Development and Design Standards 2020
This Bend Park and Recreation District’s Development and Design Standards document is available as a PDF on the district’s webpage at bendparksandrec.org. Hard copies will not be available.

Questions regarding these standards should be directed to the Development Manager at 541-389-7275.
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Introduction

The development and design standards contained within this document serve to guide the district, developers and contractors on the means, methods and materials Bend Park and Recreation District (BPRD) uses most commonly for the development of parks, trails and facilities. This document is not meant to replace construction documentation for individual projects, but rather to supplement and inform individual projects. Projects listed in the district’s five-year Capital Improvement Plan (CIP) should have individual construction documentation specific to each project. For other projects, usually small in nature, such as replacements, additions within existing facilities and upgrades, these standards may be used for construction.

The district’s Comprehensive Plan is the over-arching document that leads to park and trail projects, whether new development or renovation of existing assets. Within the plan, parameters are set for levels of service (LOS) for multiple types of parks, trails and facilities. The LOS comes from sound planning practices, community input and board direction to staff. The district’s comprehensive plan is rewritten approximately every ten years, and updated once during the ten year span. The comprehensive plan drives the CIP that leads to funding for the projects identified within the plan.

These standards are updated periodically with new products, means or methods of construction and other updates the district feels best align with community needs. As new technology and products become available they may be incorporated into this document.

The planning and development (P&D) department is the lead department for the development and design standards, including standard drawings, specifications, and construction implementation. P&D involves other district departments, such as recreation and facilities, as resources for these documents.
Chapter 1

Procedure and Guidelines
Procedure

BPRD projects are determined though the 10-year comprehensive plan. From here, projects are added to the district’s five-year CIP and approved yearly by the district’s budget committee and board of directors. The district’s fiscal year is July 1 to June 30. New projects for the current fiscal year are added to the district’s CIP where staff resources are committed and moved forward for implementation.

With funding available and staff resources in place, the projects can start. They follow a basic outline for development depending on the size, scale and type of project:

- Planning and Research
- Outreach
- Master Planning
- Schematic Design Development (SD design)
- Design Development (DD Design)
- Construction Documentation (CD design)
- Permits
- Bidding/Procurement
- Construction

Within each basic phase, information is gathered to further the project. Cost estimating is completed prior to the project’s start and at the end of master plan, SD, DD and CD phases. This keeps the project’s budget on track, as well as keeping the executive staff and board of directors aware of cost issues prior to the execution of a construction contract.

Procurement for design services follows Oregon’s Administrative Rule, OAR 137-048. Procurement is normally achieved through an advertised Request for Proposal (RFP) process, and consultants are awarded contracts based on qualifications outlined in the RFP. The district prefers to group as many of the professional services contracts together as possible under the umbrella of a single prime consultant, such as a landscape architecture, and architecture or an engineering firm, depending on the project’s requirement. Small contracts such as survey, geotechnical and environmental should be contracted under the prime proposer.

Procurement for construction is obtained via public bidding per Oregon’s Administrative Rule, OAR 137-049. Most projects bid as an invitation to bid, with a single prime bidder where cost is the primary consideration for award. In rare circumstances, the district may utilize an alternate bidding method such as construction manager/general contractor (CMGC) or design build procurements. These types of procurement use qualifications as the primary consideration for award because they involve construction of an extremely complex nature not normally performed by the district.

District P&D staff oversee the procurement of both professional services as well as construction. Design contracts are overseen by district project managers with backgrounds in park and recreation design. Construction contracts are overseen by district construction managers with experience in construction. P&D staff will utilize other district staff, such as those in the recreation or facilities departments, as required throughout the project’s development.

At the start of a project, staff develops a Public Involvement Plan (PIP) to guide the project through community input and outreach. The extent of public involvement is dependent on the type and scale of the project and by creating the PIP upfront, this level of involvement is determined. Public meetings, a project webpage, and advisory committees are formed, thus shaping the overall external input for a given project. Smaller neighborhood park projects may utilize a series of one to three open house style public meetings, where input is received from the local neighborhood in which the park is intended to serve. Larger, more complex projects may involve several public meetings, as well as the formation of Technical Advisory Committees (TACs) or Public Advisory Committees (PACs) to help shape and guide the overall design and outcome of a given project. The timing and duration of public input is determined through the PIP process. During this process the PIP may be altered to reflect information gathered during initial meetings with the public. For instance, the creation of a TAC or PAC may be warranted depending on input during initial public outreach.
Public meetings may be either open house style where the public is invited to come and look at proposed designs, ask staff questions, and mingle about, or more formal meetings where presentations are given, and the public encouraged to ask questions afterwards. Typically, the more formal meetings would be held indoors, with a seating arrangement set up with the presenters forward in the room. The less formal open house style meetings may be held at the project site, or in a public event space with open area for the public to view documents and ask staff questions. Normally, members of the consultant team are available during these meetings to assist staff with questions.

From this initial outreach, designs are created leading up to a final recommended Master Plan. Once the final master plan is created, staff will take the plan to the district’s board of directors for approval. Following the master plan approval, the project will move into schematic drawings (SD), design drawings (DD), and then construction documentation (CD) design phases. Public outreach is limited during these phases, unless major changes from the approved master plan occur. Such changes may entail the relocation, removal, or introduction of completely new programs, and cost issues.

Cost estimating is completed at the end of every stage. If cost estimates exceed the approved budgets, district staff will engage the consultant team in a value engineering (VE) exercise to move the project back within budget. The project should not move forward into the next phase until the estimated cost is in alignment with the budget. Budgets may be increased with approval of the board of directors. Minor discrepancies in budget may be allowed up to 10 percent if staff feels moving the project forward will help with estimating. An example may be moving from SD phase to DD phase. By doing so, more details about the project will be known, allowing for a more comprehensive evaluation of costs at the end of DDs.

Once a project enters construction, all efforts are made to reduce cost overruns. Contractors are expected, and shall be held responsible, to construct the project per the plans and specifications presented at the time of bid. The district applies a 10 percent contingency on all construction contracts that is available to staff for use during construction. This contingency will still fall within the overall project budget. Construction change orders are given only for issues where the bidding documents did not describe the work required, unforeseen issues, force majeure, or for work added by the district.
District Development and Design Guidelines

Development standards are applied to each facility type and include information such as:

- Purpose or intent of the land or type of facility; considerations by specific area.
- Size guidelines generally including a range of number of acres, size of overall site, or square footage.
- Location criteria addressing things such as visibility, access, central or satellite function.
- Particular features or components that would be common, and any development considerations that need to be taken into consideration such as parking, options for expansion, and ongoing maintenance cost considerations.

There are seven primary facility types identified in the district’s comprehensive plan. They are neighborhood parks, community parks, regional parks, trails, natural areas, community and recreational centers, and urban plazas. Each type has its own standards such as purpose, location and size, service population, and amenities.

During the design process, emphasis should be given to the sustainability of the design. Each project will have unique characteristics than present opportunities for sustainability and the design should consider these possibilities and weigh them against the costs of implementation. While the district desires to be a leader in the community for sustainable design, all costs should be evaluated against longevity of the product or design. When possible, grants or other funding should be sought to help offset costs versus payback, such as state and federal grants for solar use.

Concepts such as water usage, utility consumption, travel, safety, natural features, product selection and procurement, are all examples of items that should be considered throughout the process. Plant selections should consider water usage, and when the design requires areas of high-water use, such as using turf grass, the size of these areas should be evaluated for maximum efficiencies. At a minimum, the items listed above should be considered and implemented where possible. The process for documenting the overall sustainability of a project will be recorded within the feasibility studies.

Every major capital project the district constructs should include a feasibility study to confirm the decisions of the design. This process can be as simple as a matrix for small neighborhood parks, or as complex as a full documented study for a large facility or park complex. The study should answer questions such as: goals, standards, scope, levels of services needs, site analysis, environmental analysis, accessibility, transportation, land ownership, construction impacts, alternatives, regulatory compliance, operations, maintenance, and community outreach. Larger studies may include economics, market studies, costs analysis, responsibilities and limitations. The report should include a conclusion that supports the design based on the feasibilities within the study.
Neighborhood Park Standards

Purpose
- Provides a location for the recreation needs of a surrounding residential neighborhood.
- Provides informal play for neighborhood children and adults.
- Provides opportunities for social gatherings, both formal and informal, that will promote a sense of neighborhood and community cohesion.
- Provides open space for a surrounding neighborhood.

Service Area
The district aims to provide a neighborhood or community park within a ½ mile walking distance (10 minute walk) of most homes within the district.

Service Population
7.85 acres of combined neighborhood and community parks per 1,000 residents.

Specific Area
As delineated by pedestrian access barriers such as unimproved at-grade crossings of arterial streets or railroad tracks, un-bridged irrigation canals, reaches of the Deschutes River, and other physical barriers. Barriers posed by at-grade crossings of arterial streets may be mitigated with pedestrian-friendly crossings.

Size Guidelines
1.5 to 6 acres per site.

Location Criteria
- Located as centrally as possible to the neighborhood which it serves.
- Conveniently accessible within 10 minutes walk.
- Located along bikeway and trail connections.
- Located on at least two public roadways.
- Locating adjacent to an elementary school may provide for a greater array of services and may reduce space requirements.

Features/Components

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td>Drinking fountains</td>
</tr>
<tr>
<td>Benches</td>
<td>Half-court basketball courts</td>
</tr>
<tr>
<td>Litter receptacles</td>
<td>Multi-purpose courts</td>
</tr>
<tr>
<td>Picnic areas with tables</td>
<td>Bikeway and trail connections</td>
</tr>
<tr>
<td>Open lawn/play areas</td>
<td>Small picnic shelters (less than 500 sf)</td>
</tr>
<tr>
<td>Children's play area</td>
<td>Off-street parking, (when on-street is not available)</td>
</tr>
<tr>
<td>Seasonal stoilet</td>
<td>Dog off-leash area</td>
</tr>
<tr>
<td>Walkways and paths</td>
<td>Skate feature</td>
</tr>
<tr>
<td>Dog stations</td>
<td>Bike feature</td>
</tr>
<tr>
<td>Utilities (water)</td>
<td>Alternative sports feature</td>
</tr>
<tr>
<td>Irrigation (Solar controller)</td>
<td>Natural areas</td>
</tr>
<tr>
<td>Steel monument sign</td>
<td></td>
</tr>
<tr>
<td>Bicycle racks</td>
<td></td>
</tr>
<tr>
<td>Small plaza area</td>
<td></td>
</tr>
</tbody>
</table>
Development Considerations

- Neighborhood parks shall be developed primarily for informal recreation activities; a place to meet with friends, to play or relax.
- May include facilities and open lawn area for organized play when space allows.
- Developed primarily to serve pedestrians and bicyclists.
- On-street parking will be the norm. Limited off-street parking, particularly accessible parking, may be provided when space allows, or when on-street parking is not available.
- Site size and shape are important to accommodate park features and components.
- Landscaping should utilize native materials and/or preserve natural areas when possible. Landscape areas should be provided to buffer adjacent residential uses.
Community Park Standards

Purpose
- To serve as a focus for a community's recreation, social, and cultural needs and activities.
- To provide opportunities for a wide array of recreation activities ranging from active to passive recreation needs.
- To provide facilities for organized recreation activities and programs, such as group picnics, youth or adult sports league play, special events, alternative sports features, etc.
- To accommodate facilities and activities that require greater amounts of land, attract a high number of people, require off-street parking, and may need extensive buffering than what could be accommodated in neighborhood parks.
- To provide appropriate locations for regulation sports fields and complexes.
- To preserve and protect historic, cultural, or natural features with emphasis on interpretation and education.

Service Area
The district aims to provide a community or neighborhood park within a ½ mile walking distance (10 minute walk) of most homes within the district.

Service Population
7.85 acres of combined community and neighborhood parks per 1,000 residents.

Specific Area
Equally dispersed across the community, as feasible, but may also be located to take advantage of significant historical, cultural, or natural features. If the community park has an unique feature, that feature may serve the entire community.

Size Guidelines
20 to 100 acres per site.

Location Criteria
- Individual community parks should be centrally located in the portion of the community being served.
- Some community parks may be designed and located so as to serve the entire community.
- Collectively, community parks should be strategically located and uniformly dispersed throughout the community.
- Safe pedestrian and bicycle access is an important consideration. However, automobile and public transit access is also important for the activities and uses of a community park.
- Proximity to middle or senior high schools will allow for shared athletic facilities.
- Community centers, indoor recreation and aquatic facilities can be components of community parks. Locating these amenities in community parks could result in savings in land and development costs.
- Community parks should have visibility and access from arterial streets.
- Inclusion of and adjacency to natural features (woodlands, rivers, etc.) can contribute to the identity, popularity, and success of a community park.
- Sufficient size, shape, and configuration to allow for development of regulation facilities and all support components, as applicable on a per site basis.
- Separated and/or buffered from residential uses.
- Subject to the existence and availability of historic or cultural resources.

Features/Components
The following components may be included in a community park, dependent on park size, location, configuration and specific targeted use (i.e. sports, nature, etc.). A community park may also serve as a neighborhood park and include all of the components typical therein.
### Development Considerations

- Community parks provide for the broadest range of recreation activity and facilities. They may take different forms and serve different functions. The level and type of development in community parks will be influenced by the particular location and need.
- May include areas of intense recreation activity such as athletic complexes and aquatic centers. May also include natural areas supporting passive outdoor recreation such as walking, hiking, viewing, and picnicking. Or community parks may be a combination of active and passive facilities.
- Depending on specific recreation components or natural features, these parks may draw visitors from throughout the community. Visibility and access are major considerations. Off-street parking is generally required.
- Active and passive areas should be adequately separated.
- Undeveloped areas can be used for trails, nature study, or reserved for future development.
- Regulation sports facilities require intense development to exacting standards. A minimum of four fields is recommended for tournament use.
- Individual facilities for both youth and adult, at either separate sites or separated areas within a site.
- Buffering between sports fields and adjacent land uses is recommended.
- Long-range management plans should be generated prior to development, including historic and cultural resource research and documentation, educational and interpretive objectives and services, revenue and operational costs.

### Basic Components

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
<th>Ancillary Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking fountains</td>
<td>Regulation sports fields (baseball, softball, soccer, football, lacrosse, rugby, etc.)</td>
<td>Support facilities for activities programmed within the park</td>
</tr>
<tr>
<td>Benches</td>
<td>Multi-purpose lawn/playfields</td>
<td>Community/recreation centers</td>
</tr>
<tr>
<td>Permanent restrooms</td>
<td>Tennis/pickleball courts</td>
<td>Indoor aquatic centers</td>
</tr>
<tr>
<td>Picnic tables</td>
<td>Basketball courts</td>
<td>Health/fitness centers</td>
</tr>
<tr>
<td>Open lawn/play areas</td>
<td>Jogging paths and fitness circuits</td>
<td>Historic, cultural, or natural features</td>
</tr>
<tr>
<td>Children's play areas</td>
<td>Sports field lighting</td>
<td>Public golf courses</td>
</tr>
<tr>
<td>Natural areas</td>
<td>Concessions facility</td>
<td>Senior centers</td>
</tr>
<tr>
<td>Walkways, paths, trail and bike connections</td>
<td>Passive sports features (horseshoes, bocce, etc.)</td>
<td>Visitor and or interpretive center and facilities</td>
</tr>
<tr>
<td>Bicycle racks</td>
<td>Alternative sports features</td>
<td>Community meeting facilities</td>
</tr>
<tr>
<td>Litter receptacles</td>
<td>Disk golf course</td>
<td>Administrative offices</td>
</tr>
<tr>
<td>Signs</td>
<td>Bike trails</td>
<td></td>
</tr>
<tr>
<td>Off-street parking</td>
<td>Active river recreation</td>
<td></td>
</tr>
<tr>
<td>Dog stations</td>
<td>River access</td>
<td></td>
</tr>
<tr>
<td>Irrigation (powered controller)</td>
<td>Dog off-leash area</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td>Event space</td>
<td></td>
</tr>
<tr>
<td>Utilities (power, water, sewer)</td>
<td>Outdoor stages</td>
<td></td>
</tr>
<tr>
<td>Masonry monument sign</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large plaza/gathering area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large picnic shelter</td>
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<td></td>
</tr>
</tbody>
</table>

### Optional Components

- Drinking fountains
- Benches
- Permanent restrooms
- Picnic tables
- Open lawn/play areas
- Children's play areas
- Natural areas
- Walkways, paths, trail and bike connections
- Bicycle racks
- Litter receptacles
- Signs
- Off-street parking
- Dog stations
- Irrigation (powered controller)
- Lighting
- Utilities (power, water, sewer)
- Masonry monument sign
- Large plaza/gathering area
- Large picnic shelter
Regional Parks Standards

Purpose
- To provide park and recreation features and facilities that attract visitors and park users from the entire metropolitan area.
- To acquire and protect unique and/or significant natural areas and open space resources for the recreational enjoyment of the general public.
- To provide opportunities to escape the noise and congestion of the urban environment without traveling a great distance.
- To protect and preserve unique cultural, historical, or natural resources.
- To provide a wide range of activities, from active to passive, organized to impromptu, larger group to individual, and natural to developed.
- To provide enough physical space and separation between the diverse activities so as one activity does not infringe upon the other; that low-density passive natural area activities may co-exist alongside high density developed active activities.

Service Area
The service area should serve the entire community and areas beyond.

Service Population
10 acres of regional parks per 1,000 residents.

Size Guidelines
200 to 1,000 acres.

Location Criteria
- Proximity to unique cultural, historical, or natural areas or features.
- Availability of large expanse of land to provide for planned park development, including room for parking, support services and buffering.
- In an area not significantly infringed upon by development, industrial uses, highways or airports or areas of abandoned industrial uses, unless specific targeted activity and sufficient development resources exist to provide for appropriate levels of cleanup and mitigation.
- Safe and convenient access by vehicles and public transit, with entrances to the park fully visible.
- Access by bicyclists and pedestrians with the park linked to the community trail and bikeway network.

Features/Components
Regional parks generally include both developed facilities and undeveloped natural areas, with developed areas or portions of the park occurring around specific facilities or entrances.

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>All regional parks should provide some amount of the basic and optional components recommended for neighborhood and community parks as a basic regional park feature. Picnicking, play areas and open lawns can be located near entrances or in specific nodes within a larger regional park setting without infringing on natural areas.</td>
<td>Depending on the purpose of the specific regional park, if organized active recreation is to have some presence in the overall facility, some of the optional components recommended for community parks may be appropriate. Should natural areas be present, the active developed recreation components can be located near entrances, or in localized nodes. In addition to the optional components listed for community parks, some of the following elements may be appropriate for a specific regional park facility.</td>
</tr>
<tr>
<td>Drinking fountains</td>
<td>Large undefined open lawn play areas, play meadows</td>
</tr>
<tr>
<td>Benches</td>
<td>Large group picnic facilities for food preparation and barbecues</td>
</tr>
</tbody>
</table>
Restrooms (permanent or seasonal) | Extensive unpaved trail and hiking systems
---|---
Picnic areas with tables and shelters | Equestrian facilities and trails
Off-street parking | Fishing areas
Dog stations | Outdoor swimming in lakes, ponds, or rivers
Extensive natural areas/wildlife habitat | Boating facilities
Walkways, paths, trail, and bike connections | Day camps
Bicycle racks | Overnight camping or RV facilities
Litter receptacles | Amphitheaters, outdoor performing arts facilities
Signs | Botanical and display gardens, arboretums
Masonry monument sign | Wildlife and wild animal areas
Utilities (water, sewer, power) | Museums, educational facilities, outdoor exhibits, living history
| Holiday or cultural events
| Specialized recreation facilities
| Heritage or demonstration agriculture

Development Considerations

- Separate active areas from passive areas, developed areas from natural areas.
- Preserve significant proportion of the park in its natural state, generally developing no more than about 60 percent of the park.
- Develop and program facilities for seasonal variation - winter as well as summer use, and for long hours, well into the evening for some activities or events.
- Generate management plans with preservation and protection in mind when natural or historical/cultural features are present. Plan for moderate to larger crowds and in anticipation of future community growth.
- Management plans should be created and maintained for regional parks. Management plans should consider cultural, natural, and developed areas that provide for long term care and maintenance of the park.
Trail Standards

Purpose
- To provide public access linkages to outdoor recreation resources throughout the community, including parks, schools, natural areas and the Deschutes River corridor.
- To provide a safe and convenient alternative to automobiles by developing a community-wide network of bikeways, pedestrian pathways, and walking/hiking trails.
- To provide connections to the network of United States Forest Service trails, canal ditch rider roads and Bureau of Land Management trails outside of the district.

Service Area
The service area should serve the entire community and areas beyond.

Service Population
One mile of trail per 1,000 residents.

Size Guidelines
Trail widths are variable depending on the classification, intended use, and available rights of way. Primary trails should be a minimum of 10 feet wide to accommodate two-way bicycle and pedestrian traffic. Connector trails should be a minimum of six feet wide. Trails designed specifically for hiking, or mountain biking, known as “single track”, should be a minimum of two feet wide.

Location Criteria
- Trails may be provided within parks and open spaces, along roadways, within utility right-of-way, through private development, along greenways, irrigation canals, on other public properties, or easements assembled for trail purposes.
- The primary location criteria are the availability of sufficient rights-of-way and the opportunity to provide a network of accessible pathways.
- All BPRD trails must be open to the general public.

Features/Components
Trails should be designed to provide safe, convenient, and enjoyable experiences for all users.

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compacted Trail Surface Aggregate (TSA) surface</td>
<td>Hard surface such as asphalt pavement, concrete, or concrete pavers.</td>
</tr>
<tr>
<td>that meets Architectural Barriers Act standards for trail grade and</td>
<td></td>
</tr>
<tr>
<td>surface firmness.</td>
<td></td>
</tr>
<tr>
<td>Wayfinding signage</td>
<td>Single track trails specifically designed for hiking or mountain biking</td>
</tr>
<tr>
<td>Connections to other trails, sidewalks, and streets</td>
<td>2’ wide soft surface “running shoulders” adjacent to hard surface trails.</td>
</tr>
<tr>
<td>Trailhead parking</td>
<td></td>
</tr>
<tr>
<td>Trailhead kiosks</td>
<td></td>
</tr>
<tr>
<td>Interpretative signs</td>
<td></td>
</tr>
<tr>
<td>Benches</td>
<td></td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
</tr>
<tr>
<td>Pedestrian control at existing gates</td>
<td></td>
</tr>
</tbody>
</table>
Development Considerations

- Primary trails are an adopted element of the City of Bend Transportation System Plan (TSP). The plan, along with an intergovernmental agreement (IGA) between the city and the district, identifies community objectives for an extensive network of primary trail routes, connections to the network, and management responsibilities for the resource.

- Secondary trails including neighborhood connectors, pathways and fisherman’s access along the river are developed according to criteria in the City of Bend Development Code and in response to opportunities as they arise.

- Specifications in the BPRD’s development and design standards and in the City of Bend development code address surfacing materials, widths, grades, access, signage, security and safety.

- Adjacent private property owner needs and considerations should be incorporated into decisions regarding network routes and specific pathway locations. Adjacent property should be protected from intrusion and trespassing.
Natural Area Standards

Purpose
- To preserve and protect significant natural areas and open space resources within and nearby the community.
- To promote environmental awareness and education, including interrelated natural processes such as wetlands, riparian areas, woodlands, meadows, and wildlife.
- To preserve remnant representative landscape types in coordination with urban development.
- To enhance the environmental quality of the community.

Service Area
Natural areas typically serve a community-wide population and include greenways, natural areas, and preserves. The natural area classification includes district held properties for which there are no immediate development plans and that are situated in such a way as to primarily serve the surrounding neighborhood.

Service Population
Variable. Need to recognize the limited carrying capacity of the natural resource and number of visitors it can reasonably accommodate without sustaining damage or degradation.

Size Guidelines
Variable acres per population. Variable site size. Sites may vary in size from small riverfront parcels (less than 10 acres) to a large land-banked property of more than 200 acres. Size is a function of the natural resource to be protected, the long-term plan for the property and opportunity for acquisition. The acquisition of smaller, linear parcels may be a function of opportunity, especially for greenways. A number of small, interrelated parcels may aggregate to form a functioning natural area or preserve.

Location Criteria
- Locations are a function of available natural areas and resources. Can be along rivers, roadways, trail networks, irrigation canals or ridgelines. Can be of riparian, wetland, high desert, woodland, or meadow environments. Can include right-of-way corridors when significant natural resources are present.
- May be accessible by vehicle, though preserves are often best protected if direct vehicular access to the site is limited or difficult.
- Connected to bicycle, pedestrian, or trail networks when possible.

Features/Components
Natural areas differ from other park categories in that a park is primarily developed to provide active recreation while a natural area is normally managed primarily for the protection of a particular natural resource. What activity there is should be limited to low impact outdoor recreation, with little facility development intruding on the area. Activities such as hiking, mountain biking, nature study and viewing are generally allowed.

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>The basic level of facility for a natural area is the exclusion of any built components</td>
<td>Trails (see Trails Standards for typical amenities)</td>
</tr>
<tr>
<td>Extensive natural areas/wildlife habitat</td>
<td>Overlooks and viewing areas</td>
</tr>
<tr>
<td>Native trees, shrubs, grasses</td>
<td>Interpretative facilities</td>
</tr>
<tr>
<td>Meadows</td>
<td>Off-street parking areas</td>
</tr>
<tr>
<td>Riparian areas/wetlands</td>
<td>Seasonal or permanent restroom facilities</td>
</tr>
<tr>
<td>Woodlands</td>
<td>Signs</td>
</tr>
<tr>
<td>Areas of Special Interest (ASI) as defined in the Bend Comprehensive Plan</td>
<td>Fencing</td>
</tr>
</tbody>
</table>
Development Considerations

- Environmental protection and/or environmental education objectives should be clearly articulated.
- Long-range protection and natural resource management plans should be developed.
- Land use controls should be established which would protect the resource from physical encroachment or from nearby visual or noise intrusion.
- Access should be controlled so visitors first enter an entry node, which has only modest development (i.e., site entry, trailhead, interpretive facility, parking, and restrooms).
- Conflicting uses, such as visitor’s facilities, parking and the like should be physically separated and buffered (using native materials) from the natural areas.
Community and Recreation Center Standards

Purpose
- To provide year-around, community social, cultural, and recreation activities, including services and programs for preschool and school age children, adults, teens, seniors, and families.
- To serve as a headquarters for community recreation programs.
- May place an emphasis on serving a particular age group (e.g. youth, senior adults), but should also strive to include multi-generational programming in order that age groups are not isolated from one another.
- To provide an outreach location for private non-profit recreation organizations, clubs and community social services.
- To provide opportunities for the development of sense of place, community, and identity via a successful gathering, recreating and meeting place.

Service Area
Community and recreation centers will serve the entire community. However, depending on identified need, community/recreation center facilities may be strategically located to serve specific geographic or economic segments of the community.

Service Population
Entire community

Location Criteria
- Generally need three to 12 acres for a basic public indoor community/recreation facility; though a larger site is often more desirable as the trend is towards integrating community, recreation, aquatics, health and fitness centers into a single complex or campus to economize capital investment and maximize public convenience and access.
- Should have direct vehicular and public transit access from major arterial.
- Should also be connected to community bikeway, trail and pedestrian circulation networks.
- Should be centrally located to conveniently serve the entire community.
- Should be highly visible from off-site.

Features/Components
Indoor:
Lobby, reception, registration, classrooms, meeting rooms, shop, crafts rooms, gymnasium, swimming pools and other aquatics facilities, fitness facilities, spectator areas, commercial kitchen or food warming/serving area, childcare area, staff office, and sufficient mechanical, maintenance and operational support area.

Outdoor:
Arrival, drop-off and pick-up, parking, and delivery area. A modest outdoor terrace/courtyard and small lawn/landscape area is recommended. May include outdoor children’s play space and/or adjacent facilities for specific outdoor recreation activities, (e.g. splash pad, sand volleyball courts, picnic shelter, etc.)

If in a larger setting, with other outdoor recreation components might also include:

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>All community park basic components.</td>
<td>Community park optional and ancillary components as appropriate for particular community park development or service provision program.</td>
</tr>
</tbody>
</table>
Development Considerations

- Sites for a community/recreation center should have well-developed site criteria. Location, visibility, target market, access, size and shape, are all important considerations in selecting an appropriate site.
- Programs for a community/recreation center should also have well developed target markets. Whether the facility will stand alone or be a part of a more comprehensive indoor and/or outdoor complex should be determined in advance.
- Direct, visible vehicular and public transit access, arriving and loading zones, and parking are important design elements for the success of the facility. The provision of adequate parking space for the near term and for future expansion is an important consideration.
- Growth in the community and in visitors to the facility should be planned for with options for future expansion designed into the building(s).
- Maintenance operations and support, equipment and supply storage, personnel and team space is vital to the community's support of the facility.
- The intense development and massing of the buildings, support areas and parking lots dictate sizable setbacks and buffering from residential and other adjacent sensitive uses.
Urban Plaza Standards

Purpose
- To promote and support place making in urban spaces that will foster community interaction and civic pride.
- To enhance the pedestrian environment within highly developed urban spaces.
- To provide open space, visual relief, and high traffic pedestrian corridors, minimizing conflicts with vehicles, in otherwise densely developed urban landscapes.
- To take advantage of occasional small urban spaces not otherwise suitable for park development.
- To support the preservation, interpretation and appreciation of cultural and historic resources.

Service Area
Due to their unique character, urban plazas would generally be accessed by, and thus serve, only those pedestrians who are otherwise nearby.

Service Population
Variable. Generally serve those who live, visit or work within intensively developed urban areas.

Size Guidelines
Variable acres per population.
Variable site size. Generally 1/4 to one acres in size.

Location Criteria
- Function of specific urban development, facilities, and plans.
- Should be publicly visible and adjacent to or connected to public sidewalks, public parking, and streets.

Features/Components
Function of specific size, location, and configuration of downtown or other urban location. May be a plaza, town square or urban open space. Traditional recreation amenities are typically not relevant or included.

<table>
<thead>
<tr>
<th>Basic</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td>Tables</td>
</tr>
<tr>
<td>Drinking fountains</td>
<td>Landscaping and irrigation</td>
</tr>
<tr>
<td>Benches</td>
<td>Lighting</td>
</tr>
<tr>
<td>Litter receptacles</td>
<td>Off-street parking</td>
</tr>
<tr>
<td>Trees and shrubs</td>
<td>Outdoor stage or bandstand</td>
</tr>
<tr>
<td>Paved walkways and plazas</td>
<td>Sculpture, murals, or other public art</td>
</tr>
<tr>
<td></td>
<td>Fountains, reflecting pools, terraces, broad steps</td>
</tr>
<tr>
<td></td>
<td>Facilities for vendors, food carts, farmer’s market, etc.</td>
</tr>
</tbody>
</table>

Development Considerations
- Should promote and enhance place making and quality urban design, utilizing appropriate materials for durability as well as urban aesthetics.
- Should integrate with and complement the downtown and other highly developed urban environments, providing places for people to gather, visit, relax, meet friends, have lunch or enjoy the community.
Chapter 2

General Professional Services Standards and General Construction Standards
General Professional Services Standards

GENERAL REQUIREMENTS FOR PROFESSIONAL SERVICES - The requirements contained in this development and design standard are for basic informational use only. Each individual project will be more fully described in an RFP. Additional requirements and terms of the contract will be outlined in an agreement for professional services contract administered by the district.

Basic Requirements
1. For every project over an estimated $25,000, BPRD shall issue an RFP for professional services. The RFP will describe the type of services requested and any required licensure. Typically, the district seeks either licensed landscape architecture or civil engineering firms for leads. As a lead firm, the district asks that the firm hire sub-consultants needed for design such as geotechnical, traffic, etc.
2. The district issues RFPs for design services in compliance with OAR 137-048. RFPs may be formal, over $100,000, or informal between $25,000 and $99,999, as expected fees for consultant services. For minor projects under $25,000, the district may directly appoint a consultant.
3. Insurance requirements are listed on the copy of contract included with a published RFP.
   A. The insurance company will be a first-class insurer and the underwriter will have an A.M. Best’s financial strength rating of A- or better, and financial size category of X or better.
   B. Workers’ compensation insurance shall be statutory limits.
   C. Employer’s liability insurance shall be subject to a waiver of subrogation in favor of the district, with limits of liability not less than $1,000,000 per accident, $1,000,000 disease per employee, and $1,000,000 disease policy limit.
   D. Commercial general liability insurance shall be applicable to all premises and operations, including bodily injury, property damage, personal injury, and blanket contractual liability, with limits of liability not less than $2,000,000 per occurrence, and $4,000,000 aggregate. The general liability coverage will name the district as additional insureds and will contain a severability of interest clause.
   E. Business automobile liability insurance shall be applicable to any automobile assigned to, or used, in the performance of the services, whether owned, hired or non-owned, with a limit of liability not less than $1,000,000 combined, single limit per accident.
   F. Professional liability insurance shall be per-claim and aggregate limits of at least $2,000,000 and a retroactive date no later than the effective date of a signed contract. The consultant will maintain such insurance for a period of three years after completion of the project construction. The consultant will require each sub-consultant engaged or employed by the consultant to be similarly insured with reasonably prudent limits and coverages in light of the services to be rendered.
4. Licensed professionals shall have the appropriate Oregon stamp.

RFP Publishing
1. Formal RFPs – RFPs for work over $100,000 will be posted on Premier Builders Exchange, as well as in an Oregon statewide publication, customarily the Daily Journal of Commerce. Formal RFPs will not consider fees in the scoring process.
2. Informal RFPs – RFPs for work between $25,000 and $99,999 may be published on Premier Builders Exchange, or may be solicited from a minimum of three firms. Informal RFPs will take proposed fee into account in the scoring process.
3. For work under $25,000 the district will usually, but not necessarily, attempt to obtain quotes for the work. The district may direct appoint a consultant at its discretion.

Key Personnel
1. RPFs are awarded on the basis of the unique background and abilities of the key personnel of the consultant and sub-consultants. The consultant will provide a list of the proposed key personnel to be assigned to the project. The list will include information on the professional background of each key person. Specific terms of the key personnel are provided in the professional services contract.
Contract
1. The contract will be provided by the district. The district will not sign or authorize any other form of contract.
2. It is the preference of the district to execute contracts for the total project. However, depending on the complexity of the project and desire of the district, project scopes may be limited to a given phase of the project such as DD development, or master plan only, with a understanding that if the project moves forward, the district may ask for, and execute, additional work with an amendment to the professional services agreement.
3. The district may ask for “allowances” in the contract, and if executed, must be done so in writing on the district’s form and executed by both parties.
4. It is the intent of the district that the consultant’s design be a fully functional/buildable project, and that the full design is considered in the base cost of the project, unless the project has been broken into phases as mentioned in preceding item 2 above. It is also the intent of the district that the consultants have a responsibility to provide a design that fits within the overall budget given in the RFP. The district relies on the expertise of consultants to lead the design towards a fundable project. Additional services will not be granted for the consultant’s inability to design within the project’s given budget.

Project Phases
1. Master Plan (MP) – the master plan for a project will describe the overall concept of the project. It should show the relationship of components and their interconnection to trails, parking, and site relationships. The final master plan will be approved by the district’s board of directors and will guide the design of the project. Final master plan drawings should be presentable and colorful with an artistic flare. This plan will be used in public meetings, outreach, and publication at the district’s discretion.
2. Schematic Design (SD) – schematic design is the starting package for full construction documents. It should layout the project in site, floor, elevation and section drawings in civil, landscape, architectural, structural, and mechanical.
3. Design Development (DD) – design development drawings will start to detail the project, showing specific details for construction. A basic set of specifications should accompany the 100% DD package.
4. Construction Documents (CD) – construction document drawings make up the complete drawing package, suitable for permitting and bidding. They should include a full set of project specifications.
5. As Built Drawings – as built drawings are produced after construction, and will depict any changes to the CD package that may have happened during construction. They should also include a workable set of irrigation drawings that clearly shows each zone, locations of mains and laterals, and color code each zone for use by park maintenance staff in the field.

Cost Estimates
1. Cost estimates should be performed by a local contractor or estimator familiar with the economy and bid environment of central Oregon. The district will normally require cost estimates at the end of the master plan and schematic design phase; at the 50% and 100% of design development phase, and at the 30%, 60%, and 90% of construction document phase.
2. Cost estimates are to be provided to the district by the design professional.

Documents
1. Design documents shall be drawn to scale on 22 x 34” size paper, unless approved otherwise by the district.
2. Specifications shall be in CSI format, book form on 8-1/2 x 11” size paper. The district will provide a Division 01 basic specification for the consultant to modify to the project parameters.
3. Color renderings shall be a minimum of 11 x 17” size at 300 dpi for use in both print and digital formats. Renderings shall be provided in PDF and PSD format.
4. Final construction documents shall be provided to the district in PDF format. Each page should be its own file, and named as such: 3-digit number, sequential from the first sheet to the last, a hyphen, the sheet number, followed by the sheet name, an underscore, and finally the project name.
   A. Naming Example: 001-CS Cover Sheet_New Park Name.pdf
5. To the extent possible, all documents should be electronic PDF format. If hard copies are required, it will be listed in the scope of work for the individual project. AutoCad files of the project are required for record drawings. AutoCad files should be a single file for each page, formatted for AutoCad Light.
   A. Drawings can be submitted on a memory stick or CD once the record drawings are complete.
6. Drawings, specifications and other documents, including those in electronic form, prepared by the consultant and the consultant's sub-consultants are instruments of service intended and authorized for particular uses with respect to a particular project and are not intended, or represented, to be suitable for any other purpose or for any other project.
7. All design documentation for all phases of the project, including, without limitation, the drawings, specifications, and all BIM information, and other instruments of service provided to the district shall be deemed the property of the district who may use them without the consultant's further permission for any lawful purpose.
   A. The consultant and the consultant's sub-consultants shall retain common law, statutory and other reserved rights in their original work, including copyrights, except that the consultant grants to the district a nonexclusive license to reproduce the consultant's instruments of service for purposes of constructing, using, and maintaining the project.
   B. Additional information is provided in the standard form of agreement (contract), for each individual project.

Payment
1. The consultant shall bill for work completed monthly, showing base contract, expenses, any allowances (if authorized), and any additional services (if authorized). The billing should sum the total paid to date, the current billing, and any amounts left owing on the contract. The district will pay the consultant within 30 days of receiving an approved invoice.
General Construction Standards

GENERAL REQUIREMENTS FOR CONSTRUCTION - The requirements contained in this development standard are for basic informational use only. Each individual project will contain a complete Division 01 specification section that shall govern the project.

Owner-Furnished, Contractor-Installed (OFCI) Products, and Owner-Furnished, Owner-Installed (OFOI) Products
1. BPRD custom builds a small amount of products for use in parks. The products are normally installed by the contractor as OFCI. Each project will indicate how they are to be installed. The following is a basic list of owner supplied projects.
   A. Bike racks – BPRD single “U” shape hoop, quantity as noted on plans.
   B. Doggy station – BPRD standard doggy station, quantity as noted on plans.
   C. Park signage – BPRD standard signage, quantity and type as noted on plans.

Access to the Site
1. Limit use of the project site to solely work in areas indicated. Do not disturb portions of the project site beyond the area(s) in which the work is indicated.
2. Maintain portions of existing areas affected by construction operations in good condition throughout the construction period. Repair damage caused by construction operations to the satisfaction of the district.

Coordination with Occupants
1. Full owner occupancy: The owner will occupy the site and existing adjacent area(s) during entirety of the construction period. Cooperate with the owner during construction operations to minimize conflicts and facilitate continued owner usage. Perform the work so as not to interfere with the owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
   A. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from the owner and approval of authorities having jurisdiction.
   B. Notify the owner no less than 48 hours in advance of activities that will affect the owner's operations.
2. Partial owner occupancy: The owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with the owner during construction operations to minimize conflicts and facilitate the owner's usage. Perform the work so as not to interfere with the owner's operations. Maintain existing exits unless otherwise indicated.
   A. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from the owner and authorities having jurisdiction.
   B. Provide not less than 48 hours notice to the owner of activities that will affect the owner's operations.
3. Owner limited occupancy of completed areas of construction: The owner reserves the right to occupy, and to place and install equipment in completed portions of the work area, prior to substantial completion of the work, provided such occupancy does not interfere with completion of the work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total work.

Work Restrictions
1. Work restrictions, General: Comply with restrictions on construction operations.
   A. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
2. Existing utility interruptions: Do not interrupt utilities serving facilities occupied by the owner or others unless permitted under the following conditions, and then only after providing temporary utility services according to requirements indicated:
   A. Notify the owner not less than two days in advance of proposed utility interruptions.
   B. Obtain the owner's written permission before proceeding with utility interruptions.
   C. Controlled Substances: Use of tobacco products and other controlled substances on the project site is not permitted.
PAYMENT PROCEDURES

Schedule of Values
1. Coordinate preparation of the schedule of values with preparation of contractor's construction schedule.
   A. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
      1) Application for payment forms with continuation sheets.
2. Format the schedule of values based on the itemized bid list provided during bidding.
   A. Arrange schedule of values to be consistent with the format of the owners form 006365 “Owners Application for Payment”.
   B. Round amounts to the nearest whole dollar; total shall equal the contract sum.
   C. Each item in the schedule of values and applications for payment shall be complete. Include the total cost and proportionate share of overhead and profit for each item.

Applications for Payment
1. Each application for payment following the initial application for payment shall be consistent with previous applications and payments.
2. The date for each progress payment is indicated in the agreement between the owner and contractor. The period of construction work covered by each application for payment is the period indicated in the agreement, normally 30 days, or one month.
3. Use the owners form 006365 “Owners Application for Payment” as form for applications for payment. An electronic copy will be available upon request to owner. No other forms of payment shall be used.
4. Complete every entry on the form. The form shall be executed by a person authorized to sign legal documents on behalf of contractor. Owner will return incomplete applications without action.
   A. Entries shall match data on the schedule of values. Use updated schedules if revisions were made.
   B. Include amounts for work completed following the previous application for payment, whether or not payment has been received. Include only amounts for work completed at the time of application for payment.
   C. Include amounts of change orders issued before the last day of construction period covered by the application.
5. Submit electronically via email one signed PDF copy of each application for payment to owner.
   A. Transmit required BOLI wage certifications of all contractor employees having worked onsite during the application period for the owner reference per contract documents.
6. After the owner issues the certificate of substantial completion, submit an application for payment showing 100% completion for portion of the work claimed as substantially complete.
7. After completing the project closeout requirements, submit final application for payment with releases and supporting documentation that have not been previously submitted and accepted, including, but not limited to, the following:
   A. Evidence that claims have been settled if required.
   B. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of substantial completion or when the owner took possession of, and assumed responsibility for, corresponding elements of the work.

PROJECT MANAGEMENT AND COORDINATION

General Coordination Procedures
1. Coordinate construction operations included in different sections of the specifications to ensure efficient and orderly installation of each part of the work. Coordinate construction operations, included in different sections that depend on each other for proper installation, connection, and operation.
2. Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the work. Each contractor shall coordinate its operations with operations, included in different sections that depend on each other for proper installation, connection, and operation.
3. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
4. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the work.
5. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

**Coordination Drawings**
1. Prepare coordination drawings according to requirements in individual sections, and additionally where installation is not completely shown on shop drawings, limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
2. Prepare coordination digital data files for final submittal using PDF format.

**QUALITY REQUIREMENTS**

**Quality Control**
1. Where quality-control services are indicated as owner's responsibility, the owner will engage qualified testing agency to perform these services.
2. Tests and inspections not explicitly assigned to the owner are the contractor's responsibility. The contractor shall perform additional quality-control activities required to verify that the work complies with requirements, whether specified or not.
3. Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
4. Where indicated, engage a manufacturer's technical representative to observe and inspect the work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of installer activities, inspection of completed portions of the work, and submittal of written reports.
5. Regardless of whether original tests or inspections were the contractor's responsibility, provide quality-control services, including re-testing and re-inspecting, for construction that replaced work that failed to comply with the contract documents.
6. Testing agency shall cooperate with architect, owner and contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
7. Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel.
8. Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   A. Schedule times for tests, inspections, obtaining samples, and similar activities.
9. Prepare a schedule of tests, inspections, and similar quality-control services required by the contract documents as a component of contractor's quality-control plan. Coordinate and submit concurrently with the contractor's construction schedule. Update as the work progresses.
10. Distribute schedule to owner, architect, testing agencies, and each party involved in performance of portions of the work where tests and inspections are required.

**Special Tests and Inspections**
1. Owner will engage a qualified testing agency (special inspector) to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of the owner.
TEMPORARY FACILITIES AND CONTROLS

Security and Protection of Facilities
1. Protect existing landscaping, vegetation, irrigation systems, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities to the satisfaction of the owner.
2. Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and minimize possible air, waterway, and subsoil contamination, pollution, or other undesirable effects, including temporary erosion and sediment control, and stormwater control.
3. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion. Contractor shall use a certified arborist for proper management of tree and plant protection.
4. Engage a qualified service for the removal and eradication of noxious weeds during construction activities. Weeds shall be removed prior to blooming.
5. Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so project will be free of pests and their residues at substantial completion. Perform control operations lawfully, using environmentally safe materials.
6. Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   A. As required to enclose entire project site or portion determined sufficient to accommodate construction operations.
   B. Maintain security by limiting number of keys, and restricting distribution, to authorized personnel.
   C. Allow for the owner's lock to be placed for owner's use and do not “lockout” owner's lock.
7. Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at the end of each work day.
8. Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
9. Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
10. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
11. Install and maintain temporary fire-protection facilities with the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 24 and manage fire-prevention program.
12. Prohibit smoking while on owner's property.
13. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Performance Requirements
1. Achieve end-of-project rates for salvage/recycling of 75% by weight of total non-hazardous solid waste generated by the work.
2. Practice efficient waste management in the use of materials in the course of the work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators.
3. Facilitate recycling and salvage of materials.
**Waste Management Plan**

1. Develop a waste management plan according to ASTM E 1609 and requirements in this section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but the same units of measure should be used throughout waste management plan.

2. Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the work. Include estimated quantities and assumptions for those estimates.

3. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the contract.

4. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the work.

5. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.


7. Recycling incentives: revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to contractor.

8. Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

**CLOSEOUT PROCEDURES**

**Substantial Completions Procedures**

1. Prepare and submit a list of items to be completed and corrected (contractor's punch list), indicating the value of each item on the list and reasons why the work is incomplete.

2. Complete the following a minimum of 10 days prior to requesting inspection for determining date of substantial completion. List all items below that are incomplete at the time of request.
   
   A. Obtain and submit releases from authorities having jurisdiction permitting owner unrestricted use of the work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   
   B. Submit closeout submittals specified, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
   
   C. Submit closeout submittals specified, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   
   D. Submit maintenance material submittals, including tools, spare parts, extra materials, and similar items, and deliver to location designated by owner. Label with manufacturer's name and model number where applicable.
   
   E. Submit test/adjust/balance records.
   
   F. Submit changeover information related to owner's occupancy, use, operation, and maintenance.
   
   G. Advise owner of pending insurance changeover requirements.
   
   H. Make final changeover of permanent locks and deliver keys to owner. Advise owner's personnel of changeover in security provisions.
   
   I. Complete startup and testing of systems and equipment.
   
   J. Perform preventive maintenance on equipment used prior to substantial completion.
   
   K. Instruct owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings as specified.
   
   L. Advise owner of changeover in heat and other utilities.
   
   M. Participate with the owner in conducting inspection and walkthrough with local emergency responders.
   
   N. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.
   
   O. Complete final cleaning requirements, including touchup painting.
   
   P. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
   
   Q. Clean and sweep all site hardscapes to an acceptable appearance.
   
   R. Remove all temporary sediment and erosion control measures.
Final Completion Procedures
1. Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, the owner will either proceed with inspection or notify the contractor of unfulfilled requirements. The owner will prepare a final certificate for final completion after inspection or will notify the contractor of construction that must be completed or corrected before the certificate will be issued.
2. Request re-inspection when the work identified in previous inspections as incomplete is completed or corrected.

List of Incomplete Items (Punch List)
1. Owner will provide a punch list of items needing correction with the notice of substantial completion.

Final Cleaning
1. Conduct cleaning and waste-removal operations to comply with local laws and ordinances, and federal, local environmental, and antipollution regulations.

Repair of the Work
1. Complete repair and restoration operations before requesting inspection for determination of substantial completion.
2. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, replacements shall be provided. Remove and replace operating components that cannot be repaired. Restore damaged construction and existing features to specified condition.
Chapter 3

Standard Specifications
1.0 Site Conditions

Definitions
1. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1% organic matter and few soil organisms.
2. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.
3. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than two inches in diameter; and free of weeds, roots, toxic materials, or other non-soil materials.
4. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on drawings.
5. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated according to requirements in Section 015639 "Temporary Tree and Plant Protection".
6. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

Material Ownership
1. Except for materials indicated to be stockpiled, reinstalled or otherwise remain owner's property, cleared materials shall become contractor's property and shall be removed from project site.

Submittals
1. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   A. Use sufficiently detailed photographs or video recordings.
   B. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
2. Topsoil stripping and stockpiling program.
3. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

Quality Assurance
1. Topsoil Stripping and Stockpiling: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the work. Include dimensioned diagrams for placement and protection of stockpiles.

Field Conditions
1. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   A. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from owner and authorities having jurisdiction.
   B. Provide alternate routes around closed or obstructed traffic-ways if required by owner or authorities having jurisdiction.
2. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on owner's premises.
3. Utility Locator Service: Notify utility locator service for area where project is located before site clearing.
4. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
5. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.
Materials
1. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 2: Earthwork.
   A. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

Preparation
1. Protect and maintain benchmarks and survey control points from disturbance during construction.
2. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed.
3. Protect existing site improvements to remain from damage during construction.
   A. Restore damaged improvements to their original condition, as acceptable to owner.

Temporary Erosion and Sedimentation Control
1. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion and sedimentation control drawings and requirements of authorities having jurisdiction.
2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
3. Inspect, maintain, and repair erosion and sedimentation control measures during construction until permanent vegetation has been established.
4. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

Tree and Plant Protection
1. Protect trees and plants remaining on-site.
2. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations.

Clearing and Grubbing
1. Remove all noxious weeds and junipers smaller than four inches DBH within areas to be cleared as shown on drawings.
2. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   A. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   B. Grind down stumps and remove roots larger than three inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
   C. Use only hand methods or air spade for grubbing within protection zones.
   D. Chip removed tree branches and stockpile in areas approved by architect.
3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   A. Place fill material in horizontal layers not exceeding a loose depth of eight inches, and compact each layer to a density equal to adjacent original ground.

Topsoil Stripping
1. Remove bunchgrass before stripping topsoil.
2. Strip topsoil to depth of six inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
   A. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects larger than two inches in diameter; trash, debris, weeds, roots, and other waste materials.
3. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   A. Limit height of topsoil stockpiles to 72 inches.
   B. Do not stockpile topsoil within protection zones.
   C. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
   D. Stockpile surplus topsoil to allow for re-spreading deeper topsoil.

4. Remove and stockpile from area of construction naturally formed rocks that measure more than one foot across in least dimension. Do not include crushed rock.

5. Stockpile rock away from edge of excavations without intermixing with other materials.

**Disposal of Surplus and Waste Materials**

1. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off owner's property.

2. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other project work.
2.0 Earthwork and Surface Drainage

Definitions
1. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   A. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   B. Final Backfill: Backfill placed over initial backfill to fill a trench.
2. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
3. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
4. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
5. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   A. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by owner’s representative. Authorized additional excavation and replacement material will be paid for according to contract provisions for changes in the work.
   B. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   C. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by owner’s representative. Unauthorized excavation, as well as remedial work directed by owner’s representative, shall be without additional compensation.
6. Fill: Soil materials used to raise existing grades.
7. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed one cubic yard for bulk excavation or 3/4 cubic yard for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted.
8. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
9. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

Submittals
1. Product Data: For each type of the following manufactured products required:
   A. Warning tapes.
2. Samples for Verification: For the following products, in sizes indicated below:
   A. Warning Tape: 12 inches long; of each color.
3. Qualification Data: For qualified testing agency.
4. Material Test Reports: For each borrow soil material proposed for fill and backfill as follows:
   A. Classification according to ASTM D 2487.
   B. Laboratory compaction curve according to ASTM D 698.
5. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

Field Conditions
1. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
   A. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from owner and authorities having jurisdiction.
   B. Provide alternate routes around closed or obstructed traffic ways if required by owner or authorities having jurisdiction.
2. Utility Locator Service: Notify utility locator service for area where project is located before beginning earth-moving operations.
3. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures as specified are in place.
4. Do not commence earth-moving operations until plant-protection measures as specified are in place.
5. The following practices are prohibited within protection zones:
   A. Storage of construction materials, debris, or excavated material.
   B. Parking vehicles or equipment.
   C. Foot traffic.
   D. Erection of sheds or structures.
   E. Impoundment of water.
   F. Excavation or other digging unless otherwise indicated.
   G. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

6. Do not direct vehicle or equipment exhaust towards protection zones.

7. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

**Soil Materials**

1. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
2. Satisfactory Soils: Soil classification groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than three inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
3. Unsatisfactory Soils: Soil classification groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   A. Unsatisfactory soils also include satisfactory soils not maintained within 2% of optimum moisture content at time of compaction.
4. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90% passing a 1-1/2-inch sieve and not more than 12% passing a No. 200 sieve.
5. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M 0; with at least 95% passing a 1-1/2-inch sieve and not more than 8% passing a No. 200 sieve.
6. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100% passing a 1-inch sieve and not more than 8% passing a No. 200 sieve.
7. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100% passing a 1-inch sieve and 0 to 5% passing a No. 8 sieve.
8. Sand: ASTM C 33/C 33M; fine aggregate.

**Accessories**

1. Detectable Warning Tape: Acid and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of six inches wide and four millimeters thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   A. Red: Electric.
   B. Yellow: Gas, oil, steam, and dangerous materials.
   C. Orange: Telephone and other communications.
   D. Blue: Water systems.
   E. Green: Sewer systems.

**Preparation**

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
2. Protect and maintain erosion and sedimentation controls during earth-moving operations.
3. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
Dewatering
1. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding project site and surrounding area.
2. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
3. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

Explosives
1. Explosives: Do not use explosives.

Excavation, General
1. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the contract sum or the contract time will be authorized for rock excavation or removal of obstructions.
   A. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   B. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
      1) 24 inches outside of concrete forms other than at footings.
      2) 12 inches outside of concrete forms at footings.
      3) Six inches outside of minimum required dimensions of concrete cast against grade.
      4) Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
      5) Six inches beneath pipe in trenches and the greater of 24 inches wider than pipe.

Excavation for Structures
1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus one inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   A. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavations at Edges of Tree and Plant Protection Zones:
   A. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   B. Cut and protect roots according to requirements in project specifications.

Excavation for Walks and Pavements
1. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

Excavation for Utility Trenches
1. Excavate trenches to indicated gradients, lines, depths, and elevations.
   A. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
2. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
   A. Clearance: 12 inches each side of pipe or conduit.
3. Trench Bottoms: Excavate trenches four inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
   A. Excavate trenches six inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
3. Trenches in Tree and Plant-Protection Zones:
   A. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
   B. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
   C. Cut and protect roots according to requirements in project specifications.

Subgrade Inspection
1. Notify owner’s representative when excavations have reached required subgrade.
2. If owner’s representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
3. Authorized additional excavation and replacement material will be paid for according to contract provisions for changes in the work.
4. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by owner’s representative, without additional compensation.

Storage of Soil Materials
1. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   A. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

Backfill
1. Place and compact backfill in excavations promptly, but not before completing the following:
   A. Testing and inspecting underground utilities.
   B. Removing concrete formwork.
   C. Removing trash and debris.
   D. Installing permanent or temporary horizontal bracing on horizontally supported walls.
2. Place backfill on subgrades free of mud, frost, snow, or ice.

Utility Trench Backfill
1. Place backfill on subgrades free of mud, frost, snow, or ice.
2. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
3. Backfill voids with satisfactory soil while removing shoring and bracing.
4. Initial Backfill:
   A. Soil Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than one inch in any dimension, to a height of 12 inches over the pipe or conduit.
      1) Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
   B. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.
5. Final Backfill:
   A. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
6. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except six inches below subgrade under pavements and slabs.
Soil Fill
1. Plow, scarify, bench, or break up sloped surfaces steeper than one vertical to four horizontal so fill material will bond with existing material.
2. Place and compact fill material in layers to required elevations as follows:
   A. Under grass and planted areas, use satisfactory soil material.
   B. Under walks and pavements, use satisfactory soil material.
   C. Under footings and foundations, use engineered fill.
3. Place soil fill on subgrades free of mud, frost, snow, or ice.

Soil Moisture Control
1. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2% of optimum moisture content.
   A. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   B. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry density.

Compaction of Soil Backfills and Fills
1. Place backfill and fill soil materials in layers not more than eight inches in loose depth for material compacted by heavy compaction equipment and not more than four inches in loose depth for material compacted by hand-operated tampers.
2. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
3. Compact soil materials to not less than the following percentages of maximum dry density according to ASTM D 698:
   A. Under walkways, scarify and re-compact top six inches below subgrade and compact each layer of backfill or fill soil material at 92%.
   B. Under turf or unpaved areas, scarify and re-compact top six inches below subgrade and compact each layer of backfill or fill soil material at 85%.
   C. For utility trenches, compact each layer of initial and final backfill soil material at 85%.

Grading
1. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   A. Provide a smooth transition between adjacent existing grades and new grades.
   B. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
2. Site Rough Grading: Slope grades to direct water away to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
   A. Unpaved Areas: Plus or minus one inch.
   B. Walks: Plus or minus one inch.
   C. Place and compact impervious fill over drainage backfill in six inch thick compacted layers to final subgrade.

Subbase and Base Courses Under Walks
1. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
2. On prepared subgrade, place subbase course and base course under walks as follows:
   A. Shape subbase course and base course to required crown elevations and cross-slope grades.
   B. Place subbase course and base course six inches or less in compacted thickness in a single layer.
   C. Place subbase course and base course that exceeds six inches in compacted thickness in layers of equal thickness, with no compacted layer more than six inches thick or less than three inches thick.
   D. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95% of maximum dry density according to ASTM D 698.
Field Quality Control
1. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   A. Determine prior to placement of fill that site has been prepared in compliance with requirements.
   B. Determine that fill material classification and maximum lift thickness comply with requirements.
   C. Determine that, during placement and compaction, in-place density of compacted fill complies with requirements.
2. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
3. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
4. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Owner’s Representative.
5. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:
   A. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 500 square feet or less of paved area but in no case fewer than two tests.
6. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.

Protection
1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
2. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   A. Scarify or remove and replace soil material to depth as directed by owner’s representative; reshape and re-compact.
3. Where settling occurs before project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   A. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

Disposal of Surplus and Waste Materials
1. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off owner's property.
3.0 Hardscape

ASPHALT PAVING

Submittals
1. Product Data: For each type of product.
   A. Include technical data and tested physical and performance properties.
   B. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the work.
   C. Job-Mix Designs: For each job mix proposed for the work.
2. Qualification Data: For testing agency.
3. Material Certificates: For each paving material.
4. Material Test Reports: For each paving material, by a qualified testing agency.
5. Field quality-control reports.

Quality Assurance
1. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which project is located.
2. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
3. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of insert applicable standards of for asphalt paving work.
   A. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this section.

Field Conditions
1. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
   A. Prime Coat: Minimum surface temperature of 60° Fahrenheit.
   B. Tack Coat: Minimum surface temperature of 60° Fahrenheit.
   C. Slurry Coat: Comply with weather limitations in ASTM D 3910.
   D. Asphalt Base Course: Minimum surface temperature of 40° Fahrenheit and rising at time of placement.
   E. Asphalt Surface Course: Minimum surface temperature of 60° Fahrenheit at time of placement.

Field Quality Control
1. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
2. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
3. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
4. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.
5. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
   A. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
   B. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
      1) One core sample will be taken for every 1000 square yard or less of installed pavement, with no fewer than three cores taken.
      2) Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
6. Replace and compact hot-mix asphalt where core tests were taken.
7. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.
Preparation
1. Prepare subgrade and aggregate base in conformance with the requirements of applicable specifications sections.
2. Surface Preparation
   A. Prepare subgrade and aggregate base course in conformance with section 2.0 Earthwork and Surface Drainage.

Construction
1. Placement during rain or other adverse conditions will not be permitted, except that mix in transit at the time these conditions occur may be placed, provided the mix is of proper temperature, has been covered during transit, and is placed on a surface free of standing water.
2. The temperature of HMAC shall be:
   A. Maximum mix temperature to be 350° Fahrenheit.
   B. Minimum placement temperature behind the paving machine to be 240° Fahrenheit.
3. Mix shall be placed as to reduce the number of longitudinal joints. Longitudinal joints in any layer shall offset those joints in layers below by not less than six inches.
4. Minimum asphalt lift thickness shall be two inches. Maximum lift thickness shall be three inches.
5. HMAC Placement Equipment
   A. Paving machines shall be self-contained, self-propelled, and supported on tracks or wheels. Neither wheels nor tracks shall contact the mixture during placement.
   B. Conform finished surfaces to the lines and grades indicated in the contract documents.
   C. Maintain grade control by means of automatic screed controls on the paving machine and by use of erected and mobile string lines as applicable.
   D. The use of the automatically controlled paver may be waived by owner on irregular sections.
   E. When paving shoulders or similar work, it may be permitted to use towed-type paving machines provided the machine meets the following requirements:
      1) The machine is equipped with a receiving and distribution system of a sufficient capacity for a uniform spreading operation without segregation of materials.
      2) The machine is equipped with a screed which will produce a finished surface of the specified thickness and smoothness, and will not tear or gouge the mixture.
6. When the capacity of the paver to properly spread and finish exceeds the rate of delivery of mixture, operate the paver at a reduced and uniform speed to give continuous spreading and finishing.
7. Spread and finish bituminous mixtures by hand methods only where machine methods are impractical as determined by owner.
8. Do not cast or otherwise manipulate hand placed mixtures in such manner that segregation occurs.
9. Site Tolerances
   A. Level 1 and Level 2 HMAC shall be constructed such that placing a 12-foot straightedge parallel and perpendicular to the centerline will not result in a surface variance of more than ¼ inch.
   B. Single Course Construction
      1) HMAC shall be constructed such that placing a 12-foot straightedge parallel and perpendicular to the centerline will not result in a surface variance of more than ¼ inch.
   C. Multiple Course Construction
      1) Test the wearing surface with a rolling straightedge in a designated wheel path of a 300-foot strip of each travel lane, parallel to the centerline. The surface shall not vary more than 3/16 inch.
      2) Also test the wearing surface with a 12-foot straightedge placed perpendicular to the centerline at least once within the above-mentioned 300 foot strip. The surface shall not vary more than ¼ inch.
10. Compaction Equipment
    A. The contractor is responsible for providing sufficient rollers of the appropriate type and size to compact the mixture while it is still within the specified temperatures.
    B. Operate compaction equipment at slow, uniform speeds as recommended by the manufacturer.
    C. Begin rolling at the sides and proceed longitudinally (parallel to the road centerline), gradually progressing to the centerline.
    D. Do not make sharp turn or park rollers on hot asphalt surfaces.
    E. Provide self propelled rollers capable of reversing without backlash.
F. Contractor shall use an appropriate combination of rollers needed to obtain required compaction.

G. Along curbs and walks, on walks, irregular areas, and other areas not practicably accessible to specified rollers, compact the asphalt mix with small rollers, mechanical tampers, hot hand tampers, or smoothing irons. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

H. Improved or modernized equipment which will produce results equal in quality to those which would result from the specified equipment will be considered for use.

I. Complete breakdown and intermediate compaction before the HMAC temperature drops below 80° Fahrenheit, unless otherwise directed or accepted by owner.

**Repair/Restoration**

1. Remove and replace defective areas by cutting to the full depth of the course.
   - Make cuts perpendicular and parallel to the direction of traffic with edges vertical.
   - Apply a tack coat of emulsified asphalt to exposed surfaces.
   - Fill the area with fresh hot asphaltic concrete mix in lifts of the same depths as the adjacent area, then compact by rolling to specified surface density and smoothness.

**Field Quality Control**

1. Site Tests, Inspection
   - Compaction
     1) Compliance with the density requirements for dense graded HMAC shall be determined by random testing of the compacted HMAC surface with calibrated nuclear gauges.
     2) For Level 1-3, compact the HMAC to at least 91% for single course construction, and top courses of multi-course construction. For subsequent courses of multi-course construction, compact to 92%.
     3) After completion of finish rolling, determine the density of the HMAC by averaging five tests performed at random locations with a nuclear density gauge operated in backscatter mode.
   - Frequency of Testing
     1) At least one each day of HMAC production.
     2) One test per 1,000 tons of HMAC placed. One test is defined as the average of five random tests taken in accordance with WAQTC TM8.
   - Samples and tests can be taken as frequently and at such locations as the owner elects.

**Cleaning**

1. After completion of paving operation, clean all areas of excess spilled asphalt materials to the satisfaction of owner.

**Protection**

1. Protect adjacent concrete and masonry so that no damage will occur as the result of subsequent construction operations.
2. Repair damage or discoloration to the satisfaction of owner before final acceptance by owner.
3. Prevent bituminous materials from spraying or splashing.
4. Protect adjacent construction by covering with suitable fabric or paper.

**CONCRETE PAVING**

**Submittals**

1. Product Data: For each type of product.
2. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
3. Samples for Verification: For each type of product or exposed finish.
4. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
5. Qualification Data: For qualified ready-mix concrete manufacturer.
6. Material Certificates: For the following, from manufacturer:
   A. Cementitious materials.
   B. Steel reinforcement and reinforcement accessories.
   C. Fiber reinforcement.
   D. Admixtures.
   E. Curing compounds.
   F. Applied finish materials.
   G. Bonding agent or epoxy adhesive.
   H. Joint fillers.

7. Material Test Reports: For each of the following:
   A. Aggregates: Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
   B. Field quality-control reports.

Quality Assurance
1. Stamped Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
2. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
3. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
4. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
5. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   A. Build mockups of full-thickness sections of concrete paving to demonstrate typical joints; surface finish, texture, and color; curing; and standard of workmanship.
   B. Build mockups of concrete paving in the location and of the size indicated or, if not indicated, build mockups where directed by owner’s representative and not less than 96” x 96”.
   C. Approval of mockups does not constitute approval of deviations from the contract documents contained in mockups unless owner’s representative specifically approves such deviations in writing.
   D. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of substantial completion.

Field Quality Control
1. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
2. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
   A. Testing Frequency: Obtain at least one composite sample for each 100 cubic yard or fraction thereof of each concrete mixture placed each day.
      1) When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   B. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day’s pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   C. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day’s pour of each concrete mixture.
   D. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40° Fahrenheit and below and when it is 80° Fahrenheit and above, and one test for each composite sample.
   E. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
F. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

1) A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

3. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

4. Test results shall be reported in writing to owner’s representative, concrete manufacturer, and contractor within 48 hours of testing. Reports of compressive-strength tests shall contain project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven and 28-day tests.

5. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by owner’s representative.

6. Concrete paving will be considered defective if it does not pass tests and inspections.

7. Additional testing and inspecting, at contractor’s expense, will be performed to determine compliance of replaced or additional work with specified requirements.

Repair and Protection

1. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this section. Remove work in complete sections from joint to joint unless otherwise approved by owner’s representative.

2. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

3. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for substantial completion inspections.

CONCRETE UNIT PAVING

Submittals

1. Product Data: For the following:
   A. Pavers.
   B. Edge restraints.

2. Sieve Analyses: For aggregate setting-bed materials.

3. Samples for Initial Selection: For each type of unit paver indicated.

4. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for unit pavers, indicating compliance with requirements.
   A. For solid interlocking paving units, include test data for freezing and thawing according to ASTM C 67.

Quality Assurance

1. Mockups: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   A. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of substantial completion.

Delivery, Storage, and Handling

1. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

2. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
Field Conditions
1. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

Concrete Pavers
1. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936/C 936M and resistant to freezing and thawing when tested according to ASTM C 67, made from normal weight aggregates.
   A. Provide pavers
      1) Willamette Graystone, Holland Interlocking Pavers, edge course.
      2) Willamette Graystone, Plaza Stone Interlocking Pavers, field.
   B. Thickness: 2-3/8”.
   C. Plaza Stone Face Size and Shape: 6” x 6” square, and 6” x 9” inch rectangle.
   D. Holland Face Size and Shape: 4” x 8” inch rectangle.
   E. Color: Walnut Blend field color, Charcoal edge course.
   F. Pattern: Muster K with Soldier Course at edger.

Edge Restraints
1. Edge Restraints: Pave Tech; Pave Edge Pro Rigid and Pave Edge Pro Flexible, where specified or per manufacturer requirements.

Aggregate Setting - Bed Materials
1. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with requirements in "Earthwork" for subbase material.
2. Graded Aggregate for Base: Sound, crushed stone or gravel complying with requirements in "Earthwork" for base course.
3. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33/C 33M for fine aggregate.
5. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100% passing No. 16 sieve and no more than 10% passing No. 200 sieve.
   A. Provide sand of color needed to produce required joint color.

Examination
1. Examine surfaces indicated to receive unit paving, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
2. Where unit paving is to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

Preparation
1. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
2. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
3. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive course for unit pavers.

Installation - General
1. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.
2. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
3. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
4. Joint Pattern: Muster K with Soldier Course at edger.
   A. Provide joint filler at waterproofing that is turned up on vertical surfaces unless otherwise indicated; where unfilled joints are indicated, provide temporary filler or protection until paver installation is complete.
5. Tolerances: Do not exceed 1/32” unit-to-unit offset from flush (lippage) or 1/8” in 10 feet from level, or indicated slope, for finished surface of paving.
6. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
   A. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
   B. Install edge restraints directly to finished base. Do not install on bedding sand or leveling course.

**Aggregate Setting - Bed Applications**
1. Compact soil subgrade uniformly to at least 95% of ASTM D 698 laboratory density.
2. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by owner's representative, and replace with compacted backfill or fill as directed.
3. Place separation geotextile, when specified, over prepared subgrade, overlapping ends and edges at least 12 inches.
4. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.
5. Place aggregate subbase and base, compact to 100% of ASTM D 1557 maximum laboratory density, and screed to depth indicated.
6. Place drainage geotextile, when specified, over compacted base course, overlapping ends and edges at least 12 inches.
7. Place leveling course and screed to a thickness of one inch, assure that moisture content remains constant and density is loose and uniform until pavers are set and compacted.
8. Treat leveling course with herbicide to inhibit growth of grass and weeds.
9. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to fit from full-size unit pavers.
   A. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
10. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500 to 5000-lbf compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
    A. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least 36 inches of uncompacted pavers adjacent to temporary edges.
    B. Before ending each day's work, compact installed concrete pavers except for 36-inch width of uncompacted pavers adjacent to temporary edges (laying faces).
    C. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within 36 inches of laying face.
    D. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with non-staining plastic sheets to protect them from rain.
11. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
12. Do not allow traffic on installed pavers until sand has been vibrated into joints.
13. Repeat joint-filling process 30 days later.

**Repairing and Cleaning**
1. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
2. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
   A. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
SOFT-SURFACE - TRAIL SURFACE AGGREGATE

Submittals
1. Submit one cubic foot of crushed rock base material and sieve analysis indicating gradation.
2. The contractor shall submit certified test results from a commercial testing laboratory or other evidence satisfactory to the owner proving that all materials used meet the quality and gradation requirements specified.

Quality Assurance
1. Proprietary items shown on the drawings and specified herein are shown to establish standards of quality, utility, design, and function. Equivalent units by other manufacturers (substitutions) will be considered provided they are similar in characteristics. They shall be substituted only if approved by the owner’s representative.
2. Construction shall be done by a contractor with at least five years experience in construction of similar surfaces.
3. Construction superintendent shall have a minimum of three years of documented experience with successful completion of projects of similar size and complexity.
4. Work shall be completed in accordance with the United State Access Board section 1017 (Trails).
5. All local, municipal and state laws and rules and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications and the contractor shall carry out their provisions. Any specification herein contained, shall not be construed to conflict with the above rules, regulations or requirements.

Products
1. **Trail Surface Aggregate, (#10 Minus, or TSA)” Crushed Rock Surface**
   A. Trail Surface Aggregate mix design:
   1) One part AASHTO #8
   2) Four parts unwashed AASHTO #10
   3) One part minus #200 fines
   B. Trail surface aggregate shall be crushed rock free from deleterious or foreign matter with a plasticity index not exceeding 6 by ASTM D4318, a pH between 6-12.45 per EPA 9045C, and abrasion of 35% maximum per AASHTO T96, meeting the following gradation:

<table>
<thead>
<tr>
<th>SIEVE</th>
<th>PERCENT PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2”</td>
<td>100</td>
</tr>
<tr>
<td>3/8”</td>
<td>96-100</td>
</tr>
<tr>
<td>#4</td>
<td>75-90</td>
</tr>
<tr>
<td>#8</td>
<td>55-75</td>
</tr>
<tr>
<td>#16</td>
<td>35-50</td>
</tr>
<tr>
<td>#200</td>
<td>10-15</td>
</tr>
</tbody>
</table>

2. **Crushed Rock Base Course (State Spec)**
   A. Crushed rock base shall conform to the following quality standards:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasion (AASHTO T 96) Maximum wear</td>
<td>35%</td>
</tr>
<tr>
<td>Fractured Face Minimum wear</td>
<td>75%</td>
</tr>
<tr>
<td>Liquid Limit (AASHTO T89) not greater than</td>
<td>30%</td>
</tr>
<tr>
<td>Plasticity Limit (AASHTO T91) not greater than</td>
<td>6%</td>
</tr>
</tbody>
</table>
B. Aggregates shall consist of uniform quality, clean, tough, durable fragments of rock or gravel, free from flat, elongated, soft or disintegrated pieces, and other objectionable matter occurring either free or as a coating on the stone.

C. Based on U.S. standard sieves, the gradation of the aggregates to be furnished shall be as indicated below:

<table>
<thead>
<tr>
<th>Sieve designation (Square Opening)</th>
<th>Percent Passing By Weight</th>
<th>1-1/2&quot; Minus Base or Surfacing Course</th>
<th>3/4&quot; Minus Leveling or Surfacing Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2&quot;</td>
<td>100</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>95-100</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1&quot;</td>
<td>-</td>
<td>-100</td>
<td></td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>55-75</td>
<td>90-100</td>
<td></td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>-</td>
<td>55-75</td>
<td></td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>35-50</td>
<td>40-60</td>
<td></td>
</tr>
<tr>
<td>No. 200</td>
<td>0-5</td>
<td>0-5</td>
<td></td>
</tr>
</tbody>
</table>

Geotextile Fabric
1. Filter fabric shall be pervious synthetic polymer, non-woven, from continuous filaments. Fabric shall be Mirafi N series nonwoven, or approved equal.

Preparation
1. Prior to all work of this section, the contractor shall carefully inspect all previously installed work and verify that all such work is complete to the point where specified installation may properly commence.
2. Verify that proposed path(s) may be installed in strict accordance with all pertinent codes and regulations, the accepted design, and the referenced standards.
3. Based on site walk-through, contractor shall furnish survey of proposed surfacing and paths including centerline staking marked with stationing and other significant layout information. Survey shall also stake all proposed locations of culverts, water bars, and other drainage features, changes in path types and other significant features. These stakes shall be marked with appropriate stationing. Staking shall be reviewed and approved by owner prior to beginning excavation for paths.

Path Excavation
1. Contractor shall excavate path to create a smooth, even subgrade for path base rock material.

Preparation of Subgrade
1. Bring all pathway and paving areas to required subgrade levels on undisturbed ground and compact by sprinkling and rolling or mechanical tamping. As depressions occur, refill with specified fill material and re-compact until the surface is at the proper grade. Prior to placement of concrete curbs the subgrade shall be inspected and approved by the owner. Subgrade shall be compacted to not less than 92% relative compaction as determined by ASTM D 1557-00.

Geotextile Fabric
1. Geotextile fabric shall be placed prior to the rock base course. Fabric shall be unrolled directly to the line and dimension shown on the drawings. Fabric shall be lapped a minimum of 24 inches in all directions. Contractor shall place base rock material in such a way as to not tear, puncture, or shift the filter fabric. Tears or rips in the fabric shall be patched with fabric lapped a minimum of 12 inches around the rip. Tracked or wheeled equipment shall not be permitted on the filter fabric.
Base Course Placement
1. Place base rock in maximum of three inch lifts to reach designed thickness. Compact each lift to 95% compaction prior to placing additional lifts.
2. Compact base rock to 95% of maximum dry density at optimum moisture content as determined by ASTM D 698.

Surface Course Placement
1. Trail Surface Aggregate
   A. Place TSA only after acceptance of base rock by owner.
   B. Place TSA in a maximum lift thickness of three inches.
   C. TSA shall be pre-conditioned to maximum moisture content prior to being placed on base rock. Pre-conditioning may occur onsite if sufficient storage and stockpile area is available, or be conditioned at the plant prior to trucking.
   D. Compact TSA to 95% of maximum dry density at optimum moisture content as determined by ASTM D 698 with a vibratory roller capable of rolling a minimum of 6 foot width in a single pass.
   E. Slope surface of tread as necessary to provide positive drainage across tread, and to minimize drainage along path length.
   F. Place TSA with a small paver in four inch loose, three inch compacted lifts
   G. If unable to place material with a paver, verify with owner for normal aggregate placement methods.
   H. TSA to be delivered and placed at optimum moisture content.
   I. Do not operate equipment on finished surface.

Finish Grading
1. After path surface is constructed, complete grading of path-side ditches, swales, and slopes as necessary.
2. Shoulder material should be placed with enough coverage to create a min of 3:1 slope from the top of the finished path to native grade. Once placed the shoulder material shall be mechanically compacted along its top edge to work the material into the TSA finished path. Shoulder material shall then be hand raked to along the slope to prepare the surface for restoration planting.
3. Final grades should appear natural, with slope rounding as necessary.
4. Place stockpiled duff material on all disturbed ground, to a depth of two to three inches.

Final Inspection and Cleaning
1. Remove all construction debris from site.
2. Repair all path surface irregularities.
3. Eliminate all areas of pooling or standing water on path surface.
4. Remove all excess path materials from plant beds, walks, roadways or other adjacent paving surfaces.
4.0 Furnishings and Equipment

GENERAL REQUIREMENTS

Summary
1. Provide products that comply with requirements of contract documents and that are undamaged and, unless otherwise indicated, unused at time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use and effect.
2. Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Where, because of nature of its application, owner is likely to need replacement or additional amounts of product at later date, either for maintenance and repair, or replacement, provide standard, domestically produced products for which manufacturer has published assurances that products and parts are likely to be available to owner at later date.
4. Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's name plates or trademarks on exposed surfaces of products which will be exposed to view.
5. Notify owner of long lead items and any need to expedite ordering.
6. Contractor is responsible for timely ordering of items to meet schedule requirements.
7. No schedule adjustments will be granted for contractor's failure to order items in a timely manner.

Submittals
1. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include specification section number and title, and drawing numbers and titles.

Quality Assurance
1. Compatibility of Options: If contractor is given option of selecting between two or more products for use on project, select product compatible with products previously selected, even if previously selected products were also options.
   A. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   B. If a dispute arises between contractors over concurrently selectable but incompatible products, owner will determine which products shall be used.

Product delivery, Storage, and Handling
1. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
2. Delivery and Handling:
   A. Schedule delivery to minimize long-term storage at project site and to prevent overcrowding of construction spaces.
   B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   C. Deliver products to project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   D. Inspect products on delivery to determine compliance with the contract documents and to determine that products are undamaged and properly protected.
   E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
3. Storage:
   A. Store products to allow for inspection and measurement of quantity or counting of units.
   B. Store materials in a manner that will not endanger project structure.
   C. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   D. Provide off-site storage and protection when site does not permit on-site storage or protection. Coordinate off-site storage with owner's representative if said materials are to be included in applications for payment. Materials stored off-site shall be in bonded facilities if included in application for payment.
   E. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   F. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   G. Protect stored products from damage and liquids from freezing.

Selection Procedures
1. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
2. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the contract documents.
3. Where products are accompanied by the term "as selected" owner will make selection.
5. For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements to obtain approval for use of an unnamed product.
6. Where specifications include a list of manufactures' names, provide a product by one of the manufacturers listed that complies with requirements.
7. Where specifications name a product, or refer to a product indicated on drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements for consideration of an unnamed product by one of the other named manufacturers.

PLAYGROUNDS

Playground Equipment
1. Quality Assurance
   A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   B. Field Control Quality
      1) Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
      2) Perform the following tests and inspections, fall height rating with the assistance of a factory-authorized service representative.
      3) Perform inspection and testing for each type of installed playground equipment according to ASTM F 1487.
      4) Playground equipment items will be considered defective if they do not pass tests and inspections.
      5) Prepare test and inspection reports.
      6) Notify owner 48 hours in advance of date(s) and time(s) of testing and inspection.
Playground Protective Surfacing

1. Quality Assurance
   A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   B. Field Quality Control
      1) Testing Agency: Contractor will engage a qualified testing agency to perform tests and inspections.
      2) Perform the following tests with the assistance of a factory-authorized service representative:
         a. Perform "Installed Surface Performance Test" according to ASTM F 1292 for each protective surfacing type and thickness in each playground area.
         b. Playground protective surfacing will be considered defective if it does not pass tests.
         c. Prepare test reports.

Picnic Tables

1. Pilot Rock, Picnic Table Recycled Plastic top. 6’ or 8’. Model: WXTH, Frame: RAL 8028, Top: PC – Cedar, or cut steel.
   A. BPRD Standard Drawing: D4.41
   S1 – Post embedment, BPRD Standard Drawing: D4.41, S2 -Surface mount.
   A. BPRD Standard Drawing: D4.42
3. Outdoor Creations, Inc., Concrete Picnic Tables. 6’ or 8’. Model: 101FSS, 100FSS.
   A. 4 Seat: BPRD Standard Drawing: D4.44
   B. 6 Seat: BPRD Standard Drawing: D4.45

Seating

1. DuMor, Inc., 57-40-PL (4’), 57-60 PL (6’), Frame Color: Terra Brown (RAL 8028), Slats: Cedar, recycled plastic.
   A. BPRD Standard Drawing: D4.51A, D5.41B, D5.41C

Trash Receptacles and Dog Stations

1. Trash Receptacles
   A. Victor Stanley, SD-42, with steel dome lid, 36 gallon plastic liner, side-opening with padlock latches. Surface mount.
   B. Color: Terra Brown (RAL 8028).
   C. BPRD Standard Drawing: D4.61A, D4.61B, D4.61C.
2. Dog Stations:
   A. Owner furnished, contractor installed (OFCI), owner will furnish product indicated. The work includes receiving, unloading, handling, storing, protecting, and installing owner-furnished product. Direct ground post installation.
   B. Color: Terra Brown (RAL 8028).

Miscellaneous

1. Bike Racks: Owner furnished, contractor installed (OFCI), owner will furnish product indicated. The work includes receiving, unloading, handling, storing, protecting, and installing owner-furnished product.
   A. Custom manufactured ‘Bicycle Hoop’, U-shape metal hoop. Surface mount.
   B. Bicycle Rack Construction:
   C. Color: Terra Brown (RAL 8028)
   D. BPRD Standard Drawing: D4.81
2. Drinking Fountains: Owner supplied and owner installed.
   A. Most Dependable Fountains, MDF 440SM, Powder coated steel frame drinking fountain, with jug filler.
   B. Color: Terra Brown (RAL 8028)
   C. BPRD Standard Drawing: D4.84
3. Electrical Enclosure
   A. Hoffman, Single-Door Dual Access enclosure, A-L1DR latch kit, with two full length panels.
   B. Size: 72” x 24” x 24” or 72” x 24” x 30”
   C. Color: Gray
   D. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
   E. Installation:
      1) Install in accordance with manufacturer’s instructions.
      2) Install furnishings level, plumb, square, and as indicated on the drawings.
      3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.
   F. **BPRD Standard Drawing: D8.32A, D8.32B**

4. Freestanding Outlet Pedestals
   A. PEDOC Power Solutions, 5P42-C, 14-gallon stainless steel pedestal, weatherproof outlet covers.
   B. Color: Terra Brown (RAL 8028)
   C. Preparation: Ensure surfaces to receive furnishings are clean, flat, and level.
   D. Installation:
      1) Install in accordance with manufacturer’s instructions.
      2) Install furnishings level, plumb, square, and as indicated on the drawings.
      3) Prior to installation, review location of furnishings with owner for approval. Make adjustments to locations as directed.
   E. **BPRD Standard Drawing: D8.31**
5.0 Structures

GENERAL REQUIREMENTS

Summary
1. Provide products that comply with requirements of contract documents and that are undamaged and, unless otherwise indicated, unused at time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use and effect.
2. Where they are available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Where, because of nature of its application, owner is likely to need replacement or additional amounts of product at later date, either for maintenance and repair, or replacement, provide standard, domestically produced products for which manufacturer has published assurances that products and parts are likely to be available to owner at later date.
4. Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's name plates or trademarks on exposed surfaces of products which will be exposed to view.
5. Notify owner of long lead items and any need to expedite ordering.
6. Contractor is responsible for timely ordering of items to meet schedule requirements.
7. No schedule adjustments will be granted for contractor's failure to order items in a timely manner.

Submittals
1. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include specification section number and title and drawing numbers and titles.

Quality Assurance
1. Compatibility of Options: If contractor is given option of selecting between two or more products for use on project, select product compatible with products previously selected, even if previously selected products were also options.
   A. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   B. If a dispute arises between contractors over concurrently selectable but incompatible products, owner will determine which products shall be used.

Product Delivery, Storage, and Handling
1. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
2. Delivery and Handling:
   A. Schedule delivery to minimize long-term storage at project site and to prevent overcrowding of construction spaces.
   B. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   C. Deliver products to project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   D. Inspect products on delivery to determine compliance with the contract documents and to determine that products are undamaged and properly protected.
   E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
3. Storage
   A. Store products to allow for inspection and measurement of quantity or counting of units.
   B. Store materials in a manner that will not endanger project structure.
   C. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
   D. Provide off-site storage and protection when site does not permit on-site storage or protection. Coordinate off-site storage with owner's representative if said materials are to be included in applications for payment. Materials stored off-site shall be in bonded facilities if included in application for payment.
   E. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
   F. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
   G. Protect stored products from damage and liquids from freezing.

Selection Procedures
1. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
2. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the contract documents.
3. Where products are accompanied by the term "as selected" owner will make selection.
5. For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements to obtain approval for use of an unnamed product.
6. Where specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
7. Where specifications name a product, or refer to a product indicated on drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements for consideration of an unnamed product by one of the other named manufacturers.

Chain Link Fencing
1. Steel Chain Link Fabric: Nine gauge vinyl coated to six gauge, 2” mesh; unless no-climb is indicated then mesh meeting the requirements of ASTM 2049-11, nine gauge vinyl coated to six gauge.
   A. Polymer Coated Steel Fabric: Class 2a extruded and adhered, nine gauge; the wire gauge specified for polymer coated wire is that of the metallic coated steel core wire.
      1) Color: brown, in compliance with ASTM F934, or as specified on drawings.
   B. Fabric selvage: Selvage shall be knuckled at both top and bottom on all fabric below nine feet in height.
   C. Tie Wire and Hog Rings: Polymer coated; match the coating, class and color to that of the chain link fabric, tie wire every 12 inch along top rail, hog rings every 24 inch along tension wire.
2. Chain Link Fabric, Hardware, Gates and Tubing: Specify consistent with the Chain Link Fence Manufacturers Institute guide for Commercial Chain Link Fence and Gate (CLFS 2445)
   A. BPRD Standard Drawings: D5.11, D5.12, D5.14
Other Fencing

1. Concrete Rail Fence:
   A. Columns to be 6” x 6”, chamfered top, reinforced concrete.
      1) Single or double rail systems.
   B. Rail spacing not to exceed 8 feet on center.
   C. Texture: All exposed sides to have wood-grained texture.
      1) BPRD Standard Drawing: 5.21

2. Split Rail Fence:
   A. Posts of 18 inch girth (approximately 25 square inches)
      1) Single or double rail systems.
   B. Rail Spacing not to exceed 10 feet on center.
      1) BPRD Standard Drawing: 5.15

Bollards and Gates

1. Removable Bollard:
   A. Owner furnished, contractor installed (OFCI), owner will furnish product indicated. The work includes receiving, unloading, handling, storing, protecting, and installing owner-furnished product.
      1) BPRD Standard Drawing: 5.82

2. Trail Gates:
   A. Owner furnished, contractor installed (OFCI), owner will furnish product indicated. The work includes receiving, unloading, handling, storing, protecting, and installing owner-furnished product.
      1) BPRD Standard Drawing: 5.84
6.0 Irrigation

IRRIGATION

Performance Requirements
1. Irrigation zone control shall be automatic operation with controller and automatic control valves.

Submittals
1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
4. Qualification Data: For qualified installer.
5. Zoning Chart: Show each irrigation zone and its control valve.
7. Field quality-control reports.

Quality Assurance
1. Installer Qualifications: An employer of workers that include a Professional Class member of the American Society of Irrigation Consultants.

Pipes, Tubes, and Fittings
1. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
   A. PVC pipe in sizes of 1”, 1 1/2”, 2”, 2 ½”, 3”, 4”.
   B. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

Automatic Control Valves
1. Plastic, Automatic Control Valves:
   A. Description: Rainbird
      1) Molded-ABS, plastic body
      2) Normally closed, diaphragm type with manual-flow adjustment and operated by 24-V ac solenoid.
   B. BPRD Standard Drawing: D6.12

Sprinklers
1. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
2. Plastic Rotors:
   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Rain Bird Corporation.
   B. Description: Rainbird 6504 Falcon, Rainbird 5505
      1) Body Material: ABS.
      2) Nozzle: ABS.
      3) Retraction Spring: Stainless steel.
      4) Internal Parts: Corrosion resistant.
      5) SAM Check Device.
   C. BPRD Standard Drawing: D6.21
3. Plastic Shrub Sprinklers:
   A. Manufacturers: Subject to compliance with requirements, provide products by the following:
      1) Rainbird
   B. Description:
      1) Body Material: ABS or other plastic.
      2) Pattern: Fixed, with flow adjustment.

Quick Couplers
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   A. Rain Bird Corporation: Model; 44-RC: 1" (26/34) Rubber Cover, 2-Piece Body

Trace Wire
1. Provide 18 gauge direct burial wire (blue) for locating irrigation circuit piping.
2. Provide connectors which securely connect wires to the main trace wire, effectively moisture sealed by means of a
dielectric non-hardening silicone sealant, and manufacturer approved for direct burial, for splices to establish a
continuous run of trace wire.
3. Trace wire shall be installed in the same trench, including through sleeves, with the piping during installation. The
wire shall be installed directly above the pipe. The trace wire shall be securely bonded together at all wire joints with
an approved watertight connector to provide electrical continuity.
4. Except for approved spliced-in repair or replacement connections, trace wire shall be continuous and without splices
from each trace wire access point.
5. Trace wire access points will be accessible at all automatic control valve locations.
6. Trace wire shall be protected from damage during the execution of the work. No cuts or breaks in the trace wire or
trace wire insulation shall be permitted.
7. At each automatic control valve, a minimum of three feet of trace wire will be coiled and secured near the control
valve.
8. Contractor shall perform a continuity test on all trace wire in the presence of the owner’s representative. If the trace
wire is found to be non-continuous after testing, the contractor shall repair or replace the failed segment of the wire.

Controllers
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   A. For Systems greater than 48 zones: Baseline, BaseStation 3200; Description:
      1) Display Features
         a. Screen size is 3.5”.
         b. Screen resolution is 320 x 240 at 65,536 colors.
         c. Screen LCD brightness is 200 lumens for easy viewing in direct sunlight.
      2) Operating Features
         a. Supports up to 200 zones in any combination of two-wire and conventional wire
         b. Supports up to 20 separate programs with overlapping run times
         c. Supports up to 25 biSensor Soil Moisture Sensors
         d. Supports up to four flow sensors or meters, which manage and monitor flow across a site as
            independent or connected hydraulic systems
         e. Supports up to seven separate normally closed pause devices
         f. Concurrently operates up to 15 typical solenoids over two-wire or up to six typical solenoids
            over conventional wire
         g. Operates up to four normally open and normally closed master valves and/or pump starts
            for the entire system
         h. Maximizes watering efficiency and minimizes total irrigation time by using Intelligent Soak
            Cycles™ to prioritize cycles for zones that have already started to water over zones that
            have not started
         i. Automatically stacks overlapping programs. The system can run any number of programs
            concurrently if permitted by the zone concurrency settings.
         j. Learns the actual flow for each zone when one or more flow meters are configured in the
            system
k. Executes a high-flow or low-flow shutdown based on total system flow or on flow per flow meter
l. Intelligently schedules watering based on available flow to maximize concurrent valve operation and minimize total water time
m. Reads flow devices once every 15 seconds when watering
n. Runs a diagnostic test weekly on normally open master valves to help prevent a normally open master valve from "sticking” open
o. Detects and repairs all address conflicts for devices that are connected to the two-wire from the controller
p. Supports two-way communication with two-wire decoders (biCoders) to gather information about the two-wire voltage and communication integrity, the solenoid voltage and current, and status (open circuit, short circuit, or ok)
q. Stores all program and history information in non-volatile memory

3) Programmable Features
   a. Program up to eight start times per program in 15 minute increments
   b. Program the run times for zones from one minute to 23.5 hours
   c. Program the day intervals in even days, odd days, or odd days excluding the 31st
d. Create a custom seven-day calendar, and historical calendar with customizable half-months
e. Program unique soak and cycle times (Intelligent Soak Cycles™) for each zone. Soak times can be programmed between zero minutes and 23.5 hours.
f. Specify hours during each day of the week when water can or cannot be applied (Water Windows) in one-hour increments for each 24-hour period
g. Assign an irrigation mode (such as timed, primary, soil moisture based, or linked) to each zone
h. Manually enter a design flow for each zone, with or without an installed flow meter
   i. Manually or automatically configure soil moisture thresholds and make irrigation decisions based on those thresholds
j. Adjust your water budget from 25% to 200% by program
   k. Schedule up to eight future dates when no watering will occur
   l. Manually operate one zone, all zones of a program, or all zones, with programmable run times, delay before starting first zone, and time between zones
m. Search for and identify all devices connected to the two-wire and list them according to device type and serial number
   n. Address two-wire decoders (biCoders) by serial number by assigning each zone address a device serial number
   o. Re-address any two-wire decoder (biCoder) from the controller by re-assigning the device’s serial number to a new zone address
   p. Assign any station or terminal number on a multi-station biCoder from the controller to any zone address in any order
   q. Back up all programming and historical data with any USB flash drive
   r. Establish two levels of remote password protection: read only access and read/write access
   s. Configure pipe stabilization time for flow management

4) Central Control and Remote Control
   a. Connect the BaseStation 3200 to BaseManager™ central control software when configured with an approved communication module. Communication options include ethernet, wi-fi, cellular modem, mesh radio, and serial connections.
   b. Manually program and operate all configured zones from BaseManager central control software
c. Receive email and text message alerts when connected to BaseManager central control software
d. Perform manual operations remotely with Mobile Access™ when connected to BaseManager central control software

5) Power Output
   a. Station Output: 30 VAC RMS over two-wire
   b. Supports up to 1.45 amp output
c. UL Listed
d. The controller powers down the two-wire after one minute of idle time
e. Drive current to a decoder is 100 to 250 milliamps (depending on the solenoid)
f. Supports up to 110 device loads on a two-wire path
   - 1, 2, and 4 station biCoders = 1 load
   - 12 to 24 station Powered biCoder = 2 loads
   - Soil Moisture Sensor = 1 load
   - Flow biCoder = 3 loads

6) Solenoid Specification
   a. Requires a typical solenoid with approximately 400 milliamps of inrush current and
      approximately 200 milliamps holding current

7) Surge
   a. 10 levels of surge protection
   b. Up to five levels of surge protection built into the controller boards
   c. Minimum surge response time of one picosecond

8) Enclosure Options
   a. “C” Cabinet—Wall Mount Enclosure
   b. Dimensions: 10.13”W x 12.00”H x 4.75”D
   c. 16-gauge steel, powder-coated

B. For Systems greater than 24 zones up to 48 zones: Weathermatic, SmartLine Solar System 48 Zones; model SLSOLAR-48. Description:
   1) Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two
      matching keys; include provision for grounding.
      a. Body Material: powder coated metal enclosure with matching pedestal
   2) Control Transformer: 24-V secondary, with primary fuse.
   3) Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any
      day in timer period, to operate every other day, or to operate two or more times daily.
      a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic
         operation.
      b. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during
         power outages.
      c. Surge-Cadmium Battery and Trickle Charger: Automatically powers timing device during
         power outages.
   4) Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.
   5) SmartLink Aircard: Shall be model as manufactured by Weathermatic Sprinkler Division of Telsco
      Industries. Package to be available with flow monitoring by amending the model to include FLOW.
      AIRCARDS must be compatible for use with SmartLine irrigation controls.
   6) Flow Sensor: Tee Type PVC Flow Sensor, the flow sensor shall consist of a custom molded tee
      shaped body with socket ends conforming to PVC pipe dimensions, a flow sensor housing
      containing the electronic circuitry and carrying the spinning impeller and a retaining nut, compatible
      with controller.
   7) Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for
      direct burial.
   8) Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
   9) Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic
      control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different
      colors for multiple-cable installation in same trench.
   10) Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or
       crimped joint and epoxy resin moisture seal; suitable for direct burial.

C. For Systems up to 24 zones: Weathermatic, Smartline model SL1624. Description:
   1) Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two
      matching keys; include provision for grounding.
      a. Body Material: powder coated metal enclosure with matching pedestal
      b. Mounting: Freestanding type for concrete base
   2) Control Transformer: 24-V secondary, with primary fuse.
3) Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
   a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
   c. Surge Protection: Metal-oxide-varistor type on each station and primary power.
4) Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.
5) SmartLink Aircard: Shall be model as manufactured by Weathermatic Sprinkler Division of Telsco Industries. Package to be available with flow monitoring by amending the model to include FLOW. AIRCARDS must be compatible for use with SmartLine irrigation controls.
6) Flow Sensor: Tee Type PVC Flow Sensor, the flow sensor shall consist of a custom molded tee shaped body with socket ends conforming to PVC pipe dimensions, a flow sensor housing containing the electronic circuitry and carrying the spinning impeller and a retaining nut, compatible with controller.
7) Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.
8) Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
9) Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
10) Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

Irrigation Heads
1. Install heads 12 inches off paving and 12 inches off curbs.
2. Install heads 24 inches off curbs at vehicle overhangs in shrub zones.
3. Install sprinkler heads after final grading.

Balancing
1. Adjust and balance system to provide uniform coverage following installation of landscape work.
2. Adjust heads for proper direction and optimum coverage without excessive overthrow on walks and roads.
3. Assure that no spray strikes buildings, roadways, or parked cars.
4. Set controllers to operate system as required.

Clean-Up
1. Replace all permanent features disturbed by the installation.

Final Inspection
1. Demonstrate the entire system to owner, showing the remote control valves are properly balanced, the heads are properly adjusted for radius and arc coverage, and the installed system is working properly.
2. Demonstrate head adjustment, controller and valve operation, and winterization procedures.

Record Drawings
1. Contractor to provide As-Built drawings of complete irrigation system. Drawings shall include details including locations and layout of POC, master valve, flow meter, mainline, valves including numbering and identification, lateral lines, and irrigation head locations.
PLANTING

7.0 Planting

Soil Preparation

1. Testing Requirements
   A. General: Perform tests on soil samples.
   B. Physical Testing
   C. Chemical Testing
   D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT WERA-103.
   E. Organic-Matter Content.
   F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
      1) Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 square feet for six inch depth of soil.
      2) Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 square feet for six inch depth of soil.

2. Organic Soil Amendments
   A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
      1) pH of 5.5 to 8.
      2) Moisture Content: 35 to 55% by weight.
      3) Organic-Matter Content: 30 to 40% of dry weight.
      4) Particle-size requirement: 3/4 inch (19 millimeter).
      5) Particle Size: Minimum of 98% passing through a one inch sieve.

3. Submittals
   A. Qualification Data: For landscape installer. Include list of similar projects completed by installer demonstrating installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.
   B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
      1) Manufacturer's certified analysis of standard products.
      2) Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.
   C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to project.
   D. Sample Warranty: For special warranty.
   E. Maintenance Data: Recommended procedures to be established by owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

4. Quality Assurance
   A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
      1) Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
      2) Experience: Five years experience in landscape installation in addition to requirements in Section 014000 "Quality Requirements."  
      3) Installer's Field Supervision: Require installer to maintain an experienced full-time supervisor on project site when work is in progress.
      4) Pesticide Applicator: State licensed, commercial.
   B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.
   1) Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements six inches above the root flare for trees up to four inch caliper size, and 12 inches above the root flare for larger sizes.
   2) Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Owner's representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner’s representative may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from project site.
   1) Notify owner’s representative of sources of planting materials seven days in advance of delivery to site.

5. Delivery, Storage, and Handling

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and federal laws if applicable.

B. Bulk Materials:
   1) Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2) Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3) Accompany each delivery of bulk materials with appropriate certificates.

C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65°F Fahrenheit until planting.

G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   1) If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
   1) Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
   2) Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
   3) Do not remove container-grown stock from containers before time of planting.
   4) Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.
6. Plant Material
   A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in plant list, plant schedule, or plant legend indicated on drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
   1) Nursery grown plants shall be grown locally or be acclimatized to the High Desert region for a minimum of 90 days before delivery to site.
   2) Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
   3) Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery except as harvested from site.
   B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to owner’s representative, with a proportionate increase in size of roots or balls.
   C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
   D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

7. Mulches
   A. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55% by weight; 100% passing through a one inch sieve; soluble-salt content of 2 to 5 dS/m; not exceeding 0.5% inert contaminants and free of substances toxic to plantings; and as follows:
      1) Organic Matter Content: 50 to 60% of dry weight.
      2) Feedstock: Agricultural, food, or industrial residuals; bio solids; yard trimmings; or source-separated or compostable mixed solid waste.

8. Preparation
   A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
   B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
   C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain owner’s representative's acceptance of layout before excavating or planting. Make minor adjustments as required.

9. Planting Area Establishment
   A. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.
   B. Before planting, obtain owner's representative's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

10. Excavation for Trees and Shrubs
    A. Planting Pits and Trenches: Excavate circular planting pits.
       1) Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
       2) Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
3) Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4) Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5) If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6) Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7) Maintain supervision of excavations during working hours.
8) Keep excavations covered or otherwise protected after working hours.
9) If drain tile is indicated on drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify owner’s representative if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

D. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

11. Plant Maintenance
   A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.
   B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
   C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

12. Repair and Replacement
   A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by owner’s representative.
      1) Submit details of proposed pruning and repairs.
      2) Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
      3) Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by owner’s representative.
   B. Remove and replace trees that are more than 25% dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that owner’s representative determines are incapable of restoring to normal growth pattern.

13. Protection
   A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
   B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off owner’s property.
   C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
   D. After installation and before substantial completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and project site.
   E. At time of substantial completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.
Chapter 4

9.0 Signs
9.0 Signs

Introduction

Effective communication requires the clear and concise delivery of a coherent message. Signs are an important means to communicate information to the public about park properties owned and operated by BPRD. The Park & Trails Sign Program Guide assists district personnel in the proper use of signs to facilitate the public’s enjoyment of parks and trails, foster safety and stewardship, provide learning opportunities, and enhance experiences. Facility signage is not covered in this document.

Currently, many locations include a collection of signs from various generations of managers and sign designers resulting in a variety of formats, styles, colors, and text. As these existing signs are replaced, they are to adhere to the information contained in this document. This guide defines how signs are developed and procured, graphics and materials used, installation standards and methods, and describes sign locations and grouping. Wayfinding, informational, interpretive, regulatory, and behavior encouragement signs are generally custom designs with predetermined sizes, shapes, fonts, colors, materials, layout, and installation standards as set forth in this guide. To jump from the table of contents to a certain section of the guide, simply hover the cursor over the name of the section, hold down the CTRL key, and left click. Links to specification sheets are provided throughout the guide to assist. Many sign images also contain direct links to spec sheets, JPEGs, or PDF images. To assure compliance with regulatory requirements and district best practices, all signs purchased and installed on park properties are to comply with the specifications contained within this guide.

The district utilizes custom designs as well as commercially available signage for parks, trails, parking lots and roadways. New and replacement signs for existing park and trails are to follow the specifications defined in this guide. Certain signs such as ADA, fire lane, and other MUTCD signage for streets and parking areas shall be purchased commercially to assure correct regulatory messaging and compliance. In select locations, unique sign graphics and installations may be preferred over the standard custom design and commercially available signs. Certain existing parks have their own unique sign graphics and therefore do not follow the standard specifications directive within this document. The guide separates the sign specifications for these unique locations into individual sections. The planning & development department shall determine the specific sign package to be used for new park and trail developments.

The asset & property analyst is primarily responsible for oversite of the park and trails sign program, purchasing of signs, and the maintenance of this guide. Other staff involved in the program includes the executive director, deputy executive director, superintendent of park services, fleet/shop manager, facilities manager, development manager, project managers, and manager of communications & community relations. This document is reviewed and updated every three years by the asset & property analyst and others as needed.
SIGN DEVELOPMENT & PROCUREMENT PROCESS

During the course of work, district staff may determine the need for signage to communicate information to patrons. To assure best messaging and to prevent excessive and haphazard signage, the district has processes and standards for procurement, design development, and installation. By following these processes, signs will be efficiently and correctly developed, purchased, and installed to successfully achieve the goals of the signage. Signs that do not follow this process are considered out of compliance and shall be removed.

Existing Parks and Trails
1. The park services department manages signs in existing parks and trails once development has been completed. Signs for existing locations are paid for using general funds.
2. New sign requests shall be made through the requestor's department manager. The requestor should seek input from other associated or affected district staff as needed. The request shall include:
   A. the specific issue to be addressed
   B. the intended communication
   C. specific location for the sign
   D. intended duration of the sign
3. Sign requests are sent by the department manager via email to the superintendent of park services for approval. Other district management staff may be contacted for review.
4. If the request is approved by the superintendent of park services, the request is then routed to the asset & property analyst for development of a graphic mock-up to be reviewed by Superintendent and requestor.
5. If the mock-up is approved, the asset & property analyst:
   A. orders the sign and manages payment
   B. submits a work order request for the installation of the sign following installation specifications, and
   C. works with the fleet/shop manager on custom mounting material needs.
6. Installations of signs in existing parks or trails are generally accomplished by park services staff including facilities, trails, and landscaping divisions.

New Parks and Trails
1. Planning & development department manages signs for new construction projects. Signs for new parks and trails are generally paid for through project funding.
2. The project manager determines sign needs (wayfinding, regulatory, traffic control, informational, and interpretive). Determining locations for signs may include other staff. Planning & park services director determines if a location warrants a unique look or district standard signs as defined in this guide.
3. Project manager itemizes sign needs and locations within the new development for order placement, and manages the work to develop mock-ups for review.
4. When approved, the project manager manages the procurement of the sign and custom mounting materials with the fleet/shop manager if needed.
5. Project manager also updates asset & property analyst of new signage.
6. Permitting for new park entry signs is coordinated by the project manager.
7. BPRD-supplied signage is generally installed by contractor or planning & development staff.
8. While new parks and trails are in the development phase, the District installs a 4” x 6” plywood “We See Fun Coming Your Way” sign.

SIGN MESSAGE & CONTENT READABILITY

Sign content should convey the intended message clearly, concisely, and consistently throughout the district. Excessive dialog diminishes the message and confuses the reader. To the right is an example of an old sign that demonstrates excessive dialog. Complete words should be used; abbreviations are used only when necessary and cannot be misunderstood. Pictographic symbols are encouraged to supplement the English word message provided they clearly convey the intended message. Consider the use of bilingual signs where the situation warrants.
When composing a single-message sign, consider the following guidelines (example of suitable message):

- For single-message signs, use no more than four words per message or line, except where the proper name of a destination is more than four words long. (Example to the right)
- Use as few word lines as possible. A maximum of three lines of directions is recommended. Do not use more than five lines of text on a sign.
- Keep messages short by using certain commonly recognized abbreviations (e.g., “Rd” for “Road,” “Mt” for “Mount,” “Pt” for “Point,” or “St” for “Street”). **DO NOT** abbreviate historic proper names.

Signs can be either landscape or portrait oriented with varying dimensions depending upon the application, location, desired viewing distance, and mounting/installation specification. Where the length of time to read the sign is short such as when one is driving, the message must be short and confined to the essentials. Reading distance from the sign determines the size of the font.

**Distance Legibility Chart**

![Distance Legibility Chart](image)
**ADA REQUIREMENTS FOR PARKS & TRAILS SIGNAGE**

Like all public facilities, parks and trails must comply with ADA regulations. Though each developed location is unique, all parking lots and restroom facilities are to include signs compliant with these regulations. Planning & development department is responsible for determining these rules and implementing sign development to meet regulations. (see “Accessibility Guidebook for Outdoor Recreation - 2012”, and the “Quick Reference Guide to ADA Signage”)

**PARK & TRAILS SIGN BASICS**

Below are examples of the basic styles and graphics that characterize park and trail signage. Generally, park and trail signs are one of three basic layouts:

The brown top bar is the template when a key word or phrase identifies the purpose of the sign. These signs can be portrait or landscape oriented with the color logo in horizontal orientation centered at the bottom.

Park boundary signs have a blue (PMS 302) top bar that is more visible in an earth-tone landscape.
Some signs have a bottom bar which includes additional information, and/or critical messaging.

With Pictograph/No Top-Bar (blank template & examples):
1. These signs can be portrait or landscape oriented with the color logo in horizontal orientation centered at the bottom. Pictographs with succinct text are the primary means to convey messages using this style. See “Pictographs” section for common and unique sign images.

No Pictograph/No Top-Bar (examples):
1. Occasionally, pictographs are unavailable or not desired. These signs allow for larger font size when reading distance is a factor. With few words, the message is quickly understood. These signs can be portrait or landscape oriented with the color logo in horizontal orientation centered at the bottom.

2. Signs can be portrait or landscape oriented. Signs have either rounded or squared corners depending on mounting frame, installation location, and method. Colors for sign graphics and installation materials are specified by PMS or RAL color matching systems. The district’s color logo in horizontal orientation is located at the bottom of the sign. The choice of layout style for new signs should clearly convey the message and be consistent with other park locations.

3. Park entry signs, which identify the park from the street, are slightly different and described in greater detail in the “Park Entry Signs Specifications Sheets” section.
Fonts
1. The standard park and trails sign font is “Myriad Pro”. (Note: some older sign images in this guide were developed prior to the establishment of “Myriad Pro” as the standard and are included here for reference only).
2. Park entry signs utilize “Century” for the name of the park, and the address font is “Highway Gothic Expanded”.
3. Key words are capitalized with lower case letters using a specified font. Short words (coordinating conjugations) less than five letters are not capitalized. This capitalization style has been shown to improve readability and enhance understanding.
   ALL-CAPITAL lettering is only used in limited situations.
4. Certain locations with unique sign packages may utilize a font and format other than the above.
   See “Unique Sign Package Locations” section for font information of these specifics location.

Colors

<table>
<thead>
<tr>
<th>Color Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMS 476</td>
<td>Brown Top bar, backside vinyl on most signs</td>
</tr>
<tr>
<td>PMS 7499</td>
<td>Cream at 50% screen Main body of signs</td>
</tr>
<tr>
<td>PMS 3425</td>
<td>Green BPRD logo, trail arrows</td>
</tr>
<tr>
<td>PMS 302</td>
<td>Blue BPRD logo and top bar</td>
</tr>
<tr>
<td>Black</td>
<td>BPRD logo, pictograph icons and border, font on light backgrounds</td>
</tr>
<tr>
<td>White</td>
<td>Font on dark backgrounds</td>
</tr>
<tr>
<td>RAL 8028</td>
<td>Terra brown New park standard for sign posts, frames, crossbars, mounting plates, etc.</td>
</tr>
</tbody>
</table>

Logos
1. Other than MUTCD signage, signs on district property should include the logo that identifies the sign and location as belonging to the district. Refer to the “BPRD Play for Life Style Guide” for detailed information regarding the district’s horizontal logo. Most sign applications include a light colored (cream) background. In these instances, the logo should be the standard specified PMS colors:

   ![Bend Park & Recreation District Logo](image)

   Green PMS 3425  
   Blue PMS 302  
   Black  
   White

2. Off-leash kiosk sign below utilizes the vertical logo format.

   ![Off-Leash Kiosk Sign](image)

   (Note: this image was created before the current sign font standards were established and is included as reference only)

3. On signs which include a dark background, the logo shall be white:
SIGN TYPES AND PURPOSE

Regulatory Signs
1. Regulatory signs are used to inform patrons of laws, regulations, district rules and policies, or requirements which apply either at all times or at specified times or places within a park, the disregard of which may constitute a violation. Successful regulatory signs should have a direct, clear and consistent message to communicate expectations, allowable uses, and boundaries of behaviors. These signs should be located where they are most likely to be seen such as parking lots, trail heads, entries, kiosks, drinking fountains, restrooms or places where behavior enhancement is needed. If a specific law applies to the sign, the code number shall be included on the sign. Park rules signs can be either double-sided or single–sided with a brown vinyl back. Specification sheets for these and more are found in the “Sign Guide Linked Documents” section.

Examples of standard park regulatory signs:

Informational Signs
1. Informational signs are used to define the purpose of an object or give instruction on the use of something. They generally utilize the “top bar” format, but these signs can also be individually unique as the “River Float People” example below. Detailed information can be found in the Informational Sign Specifications Sheets’ section.
Off-Leash Area Informational Signage & Kiosk

1. Dog off-leash Areas (OLAs) include a kiosk with a grouping of signs on one side which communicate numerous messages about the OLA and others around the district. These are located inside the OLA boundaries. The rear of the kiosk is to remain blank. See “OLA Signage” section for details. Note: these sign images were created before the current sign font standards were established and are included as reference only. Future and replacement OLA signs are to incorporate current standards, revised “Rules & Courtesies”, simplified “Safety Information”, new map imagery, and the “Don’t poo-lute…” bottom sign will be eliminated.

2. The map image for replacement and future developments has changed to the format and colors of the map from Rockridge Park below:
Small Dog OLAs
1. Small dog OLAs include a “NOTICE” sign on the entry gate and “Indigo”, a cartoon dog image that defines the maximum size of dog allowed inside. The “NOTICE” sign pictured below needs updating (delete top and bottom bar, change font to Myriad Pro, and replace logo with centered horizontal color logo).

![NOTICE sign](image)

“Indigo” is ordered from Max Manufacturing (Bend, OR) and is made using 11-gauge steel.

A. Some OLAs also include a “Tilt Knee Sign” located outside the OLA primary entries. These sign images and mounting frames are also outdated and will be revised to include current standards currently in development at new locations and when replaced.

![Tilt Knee Sign](image)

(The font in the examples above is out of date and should be changed to Myriad Pro)

WAYFINDING

Park Entry Signs
1. These signs identify the park and are located nearest the main entry or along the street of the park’s prescribed address. Graphics are unique but similar to park interior signs except the font used for the park name is “Century” serif and the address and subtext is “Highway Street Expanded”.

A. Regional, community, and neighborhood parks are mainly differentiated by size and installation materials. See “Park Entry Sign Specifications” section for design and fabrication details.

Permitting
1. Generally, signs within park boundaries and along trials do not require a city or county sign permit unless they are along a public right-of-way. Park entry signs require such permitting as they are located along city roadways. In these cases, a sign permit must be obtained when installing park entry signs. The permit shall include a site plan that defines the exact location and orientation of the sign. Refer to “Ponderosa Park Entry Sign Permit Application and Site Plan” and the “City of Bend Code – Signs 9.50” for City of Bend installations. For installations outside city limits, refer to Deschutes County Sign Permit Application for instructions.
Regional and Community Park Entry Signs
1. These signs include a welded-tuft cladded masonry monument base and steel frames that contain either single or double-sided sign panels.

2. Some community parks such as Brooks Park are too small or have traffic issues which prevent them from having the community park standard sign with masonry base. In these situations, the entry sign can instead be the size and quality of the neighborhood park entry signs.

Neighborhood Parks
1. Entry signs to neighborhood parks are smaller than community park signs and do not include the masonry base, though some locations have these signs inserted into pre-existing masonry bases. In all other cases, the steel frames are buried directly into the ground with concrete spread footings (see “Double Post Frame System Installation Specifications” for details. Signs are either single or double-sided, depending on the location of the sign, traffic flow, and the signs orientation to the street.

2. In a few locations such as Hixon Park, the space is too small to include a typical neighborhood sign. In these situations, smaller signs can be designed to better fit the location.

3. Some parks include features or share a roadway which adds a line of text to the entry sign (examples below). In these situations, the second line is the same font as the address; “Highway Street Expanded”.

4. Many parks in the district have multiple entry points. Because parks are assigned only one single address, only the sign located along the assigned street should contain the address. The other signs can include the street name of that entry or exclude an address, such as described by the examples below:
Trails Wayfinding Signage
1. Major trails which start within parks have a trailhead sign which contains relevant information regarding the trail, rules and courtesies, accessibility, district contact information, and a trail map.

![Coyner Trailhead Sign](image)

(The font in the example above is out of date and should be changed to Myriad Pro)

2. Reassurance markers are also included along major trails at key locations and intersections. The signs generally include park or trail name, and a white arrow with green background. However, each location and situation may require unique text and layout. These signs are mounted on 6” x 6” cedar wood posts and include an arrow as demonstrated below:

![To Sylvan Park and Alpine Park Signs](image)

A. The arrows intend to direct the user to or along the trail. The green is the same PMS 3425 as the logo. Arrows are normally used to point in three directions; straight ahead, left, and right. In some instances, an up-pointing arrow 45-degrees off vertical can be used. Arrows should never point downward.

See “Trails Sign Specifications Sheets” section for details.

Interpretive Signs
1. Interpretive signs intend to communicate messages that reveal the meanings and relationships of our cultural and natural heritage to the public through first-hand involvement with objects, artifacts, landscapes, and sites. These messages can be written to change behavior, educate, or evoke an emotion in the reader that increases patron enjoyment through the appreciation and understanding of features, concepts, themes, and stories of the natural, cultural, created, managed, and historic environments. Using a combination of well-written text and professional graphics helps to catch the attention or arouse curiosity. Since each location and situation is unique, the district does not utilize a standard interpretive sign style. Instead, a variety of designs and styles exist throughout the district as these locations and features were developed. Some signs have been developed in conjunction with other organizations. The examples below are examples of existing signs and do not imply how future signs should be developed. In particular, the arched top shape should be avoided in favor of rectangular shapes to simplify installation. Community relations department collaborating with the planning & development department are responsible for determination and development of these signs.
2. Below are examples of current interpretive signs found around the district.

![Sign Examples](image)

3. Below is an example of a recent interpretive sign that represents a style that the district now prefers:

![Interpretive Sign Example](image)
Traffic Control (Roadway & Parking Lots)

1. Many district properties include private roadways or are adjacent to public roads where specific sign types and design are compulsory by regulatory requirement. The US Department of Transportation’s “Manual on Uniform Traffic Control Devices (MUTCD)” defines the warning and regulatory signage for roadways and parking lots. These are purchased commercially from many locations and shall not be custom designed. These signs have specific installation standards for location and height from ground-to-bottom measure that shall be followed. These specifics are contained in the manual. MUTCD sign examples:

A. Traffic & Parking Sign Placement: Most roadway signs should be located on the right side of the road unless specific standards require otherwise. Place signs where they are clearly visible and provide adequate time for reading. Consider factors such as vehicle speed, road conditions, intermediate intersections, sight distance, and alignment. Select locations that minimize viewing obstructions. If a sign is installed within the roadway clear zone, a breakaway sign post shall be used. Avoid locations such as:
   1) Dips in the road
   2) Just beyond the crest of a hill
   3) Where a sign could be obscured by other signs or objects
   4) Where the sign may interfere with the normal use of the road, bike lanes, and walkways
   5) Where vegetation could cover the sign
   6) Snow removal and disposal areas

B. Sign Face Orientation: Signs are mounted at approximately right angles to oncoming traffic. It may be necessary to rotate a sign slightly off 90 degrees to avoid glare reflecting off the sign face directly into the driver’s eyes.

C. Mounting Height: Mounting height is measured from the ground surface to the bottom of the sign. Use a minimum of seven feet in areas with parking or pedestrians including sidewalks, and areas where the view of the sign may be obstructed.

NEW PARK & TRAIL DEVELOPMENT & CONSTRUCTION SIGNS

“We See Fun Coming Your Way”

1. Planning & development department personnel are responsible for these temporary signs which are to be placed at the location of a new development several months prior to construction. These signs are 4’ x 6’ on MDO plywood. The sign should include the location name, “We See Fun Coming Your Way” text, bullet-point information about the project, project contact information, and the district web address. The specific message is unique depending upon the project. The “Play for Life” tagline should not be included on future signs.

![Sign Example](image-url)
UNIQUE LOCATIONS SIGN PACKAGES

Riley Ranch Nature Reserve
1. This park has a unique sign package with many similarities with the specifications within this guide. Details and production .ai files for future new and replacement signs are available in the “Riley Ranch Nature Reserve/Riley Ranch Production Files” section. The park entry sign is similar to other district regional and community parks but maintains a unique appearance (see “Riley Ranch Park Entry Sign” for specifications).

Shevlin Park
1. This park has a unique sign package with many similarities with the specifications within this guide. The park entry sign is mostly the same as other district regional and community parks, but its mounting method utilizes the existing masonry unique to the location (see “Shevlin Park Entry Sign” for specifications). Future new and replacement signs shall refer to the “Shevlin Park Signage Masterplan March 1, 2018” section of this guide.
Whitewater Park & River Float Corridor

1. The Bend Whitewater Park, and the stretch of the Deschutes River between Farewell Bend Park and Drake Park where floating occurs, are considered unique locations needing distinctive signs. Riverbend Park, Farewell Bend Park, and McKay Park have a variety of these signs installed, depending on the individual locations need to convey information relevant to the site. Other images can be found in the “Whitewater Park and Float Corridor Sign Specifications” section of the guide. Production files for these are available from the community relations department.

The actual size dimensions for the “Are You River Ready?” sign above can be found by clicking this link: “Are You River Ready People Sign Dimensions”.

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Marine Board Waterway Signage

1. Custom Marine Board signs are used in situations where persons using the Deschutes River within or adjacent to a district park need instruction or wayfinding information. The district is required to follow Oregon State Marine Board requirements for signage. These signs are very specific in their design, type, size, and location. Below are examples of signs the district has installed in accordance with the Marine Board’s specifications. All such signs require Marine Board review and approval prior to fabrication and installation (Application Form). Once approved, the district either purchases premade or utilizes local sign design and fabricators for production of custom signs. For further information on waterway signage, consult with the Oregon State Marine Board website: http://www.oregon.gov/OSMB/boater-info/Pages/Waterway-Markers.aspx

Custom Marine Board Sign examples:

A. The Marine Board sign specifications at the Whitewater Park can be found by clicking the links; Colorado Bridge Marine Signage Specifications, and Pedestrian Bridge North Side Marine Sign.

Disc Golf

1. Disc Golf courses utilize unique signs specific for their intent. See “Disc Golf” section for details.

Temporary Signs

1. Temporary signs are used in district parks and trails to notify patrons of short-term projects, closures, hazards, and way finding. These signs are usually produced in-house, printed on paper and laminated to provide some protection from weather and irrigation. Reoccurring temporary signs can be made with more durable materials if warranted. Temporary signs are to adhere to the same design criteria as permanent signs that are defined in this guide. Installation of such signs should maintain a desirable appearance and not detract from the messaging.

Sign Locations, Placement, and Grouping

1. The correct location and placement of a sign should enhance readability, reduce risk, meet code and permitting requirements, and minimize view obstructions. Though the specific location and placement for every sign cannot be defined by this guide, the requestor and installer should study the location and situation the sign is attempting to address while determining sign placement. All new signs must comply with City of Bend Sign Code with particular attention to General Requirements 9.50.100, and Clear Vision Areas 3.1.500.
2. New and replacement signs shall also consider their location and the presence of other signage in the immediate area. Too many signs in a single location (over-signing) and haphazard placement can significantly diminish a patron's understanding of the intended messages. Multiple signs in the same location can overload users with information, causing confusion and disregard of critical messages. Below are examples to avoid. In situations such as these, replacing the various signs with a single sign panel containing the various messages should be considered.

3. Grouping two signs together to share a frame or post should be avoided. Signs with different messages should be erected individually on separate posts, or combined on the same sign panel. Below are examples of sign groupings that should be avoided:
SIGN INSTALLATION SPECIFICATIONS

Installation of signs varies by sign type, location, and application. Park Rules and Trailhead signs are installed using a “Double Post Frame” with an open back, allowing for an optional double-sided sign. Traffic and other signs located near roadways are to be installed on knockdown (breakaway) posts and powder coated RAL 8028 Terra Brown. Trail reassurance markers are to be mounted on 8” x 8” rough-sawn “Cedar Sign Posts”. “Adopt- a-Park” and “Adopt-a-Trail” signs also have posts specific for their installation. See “Sign Installation Specifications” section for more information.

Kiosks

1. Off-Leash Areas and many trailheads include kiosks that signs are mounted directly onto. Planning & development staff determine the location of these kiosks in new developments. Specifications for their fabrication can be found here, “Kiosk Fabrication Specifications”.

Standard Park and Trail Sign Package

1. Planning & development staff shall develop a list of signs needed when designing and constructing new parks and trails, or renovating existing. The “Park & Trail Signage Menu” document provides a list of possible signs needed with graphic images. Some locations may require signs not included in this document. Some amenities such as bike courses or playgrounds are unique to the location and should be designed accordingly.

Signs located along trails and park walkways should be installed so that the nearest edge of the sign is at least three feet from the edge of the path to allow adequate clearance for bicycles and service vehicles.
Sign Maintenance Standards
1. Perform maintenance on a regular and systematic basis to ensure signs and other traffic control devices are clean, undamaged, and functional. Use only those materials (paints, stains, sheeting, hardware, etc.) that comply with the original specifications for the sign. Evaluate the maintained product against the standard for materials and workmanship established for the original. Clear all trees, brush, and other vegetation that may obscure signs. Also make sure that fences or other objects do not obscure signs. Relocate signs if obstructions cannot be eliminated. Vandalized signs that cannot be cleaned or repaired should be replaced following the sign procurement process. Graffiti can be cleaned off many park signs since they are usually made with an anti-graffiti film.

Disposal of Excess, Obsolete, and Damaged Signs
1. Care must be taken to ensure that all signs removed from district properties are properly disposed of to prevent their misuse and misrepresentation. Damaged aluminum-backed signs should be recycled by placing it in the metal recycling bin at park services. If the aluminum and ply backing are not damaged or holes drilled for mounting, these can be returned to the sign maker for re-use. DiBond sign boards are not recyclable, and if not repurposed, should be disposed of in the trash.
Appendixes

Specification Drawings

3.11A - Asphalt Surface Pedestrian Path
3.11B - Asphalt Surface Driving Surface
3.11C - Asphalt Surface Porous
4.41 - Direct Bury Pedestal Table
4.42 - Surface Mount Pedestal Table
4.44 - 4 Seat Tangent Table Ensemble with Sunshade A
4.45 - 6 Seat Tangent Table Ensemble with Sunshade B
4.51A - Park Bend on Concrete
4.51B - Park Bench on Pavers/Asphalt
4.51C - Park Bench on Lawn/Mulch
4.61A - Litter Receptacle Installation in Concrete
4.61B - Litter Receptacle Installation in Pavers/Asphalt
4.61C - Litter Receptacle Installation in Lawn/Mulch
4.63 - Doggie Station Installation
4.81 - Bicycle Rack Installation
4.84 - Drinking Fountain Installation
5.11 - Playground Chain Link Fencing
5.12 - Site Chain Link Fencing
5.14 - Gate Chain Child Fencing
5.15 - Split Rail Fencing with Mesh
5.21 - Concrete Rail Fence
5.83 - Removable Round Bollard
5.84 - COHCT Trail Gate
6.12 - Irrigation Box Setup
6.21 - Irrigation Falcon 6504
8.31 - Vertical Power Box Hinge Top
8.32A - 24 x 24 Dual Access Electrical Cabinet A
8.32B - 36 x 36 Dual Access Electrical Cabinet B
NOTE A PATH WIDTH TO BE SPECIFIED ON SITE PLAN.

NOTE B CROSS SLOPE NOT TO EXCEED 2%.

NOTE C SPECIFICATIONS: SHALL CONFORM TO THE CURRENT OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION, AS MODIFIED OR SUPPLEMENTED BY THE CITY OF BEND SPECIAL PROVISIONS TO THE OREGON STANDARD SPECIFICATIONS.
Specification Drawings

NOTES

A PATH WIDTH TO BE SPECIFIED ON SITE PLAN.
B CROSS SLOPE NOT TO EXCEED 2%.
C SPECIFICATIONS: SHALL CONFORM TO THE CURRENT OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION, AS MODIFIED OR SUPPLEMENTED BY THE CITY OF BEND SPECIAL PROVISIONS TO THE OREGON STANDARD SPECIFICATIONS.
3" THICK PERMEABLE ASPHALT LEVEL 2, 1/2" OPEN, PG 70-22
MHMAC (2 LIFTS)

1" NOM. COMPACTED THICKNESS
CHOKER COURSE
ASTM NO. 57 STONE

13" NOM. COMPACTED THICKNESS
OPEN-GRADED AGGREGATE BASE
ASTM NO. 3 STONE

WOVEN GEOTEXTILE

MIN. 6" DEPTH
COMPACTED SUBBASE

POROUS ASPHALT SECTION
NTS

ASPHALT SURFACE
D3.11
C

Bend Park & Recreation District

edited 06.14.18
approved 00.00.00
NOTES

1. TABLE MUST MEET A.D.A. CLEARANCE REQUIREMENTS ONCE INSTALLED

TABLE FOR REFERENCE ONLY

ADA CLEARANCE HEIGHT, 27" MINIMUM

4"X4" STEEL TUBE

FINISHED GRADE CONCRETE OR PAVERS WITH A 1.5% MAX GRADE IN ALL DIRECTIONS.

4" COMPACTED AGGREGATE BASE

COMPACTED SOIL SUBGRADE

CENTER STEEL TUBE IN SONOTUBE.

24" SONOTUBE

4 SEAT & 3 SEAT ADA, SQUARE

DIRECT BURY PEDESTAL TABLE
1. TABLE MUST MEET A.D.A. CLEARANCE REQUIREMENTS ONCE INSTALLED

TABLE FOR REFERENCE ONLY

ADA CLEARANCE HEIGHT, 27" MINIMUM

4"X4" STEEL TUBE

FINISHED GRADE CONCRETE OR PAVERS WITH A 1.5% MAX GRADE IN ALL DIRECTIONS.

4" COMPACTED AGGREGATE BASE

CONCRETE PAD/SIDEWALK

*FOR REFERENCE ONLY. MOUNT PER MANUFACTURES INSTRUCTIONS.

COMPACTED SOIL SUBGRADE

CONCRETE ANCHORS

A 4 SEAT & 3 SEAT ADA, SQUARE INSTALLATION

SURFACE MOUNT PEDESTAL TABLE

D4.42

edited 05.03.18
approved 00.00.00

Bend Park & Recreation District
NOTES

1. TABLE MUST MEET A.D.A. CLEARANCE REQUIREMENTS ONCE INSTALLED
2. SEE TANGENT TABLE ENSEMBLE AND SOLERIS SUNSHADE SURFACE MOUNT INSTALLATION INSTRUCTIONS FOR MORE DETAIL.
NOTES

1. TABLE MUST MEET A.D.A. CLEARANCE REQUIREMENTS ONCE INSTALLED
2. SEE TANGENT TABLE ENSEMBLE AND SOLERIS SUNSHADE SURFACE MOUNT INSTALLLATION INSTRUCTIONS FOR MORE DETAIL.

6 Seat Tangent Table Ensemble w/ Soleris Sunshade

edited 06.06.18
approved 00.00.00

D4.45
NOTES

1. BENCH PROVIDED BY OWNER

2. FOR REFERENCE ONLY. SEE FURNISHING SCHEDULE FOR SPECIFIED BENCH.

A BENCH INSTALLATION ON CONCRETE NTS

PARK BENCH

D4.51

edited 06.06.18
approved 00.00.00
NOTES

1. BENCH PROVIDED BY OWNER

2. FOR REFERENCE ONLY. SEE FURNISHING SCHEDULE FOR SPECIFIED BENCH.
NOTES

1. BENCH PROVIDED BY OWNER

2. FOR REFERENCE ONLY. SEE FURNISHING SCHEDULE FOR SPECIFIED BENCH.

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BENCH INSTALLATION ON LAWN/MULCH

NTS
1. APRON APPROACHING LITTER RECEPTACLE MUST MEET ADA STANDARDS FOR LANDINGS.

2. LITTER RECEPTACLE PROVIDED BY OWNER.

3. CONCRETE MUST HAVE HAD SUFFICIENT TIME TO CURF BEFORE INSTALLATION OF ANCHOR.
NOTES

1. APRON APPROACHING LITTER RECEPTACLE MUST MEET ADA STANDARDS FOR LANDINGS.

2. LITTER RECEPTACLE PROVIDED BY OWNER.

3. CONCRETE MUST HAVE HAD SUFFICIENT TIME TO CURE BEFORE INSTALLATION OF ANCHOR.

**PAVER/ASPHALT**

PAD/SIDEWALK (VARIES)

5/8" DIA. CONCRETE WEDGE ANCHOR SET IN CONCRETE

FINISHED SURFACE WITH A 1.5% MAX GRADE IN ALL DIRECTIONS

MIN. 3' SEPARATION FROM MAIN TRAFFICWAY

FOR REFERENCE ONLY. SEE FURNISHING SCHEDULE FOR PROPER LITTER RECEPTACLE

5/8" DIA. CONCRETE WEDGE ANCHOR (NOT PROVIDED BY OWNER)

PLACE LITTER RECEPTACLE MOUNTING BRACKET OVER ANCHOR AND TIGHTEN THE NUT. DOING THIS WILL EXPAND THE SLEEVE OF THE CONCRETE ANCHOR AND SECURE IT INTO THE CONCRETE.

PAVER/ASPHALT SURFACE

CONCRETE PAD

COMPACTED SUBBASE

B LITTER RECEPTACLE INSTALLATION IN PAVERS/ASPHALT

NTS

edited 07.18.18
approved 00.00.00
NOTES

1. J-BOLT TO BE PLACED IN THE CENTER OF THE SONOTUBE

2. LITTER RECEPTACLE PROVIDED BY OWNER.

3. CONCRETE MUST HAVE HAD SUFFICIENT TIME TO CURE BEFORE INSTALLATION OF RECEPTACLE.

4. MUST BE PLACED IN COMPLIANCE WITH ALL ADA STANDARDS.

FOR REFERENCE ONLY. SEE FURNISHING SCHEDULE FOR PROPER LITTER RECEPTACLE

PLACE LITTER RECEPTACLE MOUNTING BRACKET OVER ANCHOR AND TIGHTEN THE NUT. DOING THIS WILL EXPAND THE SLEEVE OF THE CONCRETE ANCHOR AND SECURE IT INTO THE CONCRETE.

10" LONG 5/8" DIA. ANCHOR J-BOLT SET IN CONCRETE. (NOT PROVIDED BY OWNER)

FINISHED GRADE

24" SONOTUBE, CONCRETE FILLED

EXISTING UNDISTURBED SUBBASE

LAWN OR MULCH

18" MIN. DEPTH

C LITTER RECEPTACLE INSTALLATION IN LAWN/MULCH

edited 07.18.18
approved 00.00.00

LITTER RECEPTACLE

Bend Park & Recreation District

D4.61 C
NOTES:
- REFER TO BPRD SHEET D8.21 FOR DOMESTIC WATER CONNECTION DETAIL

A DRINKING FOUNTAIN INSTALLATION

DRINKING FOUNTAIN

edited 06.07.18
approved 00.00.00
NOTES:
- ALL WIRE FABRIC AND FENCE HARDWARE SHALL BE GALVANIZED.
- FABRIC SHALL BE INSTALLED ON THE OUTSIDE.
- ALL MATERIAL MUST BE VINYL COATED BROWN.

A
PLAYGROUND 2"X2" NO CLIMB FENCE

NTS

Bend Park & Recreation District

Chain Link Fencing

D5.11

edited 08.07.18
approved 00.00.00
NOTES:
- ALL WIRE FABRIC AND FENCE HARDWARE SHALL BE GALVANIZED.
- FABRIC SHALL BE INSTALLED ON THE OUTSIDE.
- ALL MATERIAL MUST BE VINYL COATED BROWN.

SPECIFICATION DRAWINGS

A SITE FENCE

NTS

Chain Link Fencing
NOTES:
- All wire fabric and fence hardware shall be galvanized.
- Fabric shall be installed on the outside.
- All material must be vinyl coated brown.
NOTES:
- All wood for Split Rail Fence to be cedar or juniper. See specs.
- end post shall be terminal post. Enlarge footing to 1.5 dia. and 3.5' depth.

2"x4" WWM STAPLED @ 3" O.C. TO POSTS ON NEIGHBOR SIDE OF FENCE, 2" FROM TOP OF POST. STRETCH TIGHT. BURY 6" OF MESH BELOW FINISH GRADE AND SECURE WITH 'U' STAPLES AT 6" O.C.

10'-0"o.c. Max. Typ.7.3

10" x 3 1/2" x 1 1/2" rails with tapered tips to meet slots

EQ. SPACING IF POSSIBLE BETWEEN PROPERTY LINES

CONCRETE FOOTING (Typ.) SLOPE TOP TO DRAIN AWAY FROM POST

EXISTING SOIL

FINISH GRADE

SPLIT RAIL WITH MESH NTS

Edited 07.16.19
Approved 00.00.00
Specification Drawings

**A** DOUBLE RAIL CONCRETE FENCE

**B** SINGLE RAIL CONCRETE FENCE

**MATERIALS:**
Molds and materials are available at Timbercreek Post and Fence Products 541-447-4474, or approved equal. Submit samples of concrete post and rail materials to BPRD.

Concrete Rail Fence

D5.21
NOTES:
- 40" - 3.5" SCHEDULE 40 STEEL PIPE
- 15" - 4" SCHEDULE 40 STEEL PIPE SLEEVE WITH 2 REBAR DOG EARS WELDED 6' FROM BOTTOM
- 2" - 4" SCHEDULE 40 STEEL PIPE SECTION WELDED AS STOP ON BOLLARD POST 8"
- 2 CHAIN LOCK RINGS (3/8"), ONE WELDED TO THE TOP OF THE SLEEVE, ONE WELDED TO THE BOTTOM OF THE BOLLARD POST (BE SURE TO WELD ENOUGH OVERLAP TO RECEIVE A LOCK)
- SET BOLLARD SLEEVE AND LOCK RING IN CONCRETE FOOTING MINIMUM 12"x18", PLUMB, AND FLUSH WITH FINISH GRADE

REMOVABLE BOLLARD

FLUSH WITH FINISH GRADE

SLEEVE

CONCRETE

UNDISTURBED SOIL

REBAR STUB

FINISH GRADE

18"

15"

8"

6"

3'

REMOVABLE ROUND BOLLARD INSTALLATION

NTS

REMOVABLE BOLLARD
NOTES:
- Pedestrian opening must be installed with a width of 5'.
- Gate width will vary based on site specific parameters. Width must allow for all service vehicles to have access.
- Top of gate shall not exceed 3.5' in height.
- Must maintain a 1' clearance for the bottom of the gate.
- Pedestrian opening is to be located on the canal side trail unless otherwise noted.
- Actuator is to be installed on opposite side of the pedestrian opening.
- Gate and post to be furnished by BPRD.
- Cedar sign post to be furnished by BPRD.
- Gate and post finish to be determined by BPRD.
- Installation must meet BPRD and CQD standards.
- Maximum Z = 16'
- Minimum Z = 12'
- Optimal Z = 15'
- Location of gate must be verified by a BPRD & CQD representative.

A COHCT GATE INSTALLATION

CENTRAL OREGON HISTORIC CANAL TRAIL GATE
NOTES:
- SEE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION
- WHEN APPLICABLE, MOUNT DECODER TO SIDE OF VALVE BOX
- MUST USE DBX/DGR KIT FOR WATERPROOF WIRE SPLICE CONNECTION
- 2-WIRE OR CONVENTIONAL WIRE TO BE USED PER DESIGN
NOTES:
- SEE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
- The sprinkler shall have a screen attached to the drive housing to filter inlet water, protect the drive from clogging and simplify its removal for cleaning and flushing of the system. The sprinkler body shall have a double-wall construction 1” female NPT bottom inlet.
- The rotor sprinklers shall have a standard purple (non-potable) rubber cover which designates the full circle/part circle sprinkler from the top, as well as designates each adjustment opening from the top. The sprinkler shall have a factory installed nozzle as specified on the drawings. The angle of trajectory shall be 25 degrees from the horizontal.
Specification Drawings

HINGE TOP OUTLET BOX

MATERIAL:
INTEGRAL BASE, 16 GAUGE STAINLESS STEEL
BODY, COVER & INSERT 14 GAUGE STAINLESS STEEL

Bend Park & Recreation District

VERTICAL POWER BOX

D8.31
24" X 24" CABINET

DUAL ACCESS ELECTRICAL CABINET

edited 02.19.19
approved 00.00.00
Specification Drawings

24" X 30" CABINET

DUAL ACCESS ELECTRICAL CABINET
Appendixes

Approved Plant and Tree List

1. Wetland Plants
   A. Thin leaf alder, Alnus incana
   B. White alder, Alnus rhombifolia
   C. Redosier dogwood, Cornus sericea
   D. Twinberry, Lonicera involucrata
   E. Red flowering currant, Ribes sanguineum
   F. Woods rose, Rosa woodsia
   G. Blue elderberry, Sambucus cerulea
   H. Alpine spirea, Spiraea densiflora
   I. Douglas spirea, Spiraea douglasii
   J. Pacific ninebark, Physocarpus capitatus
   K. Black cottonwood, Populus balsamifera ssp. trichocarpa
   L. Stinky currant, Ribes hudsonianum
   M. Prickly currant, Ribes lacustre
   N. Golden currant, Ribes aureum

2. All other plantings: https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9136.pdf

3. All trees and plants should be selected from this list or extension catalog. The use and location of plantings to be reviewed and approved by owner. Exceptions or substitutions must be approved by owner prior to acceptance.