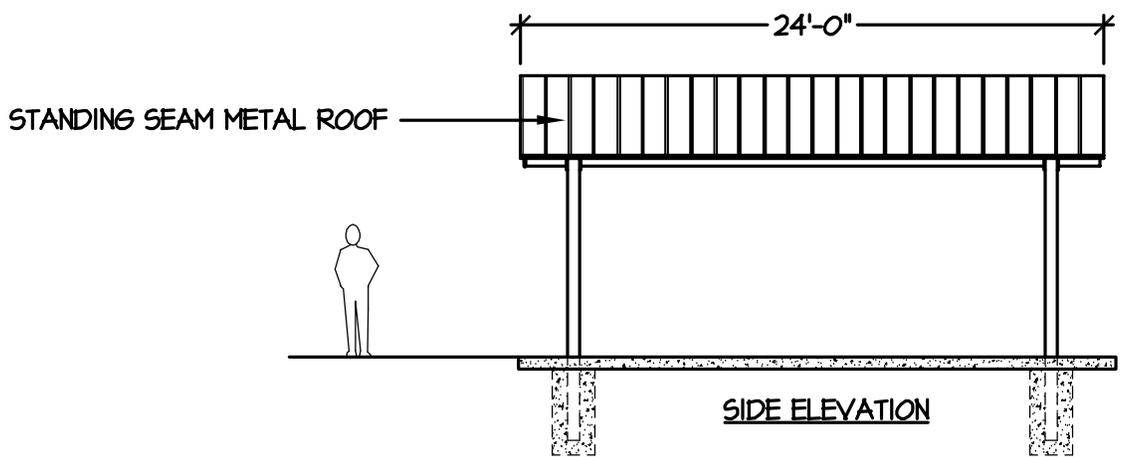
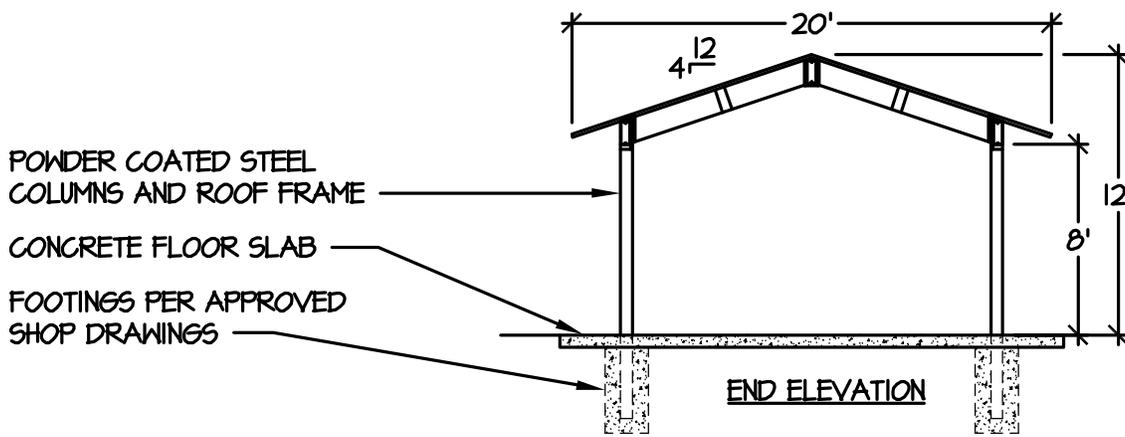
**ELEVATION**



**PLAN VIEW**

SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2200</b>
REVISED:		RAMADA - TYPE 1 (16' x 16')	



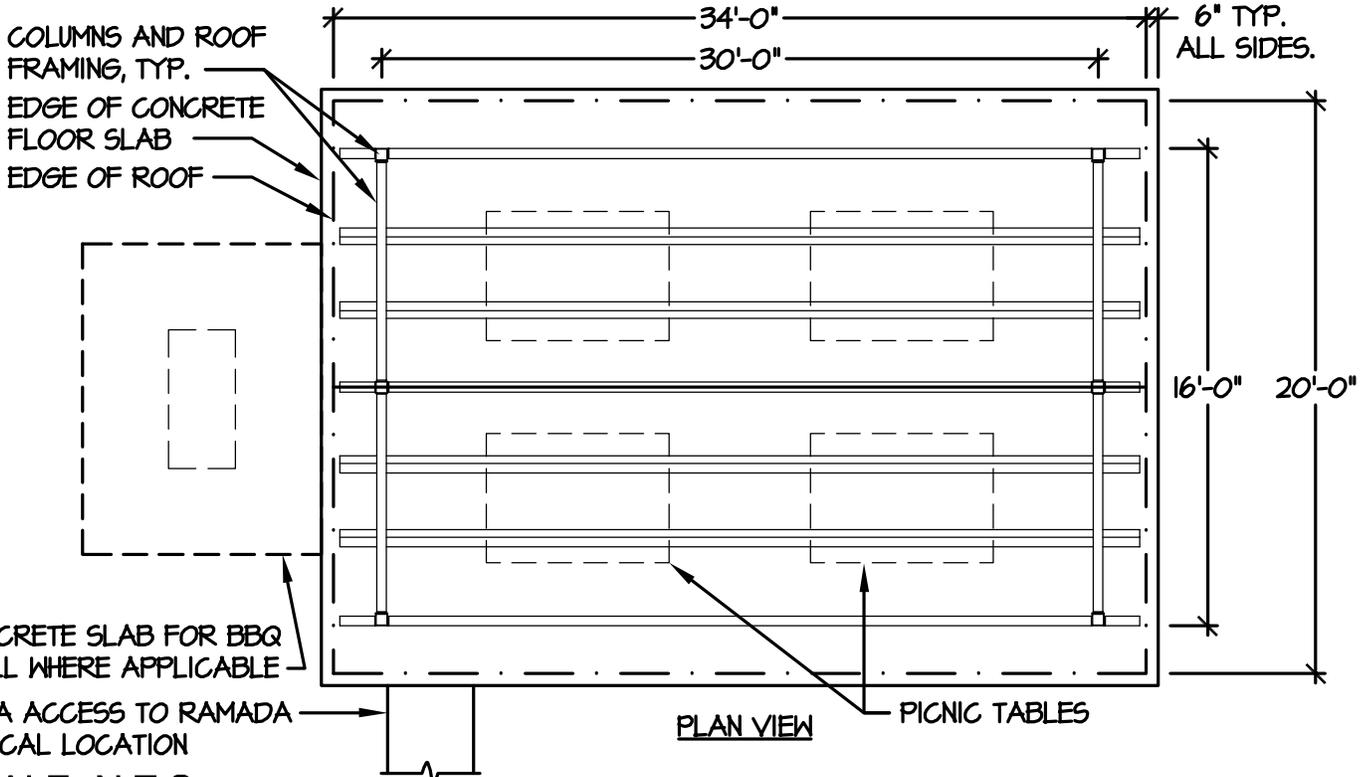
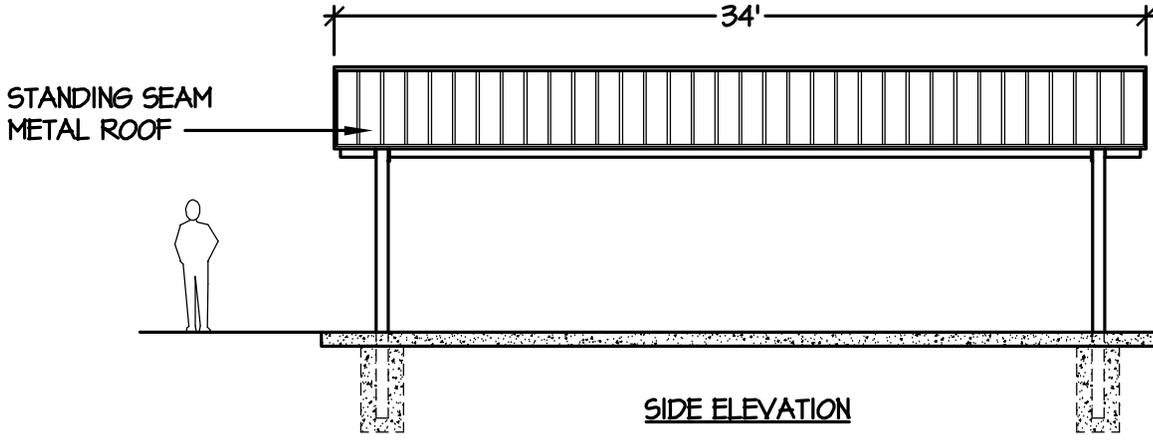
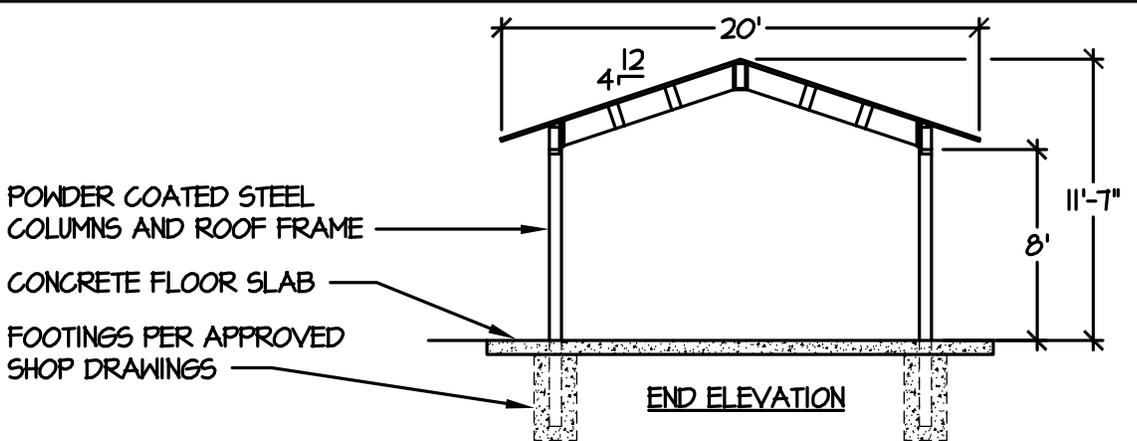
SCALE: N.T.S.

ISSUED:	
01/16	
REVISED:	



STANDARD DETAIL
PARK BUILDINGS:
RAMADA - TYPE 2 (20' x 24')

DETAIL NO.
P-2201
SHEET 1 OF 1

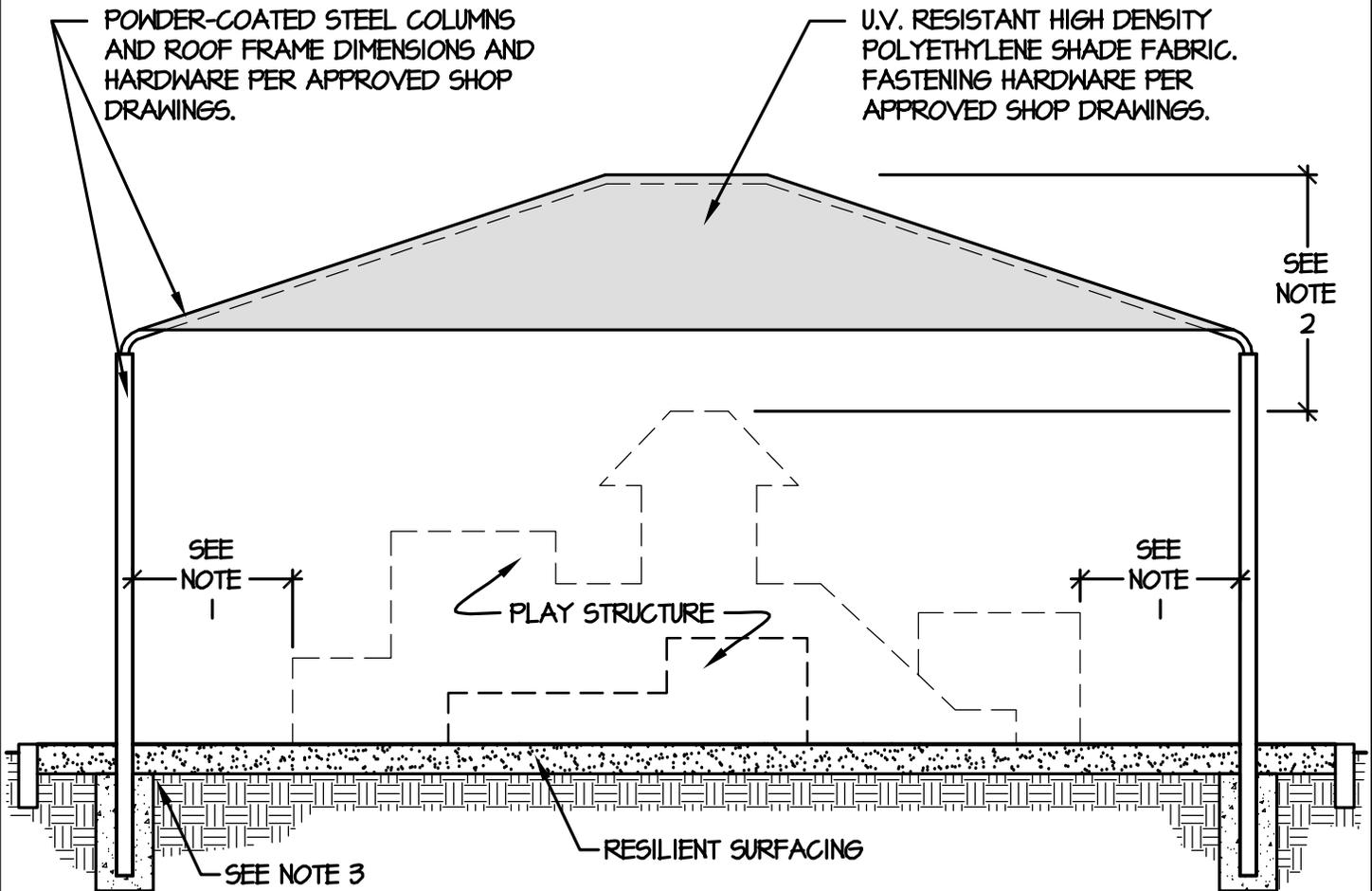


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2202</b>
REVISED:		RAMADA - TYPE 3 (20' x 34')	

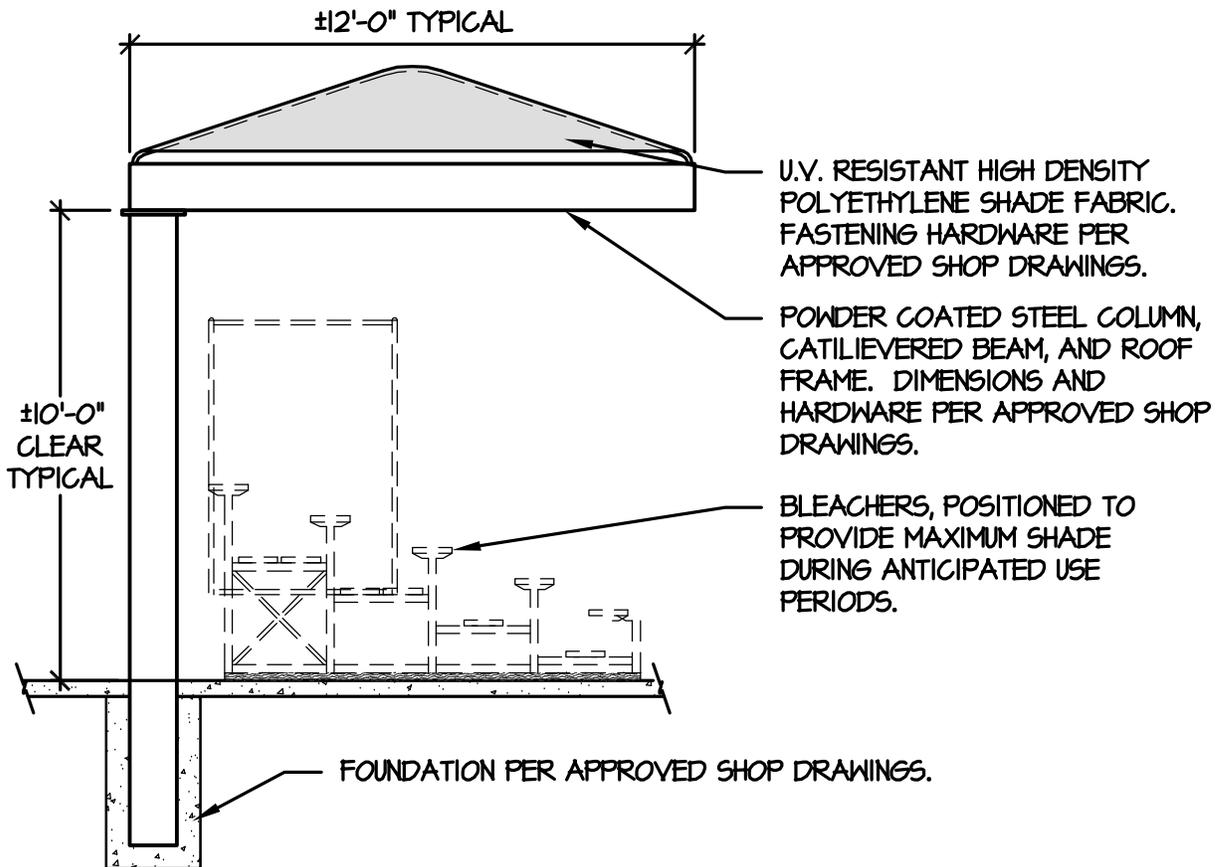
**NOTES:**

1. SHADE CANOPY COLUMNS SHALL BE LOCATED OUTSIDE THE DESIGNATED FALL ZONE FOR THE PLAYGROUND EQUIPMENT COVERED / SHADED.
2. THE DISTANCE BETWEEN THE DESIGNATED PLAY SURFACE OF THE STRUCTURE (OR PIVOT POINTS OF SWINGS) AND THE SHADE CANOPY FRAMING AND FABRIC SHALL COMPLY WITH ASTM F-1487 "STANDARD CONSUMER PRODUCT SAFETY PERFORMANCE SPECIFICATION FOR PLAYGROUND EQUIPMENT FOR PUBLIC USE." (DIMENSION SHALL BE 7'-0" TYPICAL. VERIFY FOR THE PLAYGROUND EQUIPMENT AND SHADE CANOPY TO BE INSTALLED).
3. THE TOP OF ALL SHADE CANOPY COLUMN FOOTINGS LOCATED IN AREAS WITH RESILIENT SURFACING SHALL BE BELOW THE REQUIRED DEPTH OF THE RESILIENT SURFACING.



SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2300</b>
REVISED:		TYPICAL SHADE CANOPY ABOVE PLAY EQUIPMENT	

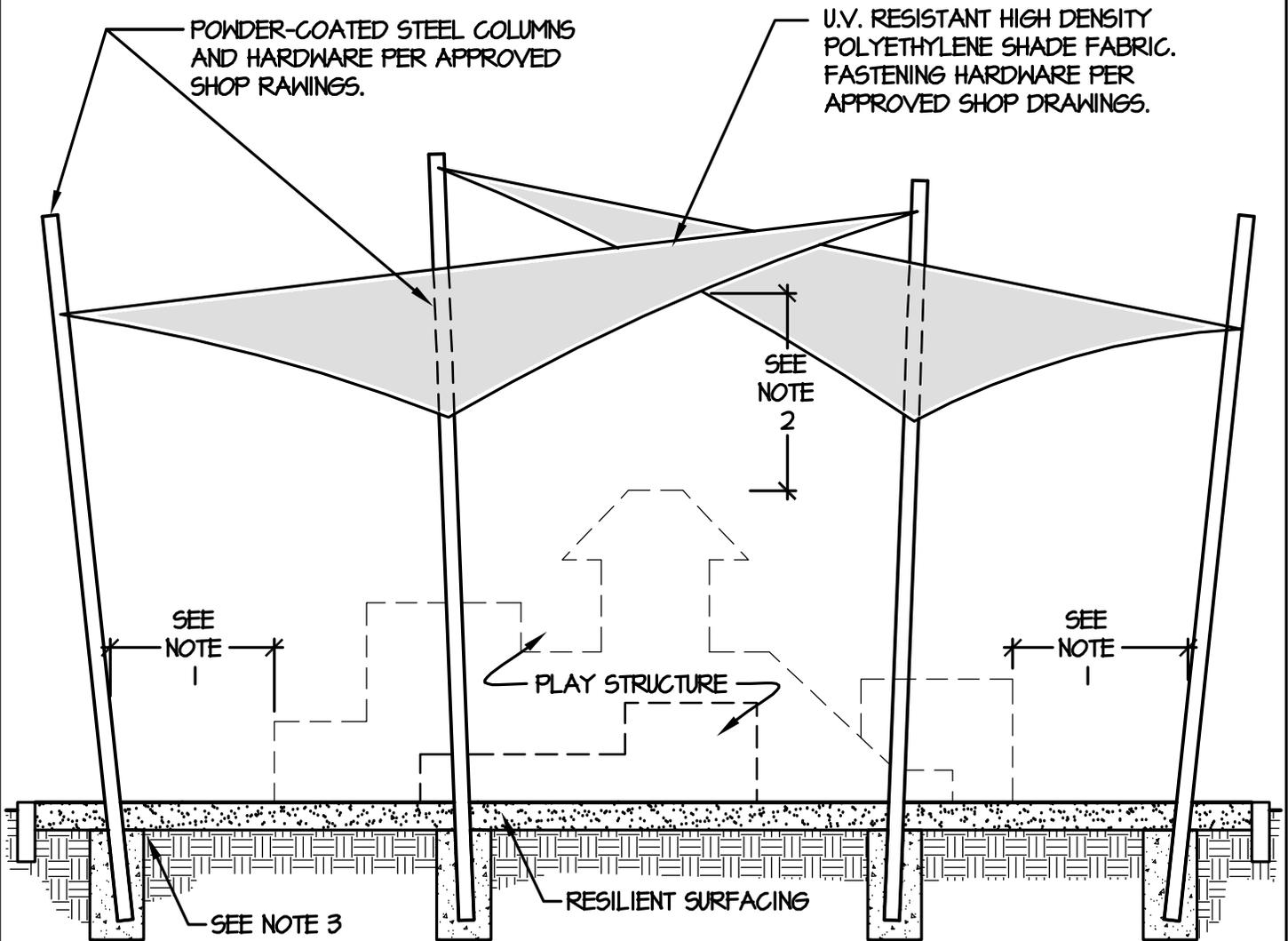


SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.	
01/16		PARK BUILDINGS:	<b>P-2301</b>	
REVISED:		TYPICAL SHADE CANOPY ABOVE BLEACHERS		SHEET 1 OF 1

**NOTES:**

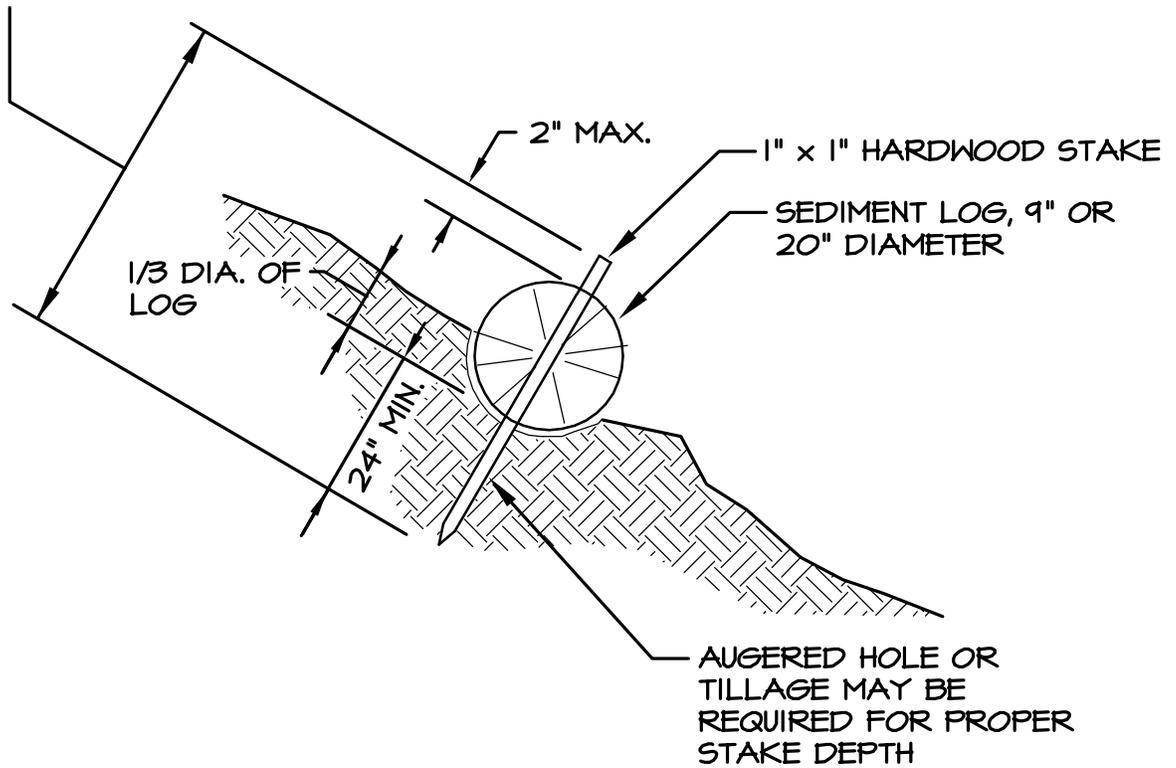
1. TENSION FABRIC SHADE STRUCTURE COLUMNS SHALL BE LOCATED OUTSIDE THE DESIGNATED FALL ZONE FOR THE PLAYGROUND EQUIPMENT COVERED / SHADED.
2. THE DISTANCE BETWEEN THE DESIGNATED PLAY SURFACE OF THE STRUCTURE (OR PIVOT POINTS OF SWINGS) AND THE SHADE CANOPY FRAMING AND FABRIC SHALL COMPLY WITH ASTM F-1487 "STANDARD CONSUMER PRODUCT SAFETY PERFORMANCE SPECIFICATION FOR PLAYGROUND EQUIPMENT FOR PUBLIC USE." (DIMENSION SHALL BE 7'-0" TYPICAL. VERIFY FOR THE PLAYGROUND EQUIPMENT AND SHADE CANOPY TO BE INSTALLED).
3. THE TOP OF ALL SHADE CANOPY COLUMN FOOTINGS LOCATED IN AREAS WITH RESILIENT SURFACING SHALL BE BELOW THE REQUIRED DEPTH OF THE RESILIENT SURFACING.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		PARK BUILDINGS:	<b>P-2302</b>
REVISED:		TENSIONED FABRIC SHADE STRUCTURE ABOVE PLAY EQUIPMENT	

STAKE LENGTH:  
 24" FOR 9" DIA. LOG  
 33" FOR 20" DIA. LOG



SECTION

SCALE: N.T.S.

ISSUED: 01/16		STANDARD DETAIL	DETAIL NO.
REVISED:		STORMWATER POLLUTION PREVENTION	P-2400
		SEDIMENT LOG	

40'-0" (MAX.) SPACING  
DEPENDS ON SLOPE  
RATIO. REFER TO LOG  
SPACING INTERVAL  
CHART, BELOW.

LOWEST THREE LOGS  
TO BE 20" DIA. (MIN.)  
WHEN SLOPE  
EXCEEDS 100'.

SLOPE LENGTH VARIES.  
MULTIPLE ROWS SHALL  
BE SPACED AS NOTED,  
PARALLEL TO SLOPE  
CONTOURS.

EXCAVATED MATERIAL  
(2" DEEP) TO BE TAMPED  
AGAINST UPSTREAM SIDE  
OF SEDIMENT LOG TO  
PREVENT UNDERMINING

RIP 6"-12" WITH FURROWS  
LEFT PARALLEL TO NEW  
SLOPE CONTOURS CREATED  
DURING SOIL TILLAGE

TRENCH AND  
STAKE LOG  
PER STAKING  
DETAIL,  
P-2500.

CUT/FILL SLOPE

SEDIMENT LOADING  
ZONE 24" (MIN.)

LOG AT TOE OF  
SLOPE TO BE 20"  
(MIN.) DIA. WHEN  
ROADSIDE DITCH  
EXISTS. INSTALL  
LOG ABOVE  
DESIGNATED HIGH  
FLOW LINE OR  
ESTIMATED  
BANKFULL LEVEL.

### LOG SPACING INTERVALS

SLOPE RATIO: (H:V)	MAXIMUM SPACING INTERVAL
2:1	10'
3:1	20'
4:1	30'
5:1	40'
6:1	40'

SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		STORMWATER POLLUTION PREVENTION	P-2401
REVISED:		SEDIMENT LOG ON SLOPE	SHEET 1 OF 1

SEDIMENT LOG

STORM DRAIN INLET

2' TYP.

STAKE TO PENETRATE MESH OF BOTH LOGS AT TOP AND BOTTOM OF WHERE LOGS MEET (TYP.)

PLAN VIEW

STORM DRAIN INLET

SEDIMENT LOG BEYOND

1"x1"x46" HARDWOOD STAKE TO PROTRUDE 2" MAX. ABOVE LOG, TYP.

FLOW

GRADUATION C ANGULAR ROCK RIP-RAP/MULCH WEDGE TO BE BUILT AGAINST UPSTREAM SIDE OF SEDIMENT LOG TO PREVENT UNDERMINING. PLACE AND FIELD ADJUST ROCK WEDGE ACCORDING TO DIRECTION OF FLOW.

SECTION

SCALE: N.T.S.

ISSUED:

01/16

REVISED:



STANDARD DETAIL

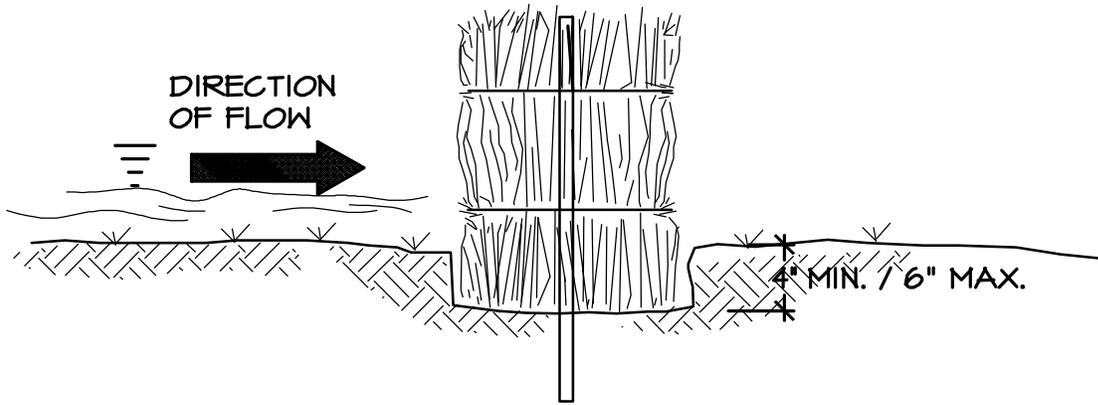
STORMWATER POLLUTION PREVENTION

SEDIMENT LOG AT DRAINAGE INLET

DETAIL NO.

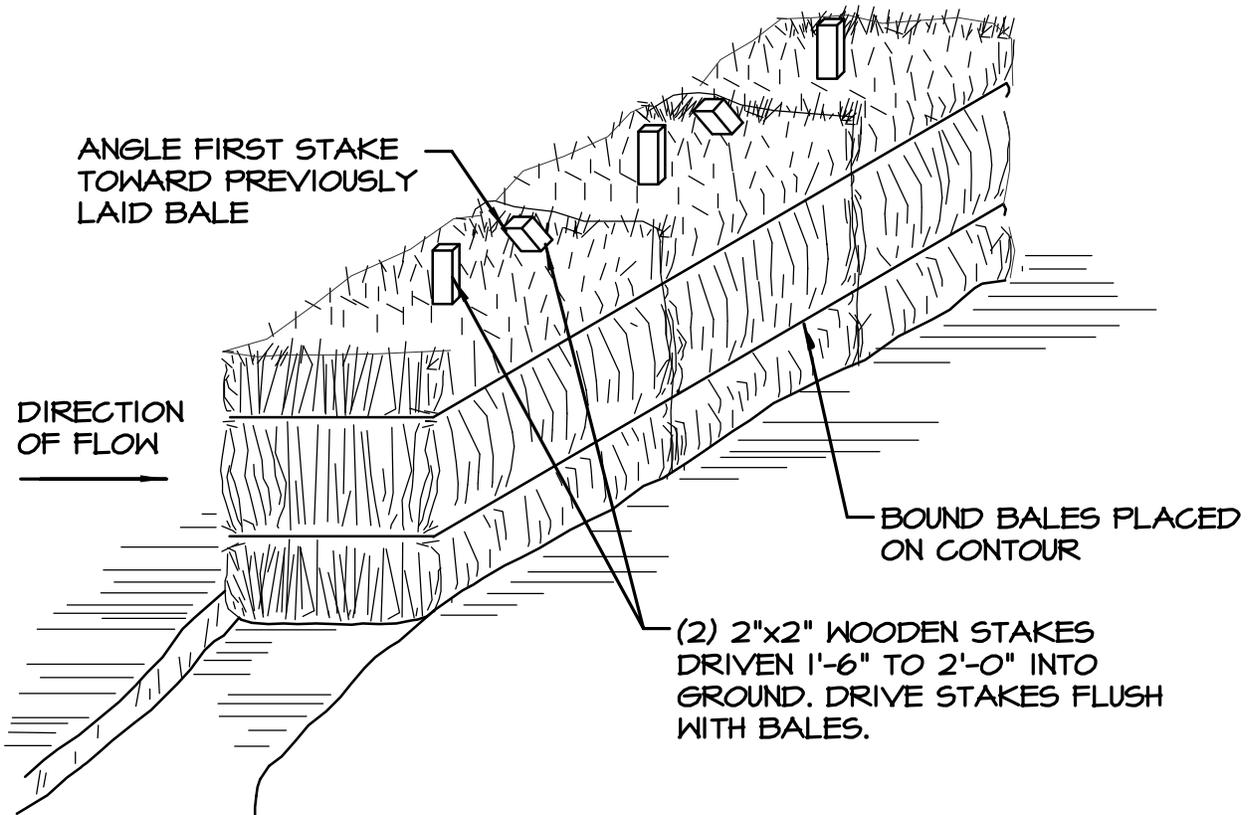
P-2402

SHEET 1 OF 1



\* PROMOTES ON SITE SEDIMENTATION BY CREATING A TEMPORARY POND.

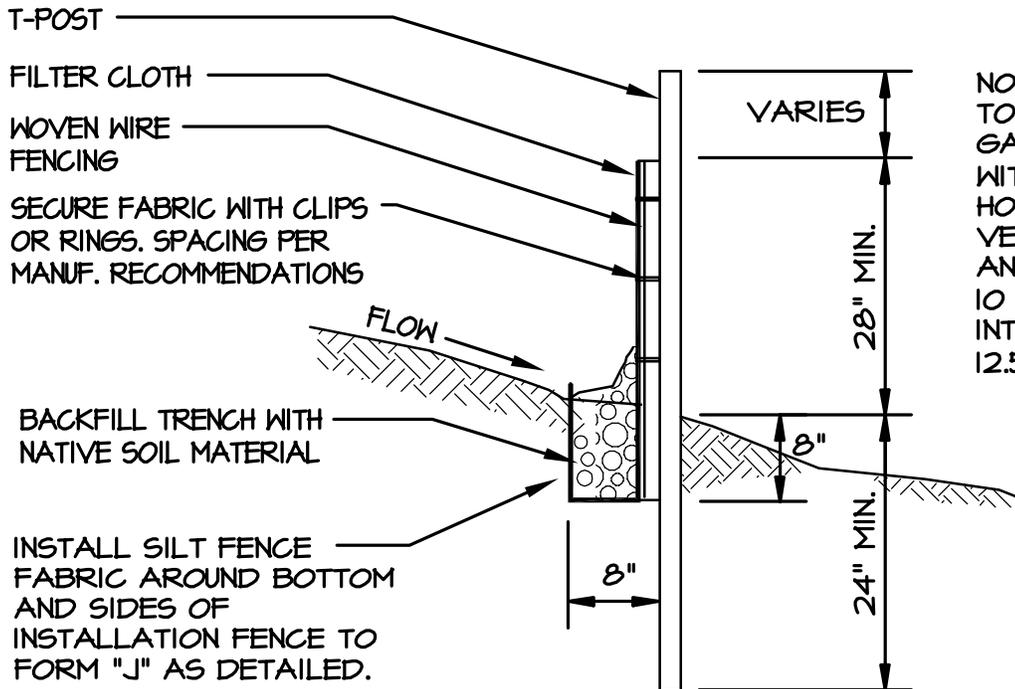
BEDDING DETAIL



ANCHORING DETAIL

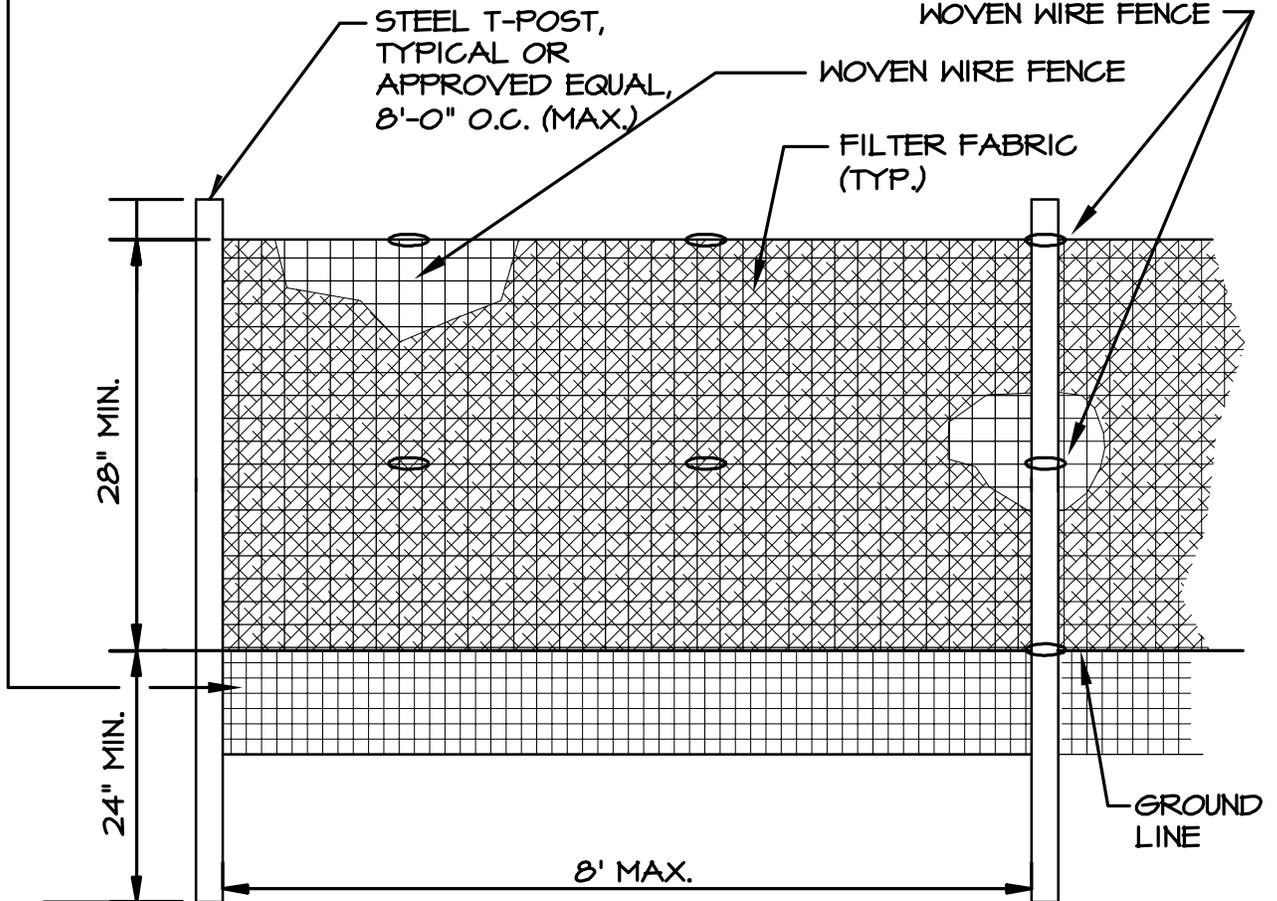
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		STORMWATER POLLUTION PREVENTION	P-2403
REVISED:		STRAW BALE	SHEET 1 OF 1



NOTE: WOVEN WIRE FENCE TO BE CONSTRUCTED OF GALVANIZED STEEL WIRE WITH 4" (MAX.) X 4" (MAX.) HORIZONTAL AND VERTICAL SPACING. TOP AND BOTTOM WIRE TO BE 10 GAUGE (MIN.) INTERMEDIATE WIRE TO BE 12.5 GAUGE (MIN.)

SECURE TOP, MIDDLE AND BOTTOM PORTION OF FILTER FABRIC TO WOVEN WIRE FENCE



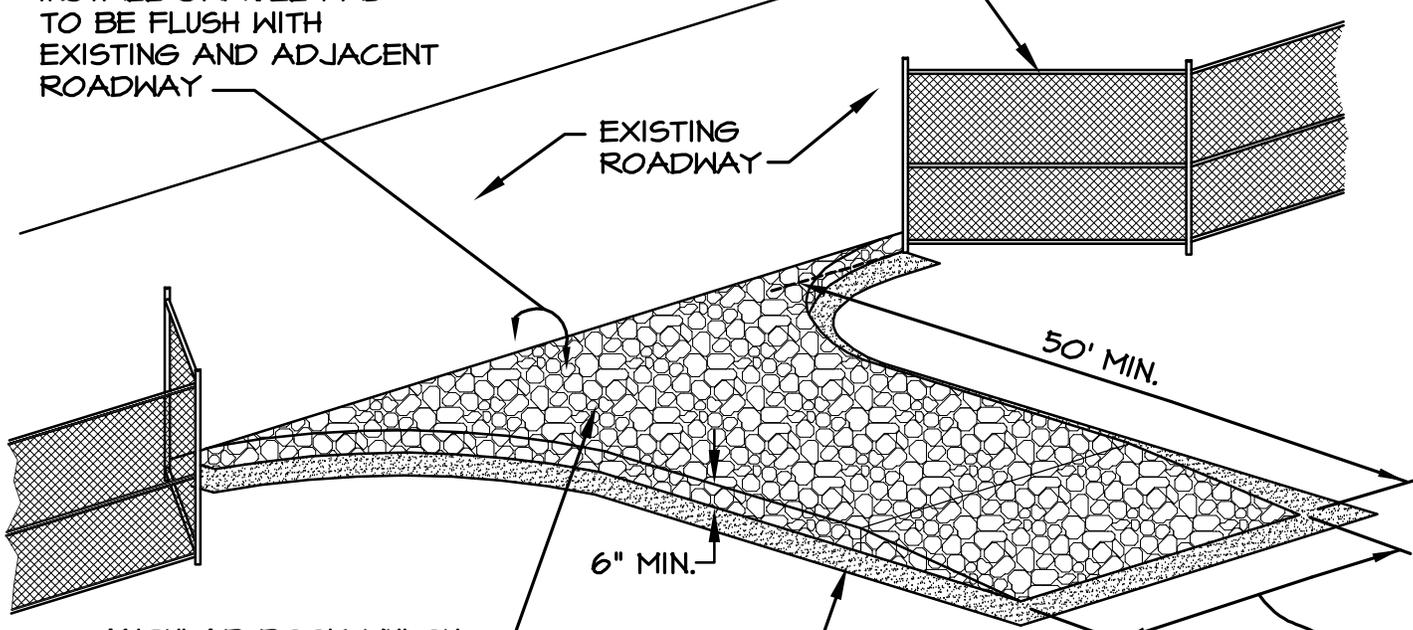
SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		STORMWATER POLLUTION PREVENTION	P-2404
REVISED:		SILT FENCE (WITH WIRE FENCE BACKING)	SHEET 1 OF 1

INSTALL FENCE OR BARRICADE TO DIRECT TRAFFIC TO GRAVEL PAD, TYPICAL.

INSTALL GRAVEL PAD TO BE FLUSH WITH EXISTING AND ADJACENT ROADWAY

EXISTING ROADWAY



50' MIN.

6" MIN.

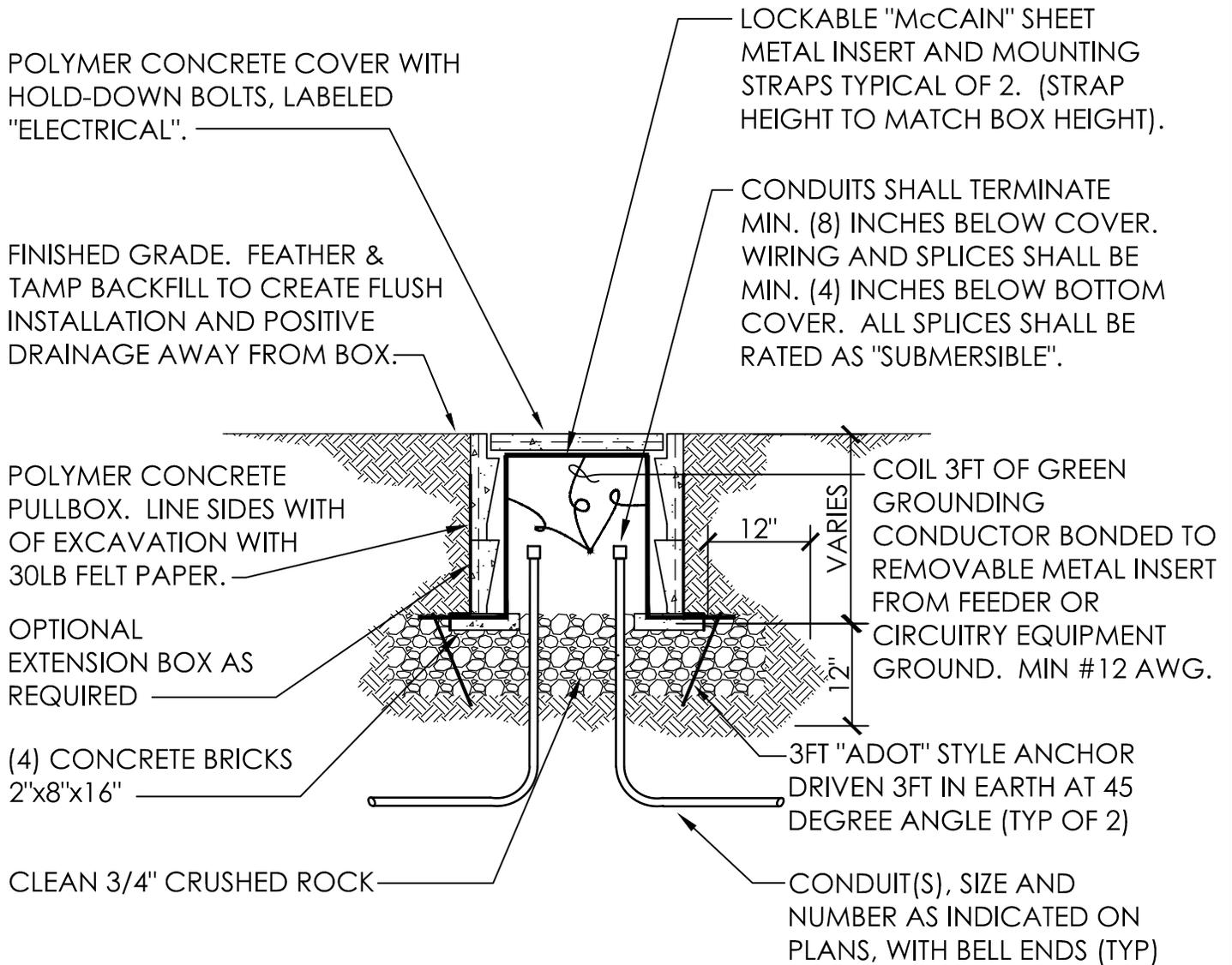
ANGULAR ROCK MULCH INSTALLED TO A DEPTH OF 6"

WIDTH OF ROCK MULCH SHALL BE EQUAL TO ROADWAY ENTRY OR 30'-0" MIN.

NON-WOVEN VERY HIGH SURVIVABILITY FABRIC BENEATH ALL AGGREGATE. EXTEND 3'-0" BEYOND ALL EDGES.

SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL STORMWATER POLLUTION PREVENTION	DETAIL NO. <b>P-2405</b>
REVISED:		CONSTRUCTION ENTRANCE/EXIT GRAVEL PAD	SHEET 1 OF 1



**NOTE:**

1. UL LISTED POLYMER CONCRETE PULLBOX AND COVER SHALL COMPLY WITH NEC AND ANSI/SCTE 77-2002 SPECIFICATION FOR UNDERGROUND ENCLOSURE INTEGRITY, TIER 15, AASHTO H-20 LOADING FOR VEHICULAR TRAFFIC AREAS (DELIBERATE VEHICULAR TRAFFIC APPLICATIONS).
2. CALL 760-727-8100 OR VISIT [WWW.MCCAIN-INC.COM](http://WWW.MCCAIN-INC.COM) FOR ADDITIONAL INFORMATION ON THE SHEET METAL INSERT AND MOUNTING STRAPS. "ADOT" ANCHORS PROVIDED BY "McCAIN" WHEN ORDERED. "McCAIN" PRODUCTS WORKS ONLY WITH "CHRISTY" STYLE BOXES. INSERTS SHALL COME COMPLETE WITH GROUNDING MOUNTING SCREWS TO LID AND FRAMES.
3. PIMA COUNTY SHALL PROVIDE LOCKS.

**SCALE: N.T.S.**

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	<b>P-3000</b> SHEET 1 OF 1
REVISED:		UNDERGROUND PULL BOX	

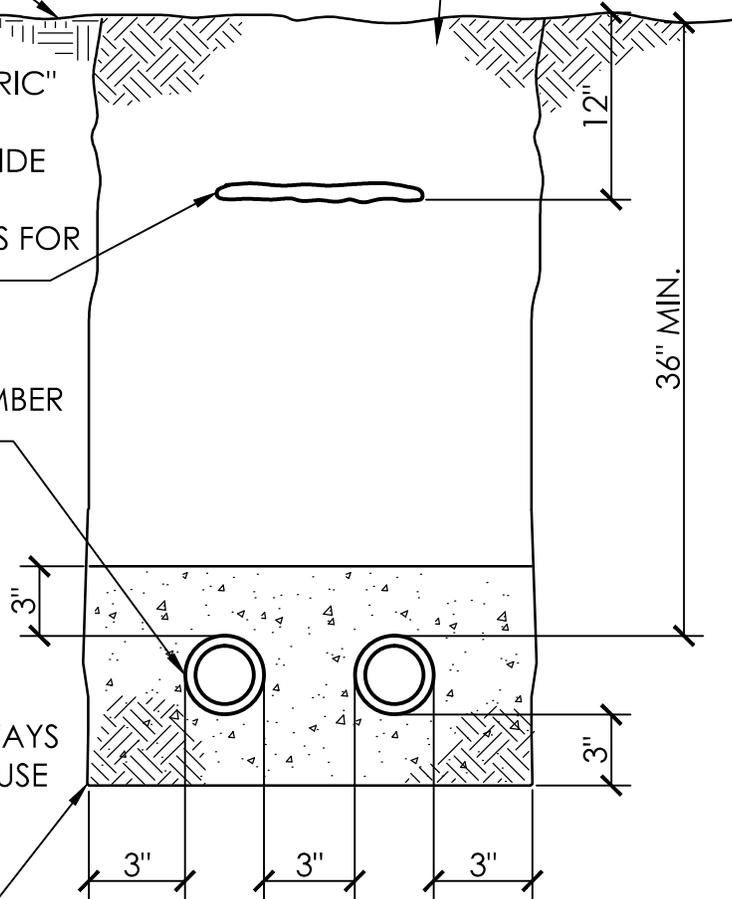
FINISHED GRADE

CLEAN BACKFILL COMPACTED TO A MINIMUM OF 95% DENSITY AS PER ASTM D698

3" MIN. RED PLASTIC "ELECTRIC" MARKING TAPE FOR ENTIRE LENGTH OF TRENCH. PROVIDE TAPE WITH INTEGRAL FOIL BACKING OR OTHER MEANS FOR METAL DETECTION.

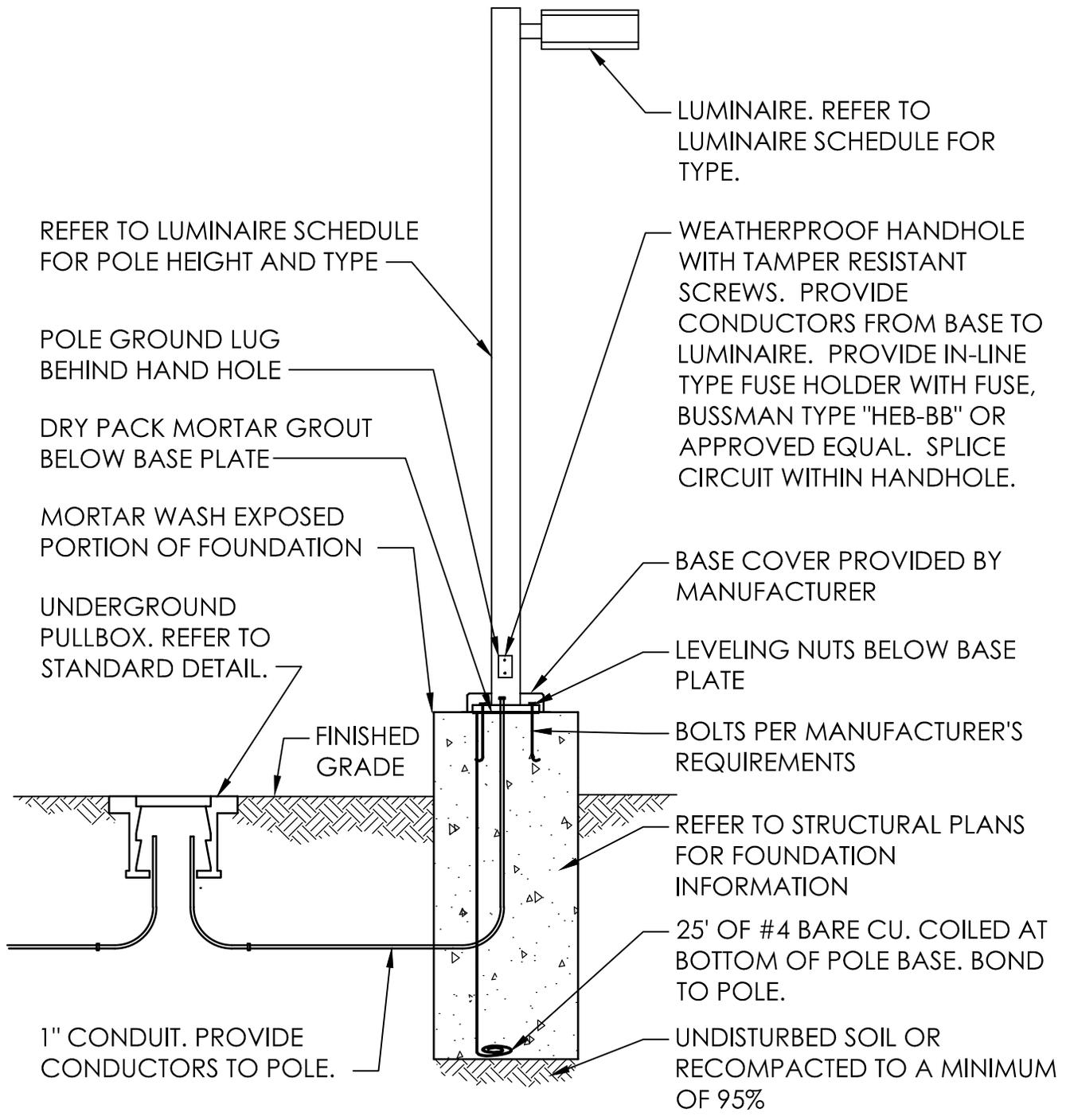
CONDUIT(S). SIZE AND NUMBER AS INDICATED ON PLANS.

2500 PSI CONCRETE WHERE CONDUIT CROSSES DRIVEWAYS OR CIRCULATION ROADS. USE CLEAN FILL IN LIEU OF CONCRETE IN ALL OTHER LOCATIONS.



SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	P-3001
REVISED:		CONDUIT IN TRENCH	
			SHEET 1 OF 1



REFER TO LUMINAIRE SCHEDULE FOR POLE HEIGHT AND TYPE

POLE GROUND LUG BEHIND HAND HOLE

DRY PACK MORTAR GROUT BELOW BASE PLATE

MORTAR WASH EXPOSED PORTION OF FOUNDATION

UNDERGROUND PULLBOX. REFER TO STANDARD DETAIL.

FINISHED GRADE

1" CONDUIT. PROVIDE CONDUCTORS TO POLE.

LUMINAIRE. REFER TO LUMINAIRE SCHEDULE FOR TYPE.

WEATHERPROOF HANDHOLE WITH TAMPER RESISTANT SCREWS. PROVIDE CONDUCTORS FROM BASE TO LUMINAIRE. PROVIDE IN-LINE TYPE FUSE HOLDER WITH FUSE, BUSSMAN TYPE "HEB-BB" OR APPROVED EQUAL. SPLICE CIRCUIT WITHIN HANDHOLE.

BASE COVER PROVIDED BY MANUFACTURER

LEVELING NUTS BELOW BASE PLATE

BOLTS PER MANUFACTURER'S REQUIREMENTS

REFER TO STRUCTURAL PLANS FOR FOUNDATION INFORMATION

25' OF #4 BARE CU. COILED AT BOTTOM OF POLE BASE. BOND TO POLE.

UNDISTURBED SOIL OR RECOMPACTED TO A MINIMUM OF 95%

SCALE: N.T.S.

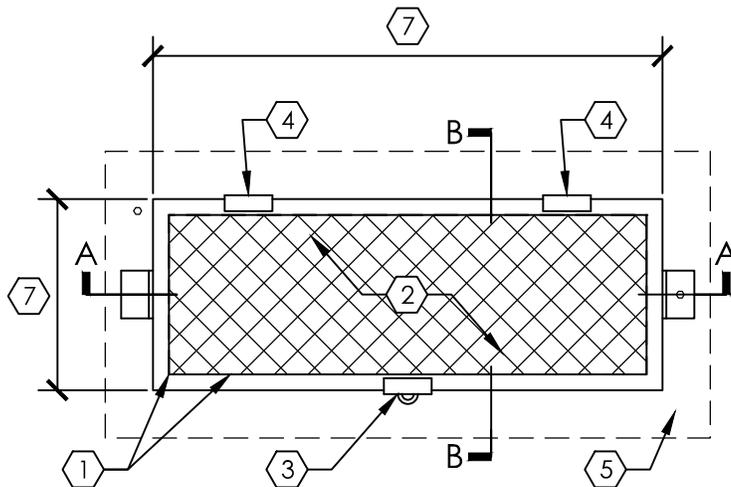
ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	P-3002
REVISED:		UNDERGROUND PULLBOX AND POLE LUMINAIRE	

# GENERAL NOTES

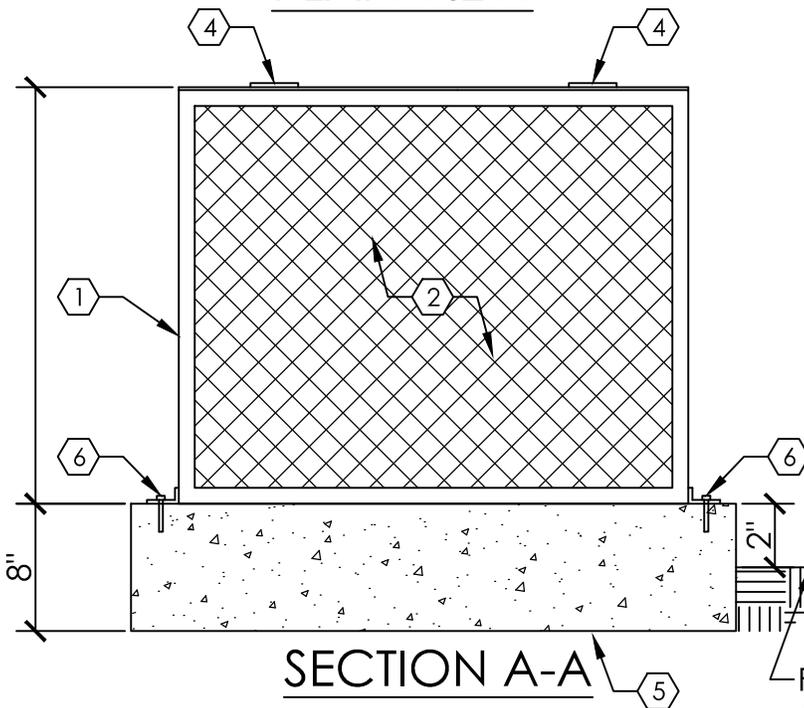
- A. PAINT ENTIRE ENCLOSURE LIGHT GRAY.
- B. BOND TO TRANSFORMER ENCLOSURE WITH #8 BARE COPPER JUMPER AND LISTED TERMINATIONS.

# KEYNOTES

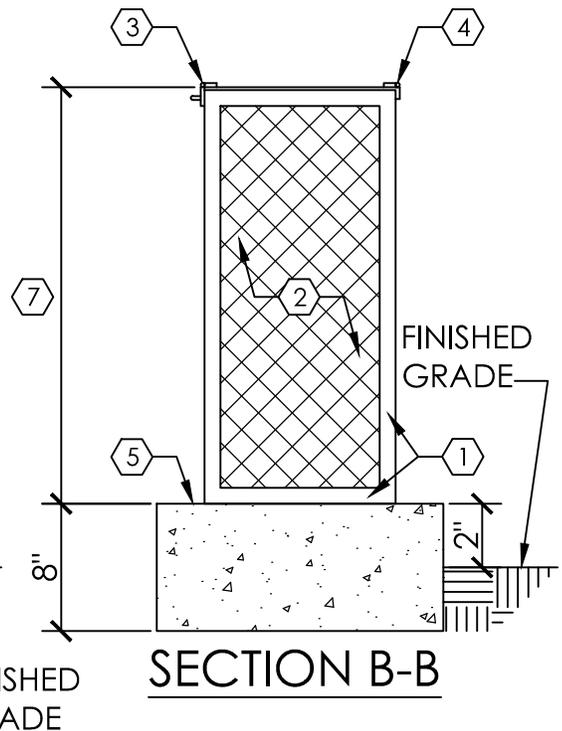
- 1. 1" WELDED STEEL TUBE FRAME.
- 2. No. 9 EXPANDED METAL, WELDED TO FRAME.
- 3. HASP WELDED TO FRAME.
- 4. HINGES.
- 5. CONCRETE HOUSE KEEPING PAD. REFER TO SPECIFICATIONS.
- 6. ANGLE AND ANCHOR BOLT (MIN. 1/2" DIM) FOR ANCHORING ENCLOSURE TO PAD, TYPICAL ONE PER END.
- 7. DIMENSION TO BE 6" LARGER THAN TRANSFORMER ON ALL SIDES AND TOP.



PLAN VIEW



SECTION A-A

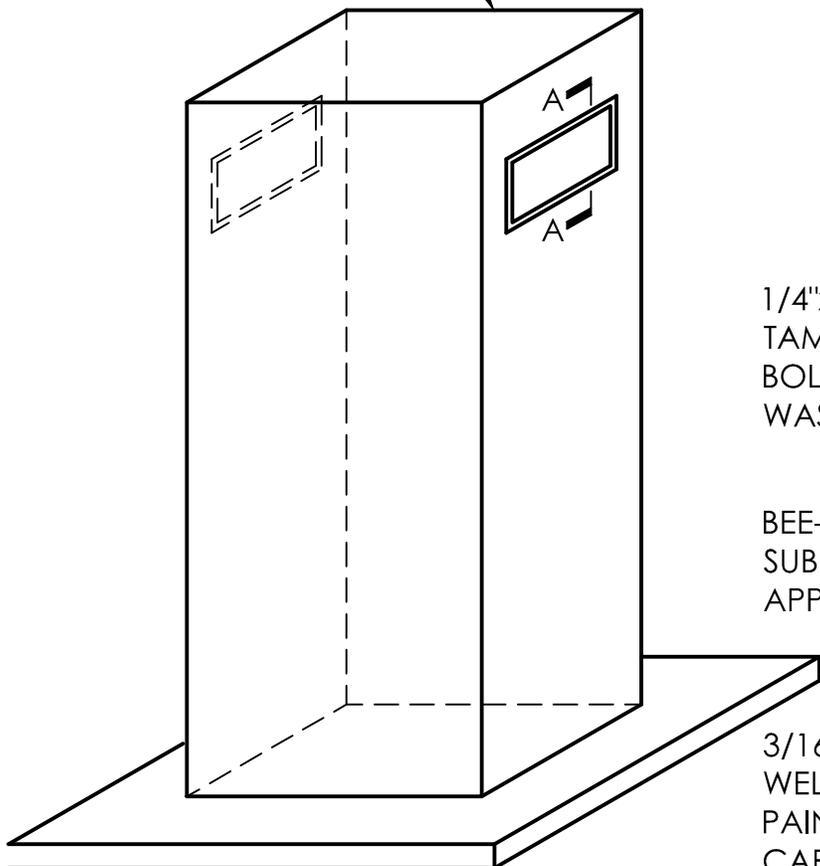


SECTION B-B

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	<b>P-3003</b> SHEET 1 OF 1
REVISED:		TRANSFORMER ENCLOSURE	

CONTROL CABINET



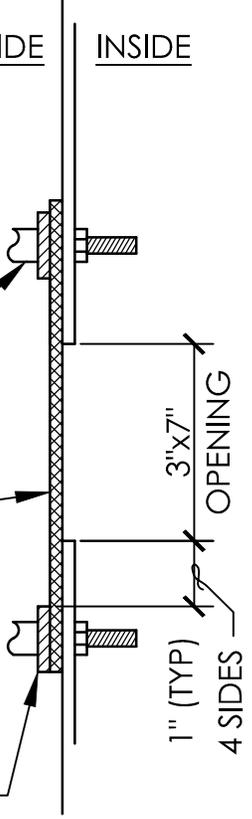
CONCRETE PAD.  
REFER TO SITE PLAN  
AND SPECIFICATIONS.

OUTSIDE      INSIDE

1/4"x1-1/2"  
TAMPER-RESISTANT  
BOLT, NUT AND  
WASHER (TYP. OF 4)

BEE-PROOF SCREEN.  
SUBMIT SAMPLE FOR  
APPROVAL.

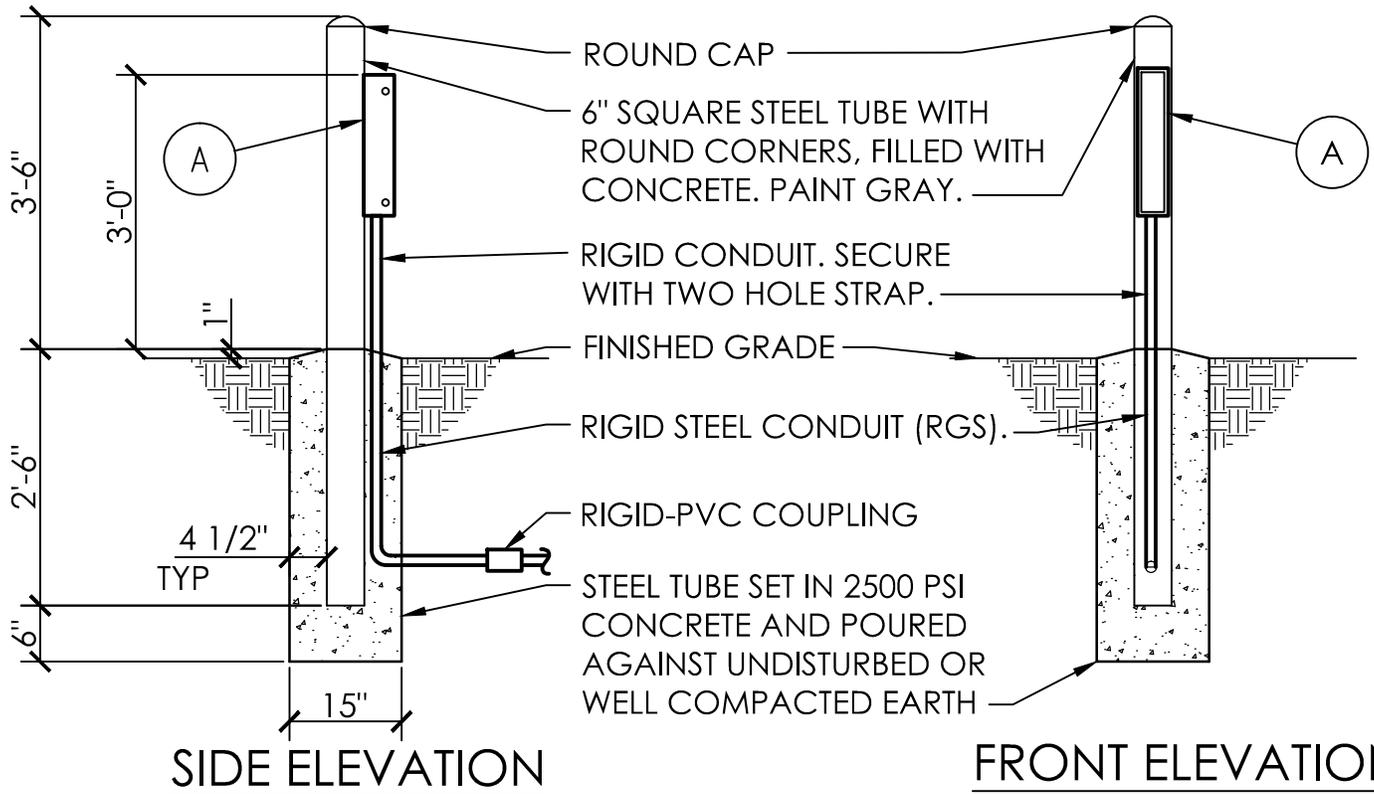
3/16" X 1" FLAT IRON  
WELDED FRAME. PRIME &  
PAINT TO MATCH  
CABINET (TYP. 4 SIDES)



**SECTION "A"**  
TYP 2 SIDES OF CABINET

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	<b>P-3004</b>
REVISED:		CONTROL CABINET VENT	



6" SQUARE STEEL TUBE WITH ROUNDED CORNERS. FILL WITH CONCRETE.

TWO (2) DUPLEX GFCI RECEPTACLES. CONNECT EACH ON DEDICATED CIRCUIT. REFER TO SITE PLAN.

THREADED 1" RIGID STEEL CONDUIT WITH TAPE, 1/2 LAP WRAPPED. TAPE CONDUIT BELOW GRADE AND IN CONCRETE TO 6" AFG. SECURE TO STEEL TUBE WITH TWO HOLE STRAPS. PAINT GRAY.

NO. 14 GAUGE WELDED STEEL ENCLOSURE WITH CONTINUOUS HINGED GASKETED COVER (FROM TOP) WITH LOCKING HASP. LOCK PROVIDED BY PIMA COUNTY. PAINT GRAY. COVER NOT SHOWN.

CONDULET MULTI-GANG CAST DEVICE BOX WITH MOUNTING LUGS FOR THREADED RIGID 1" STEEL CONDUIT. PROPERLY SECURE CONDULET AGAINST VANDALISM (WELD/EPOXY/SECURITY FASTENERS, ETC.)

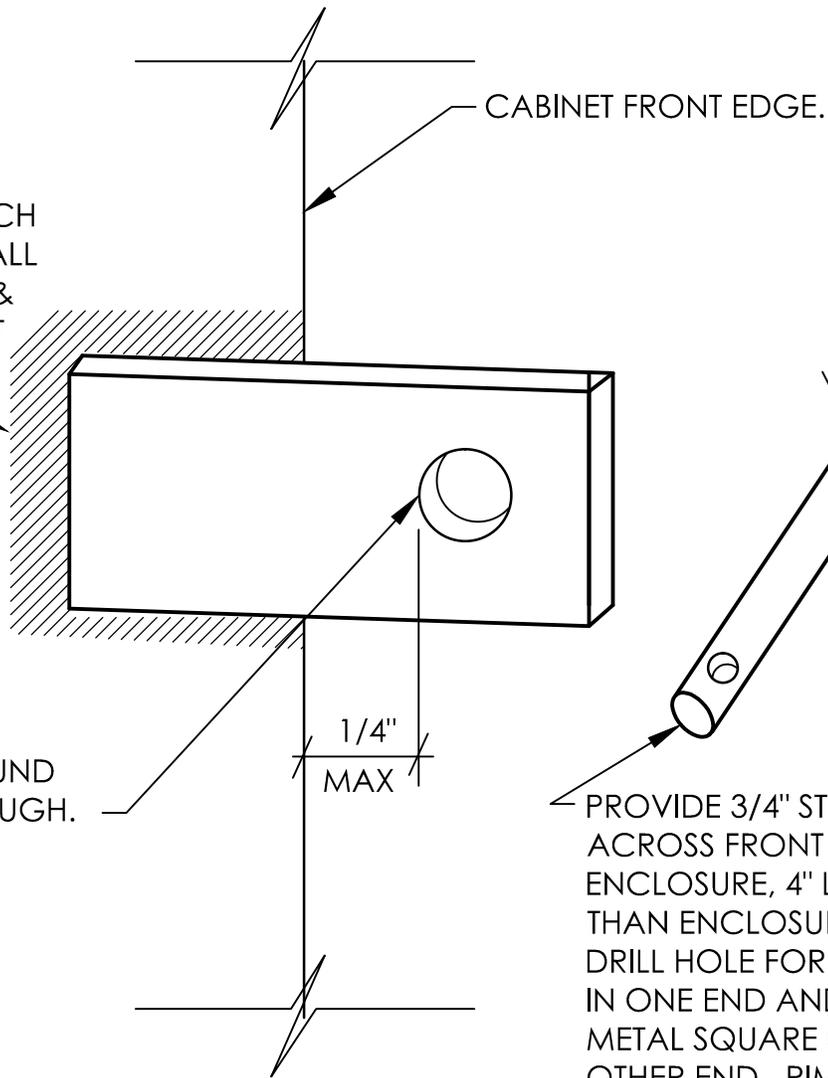
1/8" THICK COLD ROLLED STEEL PROTECTIVE SHIELD, SAME WIDTH AS STEEL TUBE WITH ROUNDED CORNERS. PAINT GRAY.

**A ENLARGED DETAIL**

SCALE: N.T.S.

ISSUED: 01/16	<p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
REVISED:		ELECTRICAL:	<b>P-3005</b>
		RECEPTACLE PEDESTAL	SHEET 1 OF 1

WELD PIECE OF 1/8" FLAT BAR TO EACH SIDE OF EACH CABINET. WELD ALONG ALL 3 SIDES OF PLATE. PRIME & PAINT TO MATCH CABINET (TYP BOTH SIDES).



DRILL HOLE FOR 3/4" ROUND STEEL BAR TO PASS THROUGH.

PROVIDE 3/4" STEEL BAR ACROSS FRONT OF ENCLOSURE, 4" LONGER THAN ENCLOSURE WIDTH. DRILL HOLE FOR PADLOCK IN ONE END AND WELD A METAL SQUARE CAP AT OTHER END. PIMA COUNTY TO PROVIDE LOCK.

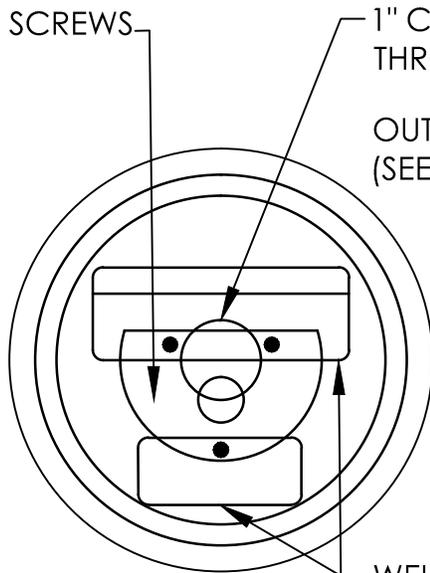
SCALE: N.T.S.

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	P-3006
REVISED:		CABINET LOCKING BAR	

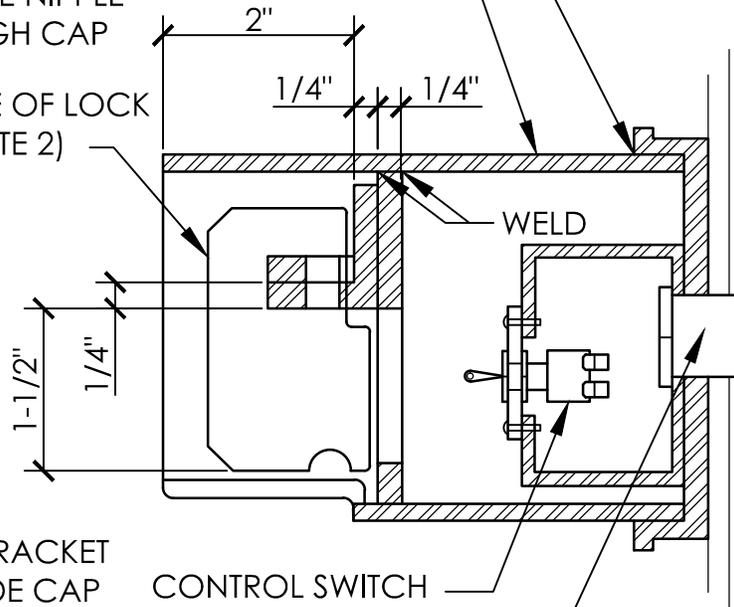
REMOVABLE SWITCH  
PLATE SECURED TO  
BRACKETS WITH (3)  
STAINLESS STEEL  
SCREWS

3-1/2" I.D. x 8" NIPPLE. TRIM OFF  
THREADS ON ONE END AND NOTCH AS  
REQUIRED TO CLEAR KEY FOR LOCK

TACK WELD TO  
CONTROL CABINET  
OR POLE.



1" CHASE NIPPLE  
THROUGH CAP  
OUTLINE OF LOCK  
(SEE NOTE 2)



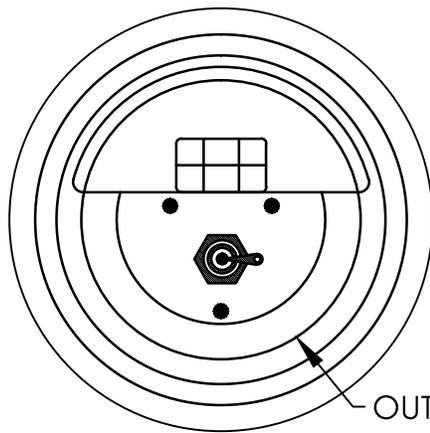
WELD BRACKET  
TO INSIDE CAP

CONTROL SWITCH

1" CHASE NIPPLE INTO  
CONTROL CABINET (OR POLE)

## BACK CAP ASSEMBLY

## SECTION



## FRONT VIEW

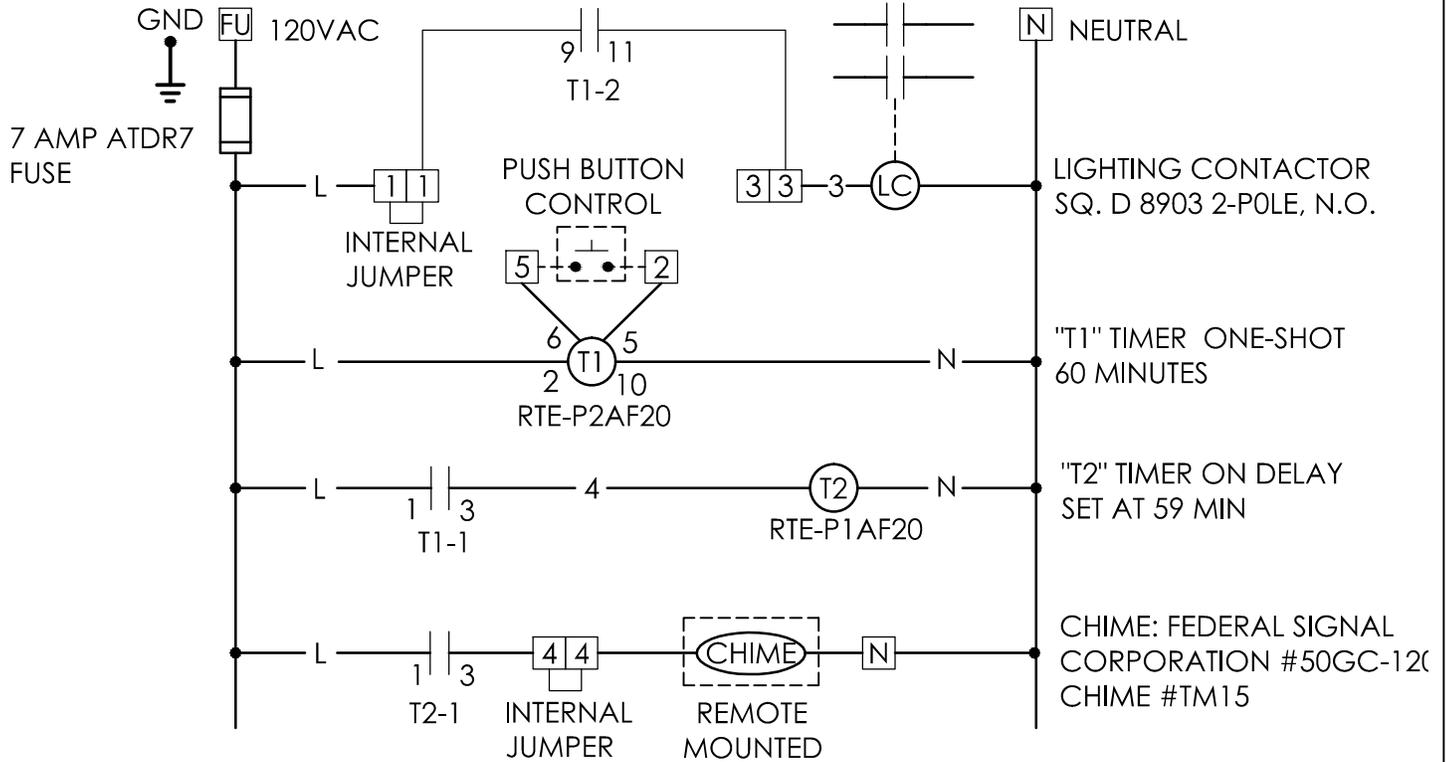
OUTLINE  
OF  
LOCK

### NOTES:

1. WHERE CONTROL SWITCH ASSEMBLY IS MOUNTED ON CONTROL CABINET, PROVIDE TABS ON REAR ASSEMBLY AND BOLT THE SWITCH ASSEMBLY TO THE CABINET AT (3) LOCATIONS USING STAINLESS STEEL HARDWARE.
2. PIMA COUNTY TO PROVIDE LOCK FOR SWITCH. CONTRACTOR TO SCHEDULE LOCK INSTALLATION.

SCALE: N.T.S.

ISSUED: 01/16	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
REVISED:		ELECTRICAL:	<b>P-3007</b>
		FIELD LIGHTING CONTROL SWITCH	SHEET 1 OF 1



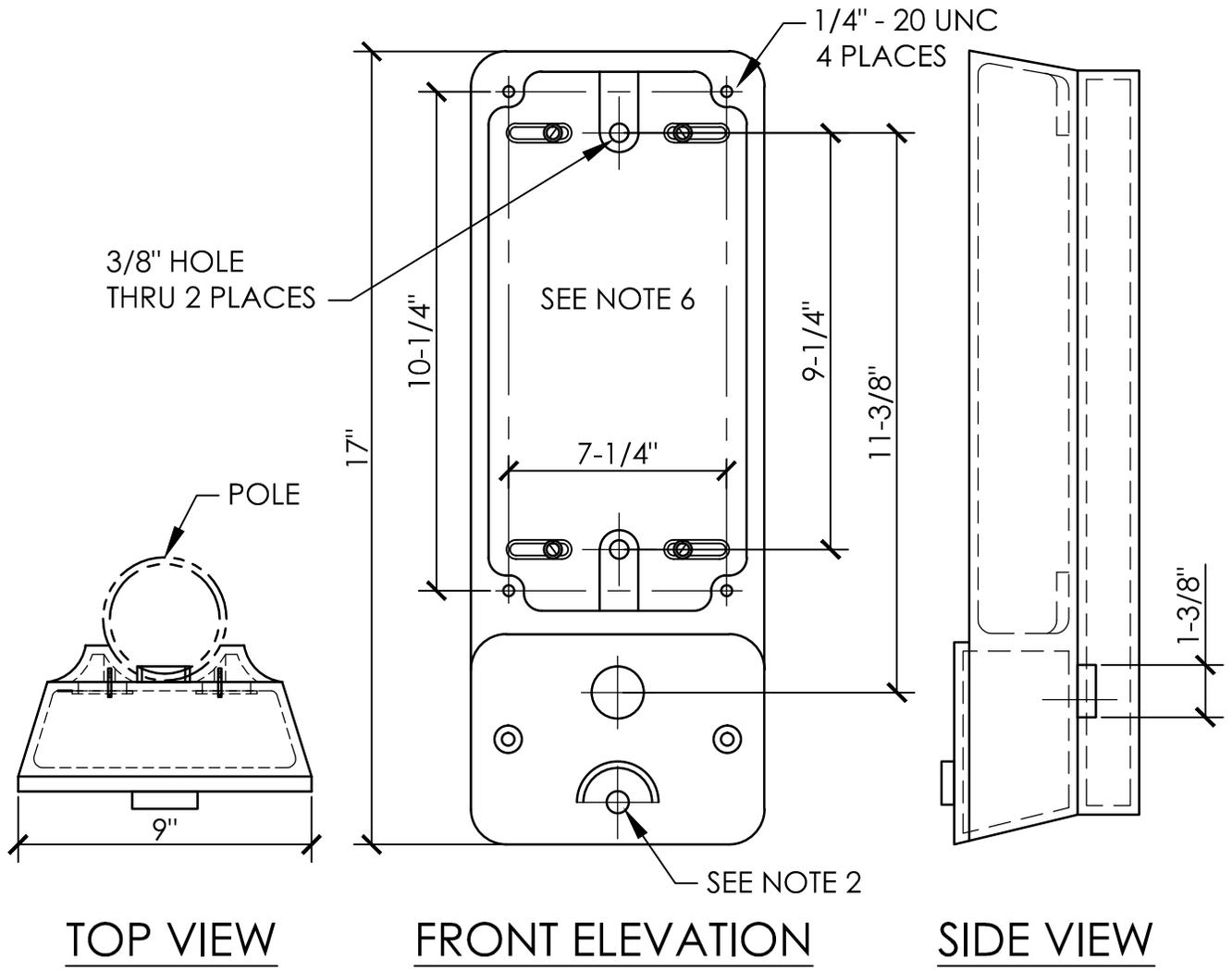
ENCLOSURE: NEMA TYPE 3R W/ HINGED COVER - 14"x14"x6"  
 FUSE HOLDER: 31295, WOHLER  
 30AMP 600 VOLT MAX, CLASS CC ONLY  
 \*\*DO NOT OPEN UNDER LOAD\*\*  
 WIRE RANGE 18-4AWG, 60/75' C CU WIRE ONLY  
 TORQUE 22LB IN FUSE INSTALLED, FERRAZ SHAWMUT, ATDR7 AMP, 600V  
 LIGHTING CONTACTOR, 8903L020V02, SQD, 2 POLE  
 30AMP FLOURESCENT, 30 TUNGSTEN, 120V COIL  
 WIRE RANGE 16-10 AWG, LARGER THAN 10 AWG, USE RING LUG.  
 TORQUE 20LBS IN, 60/75 C; CU WIRE ONLY  
 120VAC TIMER RELAYS, IDEC, RTE-P2AF20-120VAC, RTE-P1AF20-120V  
 TERMINAL BLOCKS, WIRE RANGE 22-8AWG, TORQUE 14LB IN  
 GROUND TERMINAL, WIRE RANGE 16-8AWG, TORQUE 14LBS IN  
 GROUND LUG, WIRE RANGE 2-3AWG, TORQUE 50LBS IN  
 WIRE RANGE 4-6AWG, TORQUE 45LB IN, WIRE RANGE 8AWG, TORQUE 40LB IN  
 WIRE RANGE 10-14AWG, TORQUE 35LB IN  
 PANEL RATING 5kAIC, 600V MAX

MOTION TECHNOLOGIES INC.  
 2125 S. PRIEST DR. #304  
 TEMPE, AZ 85282  
 480-303-9155  
 UL FILE #E254237

\*\*MEANS OF DISCONNECT PROVIDED BY OTHERS\*\*  
 \*\*MEANS OF SHORT CIRCUIT PROTECTION PROVIDED BY OTHERS\*\*  
 \*\*\* MEANS OF TIME CLOCK CONTROL FOR SYSTEM "ON" AND SYSTEM "OFF" BY OTHERS.

SCALE: N.T.S.

ISSUED:	 <b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	<b>P-3008</b> SHEET 1 OF 1
REVISED:		COURT LIGHTING CONTROL PANEL	



**NOTES:**

1. MATERIAL SHALL BE ALUMINUM ALLOY.
2. DIAMETER OF CASTING BACK TO ADJUST TO POLE DIAMETER.
3. PUSH BUTTON SHALL CONTAIN A MOMENTARY CONTACT SWITCH WITH NORMAL OPEN CONTACT.
4. POLE, BOLTS, SIGN SCREWS AND WASHERS, AND POLE BASE COVER SHALL BE FURNISHED WITH SWITCH CONTROL. REFER TO ARIZONA DEPARTMENT OF TRANSPORTATION (ADOT) DETAIL T.S. 4-22 FOR ADDITIONAL INFORMATION OF POE AND INSTALLATION.
5. PUSH BUTTON COVER SHALL BE RAIN AND DUST PROOF.
6. PROVIDE SIGN WITH 1/2 " WHITE LETTERING ON BLACK BAKELITE PLATE TO READ "PUSH BUTTON FOR 1 HOUR OF LIGHTING AFTER 5:00P.,. IF CHIMES SOUNDS PRESS FOR ADDITIONAL 60 MINUTES OF LIGHT. LIGHTS WILL AUTOMATICALLY TURN OFF AT 10:30PM.

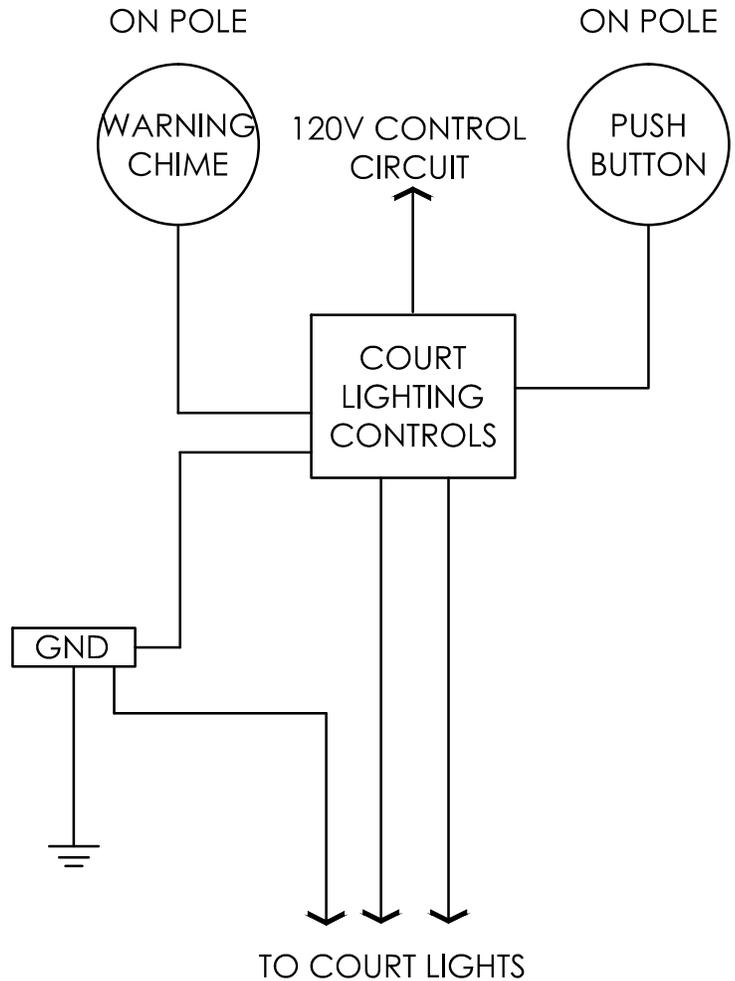
**SCALE: N.T.S.**

ISSUED:	 <p><b>PIMA COUNTY</b> NATURAL RESOURCES PARKS • RECREATION</p>	STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	<p><b>P-3009</b></p>
REVISED:		COURT LIGHTING CONTROL SWITCH	

# SEQUENCE OF COURT LIGHTING CONTROL

THE BASKETBALL COURT(S) SHALL BE CONTROLLED IN THE FOLLOWING MANNER.

1. COURT LIGHTING CONTROLLER SHALL SET THE HOURS OF OPERATION FOR THE LUMINAIRES.
2. THE PUBLIC SHALL MANUALLY ACTIVATE THE LIGHTING VIA A PUSH BUTTON TIME SWITCH MOUNTED TO ONE OF THE COURT POLES. AT THE 59TH MINUTE, A CHIME SHALL SOUND, WARNING THE PUBLIC THE LIGHTS ARE ABOUT TO TURN OFF. THE TIMER CAN BE RESET FOR ANOTHER 59 MINUTE CYCLE IF THE PUSH BUTTON SWITCH IS PUSHED.
3. WHILE THE CHIME SOUNDS AND THE TIMER IS NOT RESET BY THE PUBLIC, THE LIGHTS WILL TURN "OFF" AFTER ONE (1) MINUTE OF SOUND.
4. THE CHIME SHALL BE FIELD ADJUSTABLE FOR SOUND (db) LEVELS.
5. THE COURT LIGHTING CONTROLLER SHALL DE-ENERGIZE THE LUMINAIRES AT 10:30PM TO COMPLY WITH THE PIMA COUNTY OUTDOOR LIGHTING ORDINANCE.



**NOTE:**

- A. PROVIDE AND INSTALL NUMBER OF WIRES AS REQUIRED BY LIGHTING CONTROL SUPPLIER. REFER TO COURT LIGHTING CONTROL PANEL P-3008 FOR ADDITIONAL INFORMATION.
- B. REFER TO COURT LIGHTING CONTROL SWITCH P-3009 FOR ADDITIONAL INFORMATION.
- C. COORDINATE WITH ENGINEER OF RECORD FOR LOCATION AND ORIENTATION OF POLE MOUNTED CHIME.

SCALE: N.T.S.

ISSUED:		STANDARD DETAIL	DETAIL NO.
01/16		ELECTRICAL:	P-3010
REVISED:		COURT LIGHTING SEQUENCE OF CONTROL	



**Pima County Natural Resources, Parks and Recreation Department  
Pima County Project Management Office**

# **Electrical Design, Construction, and Maintenance Standards**

**Prepared by McGann & Associates Inc., Landscape Architects and Planners  
for Pima County Natural Resources, Parks and Recreation Department  
and Pima County Project Management Office**

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

Note: All NEC references are to the National Electrical Code, latest edition, as adopted and amended by Pima County.

### **Design:**

1. It is suggested that the engineer size underground conduit larger than required by the NEC to facilitate wire pulling and to lessen the possibility of wire damage during pulls. Minimum underground conduit size shall be 1”.
2. All underground wiring of all sizes shall be copper conductor with XHHW-2 insulation.
3. All underground splices for all conductors (phase, grounded [neutral], equipment grounding conductors, and control wiring) shall be UL-listed for direct burial or submersible applications. Suggested materials are “DryConn King 9 Blue” by King Industries and “Polaris Blue” by NSI Industries. It is understood that XHHW-2 insulation is not listed for direct burial or submersible installations.
4. Underground electrical conduits and pullboxes shall be installed per the Standard Details.
5. Underground pullboxes shall be polymer concrete. Pullboxes shall not be located in parking areas or in concrete slabs and should be located such that they are not situated in areas of prominent public foot travel and such that the potential for irrigation water intrusion is minimal.
6. Electrical equipment, light poles, and underground pullboxes shall be uniquely named or numbered on the construction documents. Photographs of the as-built conditions will form part of the Record Documents at construction close-out. Photographs shall be keyed to the equipment designations.
7. All conduits inside underground pull boxes shall terminate a minimum of eight inches below the pullbox cover. All wiring and splices in the underground pullboxes shall be installed a minimum of four inches below the pullbox cover.
8. All electrical equipment (i.e. switchboards, panelboards, sports lighting controllers, area lighting controllers, dry transformers, etc.) in one location shall be installed inside a common lockable electrical enclosure with front access doors. The electrical enclosure shall not be installed in high traffic public areas or where it will be sprayed with irrigation water. The common enclosure shall be equipped with a locking bar per the Standard Details. Where utility metering is installed, coordinate the location of the meter and the access to the meter with the serving utility. Each section of the enclosure shall be vented. Vents shall be equipped with bee-proof screens installed per the Standard Details.
9. Where dry-type transformers are not installed within a common lockable enclosure with other electrical equipment, or where existing dry-type transformers are affected by a project, they shall be enclosed per the Standard Details.
10. Concrete pads for electrical equipment enclosures shall have a conduit window located below each enclosure section. The window shall be sized for present and future conduit entries. After conduits are installed, a 2” deep concrete slurry seal shall be poured in the conduit window to prevent rodent intrusion.

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

11. All contactors shall be electronically held. Mechanical contactors are not allowed.
12. Electrical time-clocks shall be Intermatic or approved equal with manual on-off switch, rechargeable NiCad or Lithium backup battery, and digital readout of settings.
13. Provide ground fault protection on service entrance circuit breakers and distribution breakers feeding snack- bars or concessions buildings. Provide settings for ground fault function.
14. Fused switches are not acceptable as service entrance disconnects.
15. Pima County may require that certain public use receptacles be installed in lockable steel enclosures. These receptacles will be identified on a case-by-case basis by Pima County and incorporated into the engineered documents.
16. All wiring inside pre-manufactured sports lighting pole bases shall be installed in field-installed PVC conduit.
17. Sports field lighting shall be automatically controlled. Where the controller is not a digital control system accessed by remote means, provide a control switch per the Standard Details.
18. Field and court lighting levels shall be per IESNA recommended practice RP-6-01(R2009or latest edition), Sports and Recreational Area Lighting.

### **SPORTS LIGHTING SYSTEMS – FIELD SPORTS:**

1. Musco Lighting is the preferred manufacturer of all sports field lighting and control systems. The preferred system is the “Light Structure Green.” Sports field “LED” technology in lieu of HID shall be discussed with Pima County prior to beginning of any engineering design for authorization to proceed. Alternate manufacturers are allowed provided they meet or exceed the life-cycle energy cost and the 25-year warranty the Musco Lighting system offers.
2. Each sports light pole shall be served by a dedicated branch circuit conduit with minimal pull-boxes. The Engineer shall show all required pullboxes to meet NEC requirements and project needs and shall note in the construction documents that the contractor shall not install pullboxes in addition to the boxes shown without the approval of Pima County.
3. Typical Sequence of Operation:
  - a. Control system energizes entire system.
  - b. Control system de-energizes entire system at 10:30 PM.
  - c. Remote operations allow total control of system at all times.
4. Control System:

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

- a. The control system shall notify the manufacturer if an individual luminaire outage is detected.
- b. The control system shall allow Pima County to remotely schedule system operation via TCP/IP communications link and by telephone. The system shall store 7-day schedules, be protected against memory loss during power outages, and shall execute any commands that would have occurred during the outage.
- c. The control system shall monitor lighting performance and notify the manufacturer if individual luminaire outage is detected so that maintenance can be scheduled.
- d. The manufacturer shall provide a web-based database of actual field usage and provide reports by facility and user group.

### **SPORTS LIGHTING SYSTEMS – COURT SPORTS:**

1. Basketball court lighting controller shall be per the Standard Detail.
2. Mount the instruction placard on the face of the pushbutton. The placard shall say: “PUSH BUTTON FOR 1 HOUR OF LIGHT AFTER 5:00 PM. IF CHIME SOUNDS, PRESS FOR AN ADDITIONAL 60 MINUTES OF LIGHT. LIGHTS WILL AUTOMATICALLY TURN OFF AT 10:30 PM.”
3. Typical Sequence of Operation:
  - a. Time clock energizes entire system.
  - b. Pushbutton switch on pole turns lights on for one hour.
  - c. Chime sounds after 59 minutes of operation, and will continue to chime for 59 seconds.
  - d. Lights turn off if not reset. Push button to re-set lights for an additional hour. Cycle repeats as needed.
  - e. Time clock de-energizes entire system at 10:30 PM regardless of the push button status.

### **CONSTRUCTION:**

1. Testing:
  - a. Insulation resistance testing (“megger”) for all above-ground and below-ground conductors, current leakage testing for all above-ground and below-ground conductors, and ground resistance testing for grounding electrode conductors, including pole base ufer or ground rods, are required. The submittal of test results is required for all conductors of all sizes other than control wiring (50V to ground or less). Testing shall be performed by qualified persons, as defined by the NEC. The Contractor performing the testing shall submit documentation that demonstrates that the test equipment used is currently certified for accuracy by the

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

manufacturer. Pima County and/or the Engineer of Record shall review and approve the below-limits test results.

- b. Test reports shall include the name of the person(s) performing the test, a description of the equipment testing, test equipment used, date and time of test, test values, subsequent corrective actions or repairs, re-test values demonstrating below-limits results, and other appropriate comments. Test results shall be typed on testing agency stationery.
  - c. Insulation Resistance Testing for 600V Cable: Disconnect loads before testing. Apply 1000VDC for 1 minute, in relation to the equipment ground conductors and each adjacent conductor of the same circuit. Readings of less than 100 megohms shall result in replacement of the failed wiring, including splices. No circuits of feeders will be energized or accepted until this test is successfully completed.
  - d. Current Leakage Testing: Energize circuit. Current leakage testing may be performed with a clamp-on leakage tester. Reading of 6mA or more shall result in visual inspection of splices and exposed sections of cables, and investigative insulation resistance testing subsequent repair or replacement of conductors and splices, followed by retesting for current leakage. It is noted that sets of larger cables will not fit within the jaws of the clamp-on leakage tester and that this test may not be able to be performed on such cables.
  - e. Ground Resistance Testing: Ground resistance testing shall be performed with a clamp-on tester or by a three-point fall of potential test set.
2. The Pima County electrician, the installing contractor, the Development Services inspector, and the Engineer of Record shall verify installation and connection of all grounding components. Records, including photographs, where warranted, shall be kept of as-installed conditions.
  3. Underground pull boxes shall be provided with McCain metal inserts per the Standard Details and shall be engraved or indelibly marked on the interior wall (not the lid) with the pullbox designation on the permitted plans. Marking shall be minimum 2" high, and on two pullbox walls. Photographs of the as-built conditions in underground pullboxes will form part of the Record Documents at construction closeout. Photographs shall be keyed to the pullbox designation shown on the permitted plans.
  4. Contractor shall submit record documents documenting all field changes from the permitted construction documents. Record documents shall include all information necessary to perform future maintenance testing, such as manufacturer's torque values for bolted electrical connections. The Engineer of Record shall provide copies of the Contractor's record documents, and resulting Engineer's record documents, to Pima County in electronic form (Autocad .dwg and Adobe .pdf), and hardcopy formats.
  4. Contractor shall submit GIS-based record data for the electrical system, indicating the location of all grade-mounted electrical distribution and control equipment, light poles, underground pullboxes, etc. Acceptable digital file formats include ESRI Shapefiles or Geodatabase feature classes. The coordinate system shall be NAD83 HPGN/HARN, state plane projection FIPS Zone 0202 (AZ central), international feet. The equipment locations shall be collected with a commercial grade Global

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

Positioning System (GPS) receiver, which is accurate to commercial grade sub-meter standards. The GPS receiver shall be approved by Pima County.

- a) The database for each equipment item must include the following minimum standard attributes:
- b) Light poles shall include X coordinates, Y coordinates, pole and luminaire manufacturer, product material and construction type, product model number (including serial if applicable), field or court identification number (if applicable; matching the pole numbering on the construction drawings), the type of luminaire, the quantity of luminaires, and a unique digital image filename.
- c) Pullboxes shall include X coordinates, Y coordinates, product construction type, and a unique digital image filename with extension. Image shall be taken with the lid off, and after the wiring has been installed and pullbox labeled.
- d) Electrical distribution and control equipment shall include X coordinates, Y coordinates, equipment designation matching that on the construction drawings, and a unique digital image filename.
- e) Digital Photography Standards: Digital photographs of all light poles, pullboxes and electrical distribution and control equipment shall be provided in JPEG image format. Images shall be a minimum of 2592 x 1944 pixels (this requires a 5.0 megapixel or greater camera). All image files must be uniquely named to support an accurate hyperlink from the associated GIS attribute database as detailed in 2a through 2c.

## **MAINTENANCE**

1. Testing shall be performed by a qualified person, trained and experienced in the use of the testing equipment and procedures used.
2. Testing reports shall include name of person(s) performing tests, a description of equipment testing, test equipment used, date and time of test, test values, subsequent corrective actions or repairs, re-test values demonstrating below-limit results, and any appropriate comments.
3. All circuits shall be tested every 3 years with a current leakage tester. Any circuits with readings equal to or greater than the currently specified Pima County current leakage limit shall be de-energized and splices and visible sections of cabling visually inspected for damage, followed by insulation resistance testing. Any circuits that fail the insulation resistance test shall be replaced. Circuits shall not be re-energized (other than for testing) until repairs are complete and after-repair testing has been completed.
4. All circuits affected by renovation or maintenance, which do not contain an equipment grounding conductor, shall be replaced to include an equipment grounding conductor. The equipment grounding conductor shall be an insulated copper cable sized per NEC. Verify conduit fill to meet NEC and replace conduit with larger as necessary.

## **ELECTRICAL DESIGN, CONSTRUCTION, AND MAINTENANCE STANDARDS**

5. The tightness of electrical bolted connections shall be verified ever 3 years, using a calibrated torque wrench. Connections shall meet the requirements of the original equipment manufacturer.
6. [OPTIONAL] Under-energized conditions, perform a thermographic (infrared) survey of all cable and wire terminations and splices.

### **EXISTING PARKS**

1. Install expanded-metal cages around all ground-mounted dry-type transformers that are accessible to the public. Refer to the Standard Details.
2. Modify irrigation sprinkler patterns such that electrical equipment is not sprayed, or relocate the electrical equipment.
3. When an underground pullbox is affected by maintenance work, calculate the minimum size required by NEC for the conduits and wires entering and leaving the pullbox. Replace any pullboxes that are undersized with new pullbox as specified herein.
4. All abandoned wiring is to be removed. Conduit may be abandoned in place, with indelible labels at each end indication the location of the other end.