

SPECIAL PROVISIONS
IDAHO FEDERAL AID PROJECT NO. A018 (807)

River Street, Walnut to Galena, Hailey

Blaine County

<insert long description (copy from AASHTOWare Pre-Con Proposal Long Description box)

The following special provisions and all addenda issued supplement or modify the 2023 Idaho Transportation Department Standard Specifications for Highway Construction: 2020 Quality Assurance (QA) Manual (10/19), 2022 QA Manual Buy America Supplemental (11/10/22), 2020 Quality Assurance Special Provision for State Acceptance (10/21/2019), April 2023 Standard Drawings, Title VI Special Provisions; FHWA-1273 Federal Aid Required Contract Provisions with supplement, General Wage Decision ID2230074.

SOURCE IDENTIFICATION

Designated source(s): Designated source(s) are not identified for this contract/project.

Contractor provided source(s): Provide approved source(s) for all materials. A list of Department owned or controlled sources is available at the District office.

Cost. For Department controlled sources, the source recovery fee will be the applicable rate as established in the Department's Materials Manual Section 300.02.05 Source Control at the time of bidding.

CONTRACT TIME AND LIQUIDATED DAMAGES

Choose one of the 3 options below for contract time and delete those that are not used:

1. **Working day contracts:**
Work will not start earlier than [date] or later than [date] and must be completed within [XX] working days.
2. **Completion date contracts:**
Work will not start earlier than [date] or later than [date] and must be completed by [date].
3. **Calendar day contracts use:**
Work will not start earlier than [date] or later than [date] and must be completed within [XX] calendar days.

Once started, work must continuously progress until completion. Return traffic through the work zone to normal operations during any planned or unplanned work stoppage lasting longer than XX working days. [You may delete the last sentence if it is impossible to do, such as when traffic is on a partial bridge.]

Liquidated Damages

Liquidated damages provision does not waive the Department's right to seek other remedies for a breach of contract by the awarded Contractor.

CONTRACTOR NOTES

DBE PROGRAM REQUIREMENTS

4/23

For bidding purposes, the Contractor must comply with the DBE program requirement of **XX%**. Upon award, the approved percentage % on the ITD-2396 DBE Commitments form becomes contractual and failure to comply is a breach of contract. Any change to this contractual commitment during the administration of the contract must be coordinated through the Office of Civil Rights.

Whenever the Engineer determines, after investigating and obtaining evidence the Contractor has not complied with the DBE program requirement, the Engineer will take corrective action. Refer to the Department's Standard Specifications for Highway Construction, Section 110, Civil Rights.

The Contractor, sub recipient, or subcontractor will not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor will carry out applicable requirements of [49 CFR Part 26](#) in the award and administration of USDOT-assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate (e.g., withholding monthly progress payments, assessing sanctions, liquidated damages, disqualifying the Contractor from future bidding as non-responsible).

For additional DBE Program information see the Department's DBE program requirements located at: <https://itd.idaho.gov/civilrights/>

BUY AMERICA

The Buy America provision is in effect for this contract because federal-aid dollars were used during project development.

EMPLOYMENT AGENCY

01/2023

To find the nearest employment office, visit <https://www.labor.idaho.gov/dnn/Local-Office-Directory>.

GENERAL WAGE DECISION

For the classification of "XXX", ITD is providing a rate for all bidders. That rate is estimated to be \$xx.xx wage and \$x.xx fringe.

Once awarded, the Contractor will work with the Project Manager to prepare and submit a SF-1444 for the above classification. If the DOL approved wage rate differs from the determination provided above, the contract will be adjusted accordingly for the hours of the labor utilized for work conforming to this classification.

IDAHO IMPLEMENTATION OF AASHTO MANUAL FOR ASSESSING SAFETY HARDWARE, 2ND EDITION (2016)

The following safety hardware must meet AASHTO 2016 MASH criteria, ITD's Standard Drawings, and if the hardware is a proprietary product it must be approved on ITD's Qualified Product List (QPL) for new permanent installations and full replacements:

- W-beam
- Cast-in-place concrete barriers
- W-beam tangent terminals and buried-in-backslope terminals
- W-beam flared terminals and terminals installed on a flare
- Crash cushions
- Transitions
- Permanently installed portable barriers
- Bridge rails
- Cable barriers
- Cable barrier terminals

The following safety hardware may be MASH 2009/2016 or NCHRP 350 compliant for new permanent installations and full replacements:

- Double-sided or median terminals
- Sign supports
- All other breakaway hardware

For projects utilizing December 2018 Standard Drawings release or earlier, replace the 612 series sheets with the 612 series from the latest Standard Drawings release.

Temporary work zone devices (including portable barriers, truck- and trailer-mounted attenuators, portable changeable message signs (PCMS), temporary traffic signals, and camera trailers) manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH. Such devices manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH, may continue to be used throughout their normal service lives.

POLLUTION PREVENTION PLAN

8/2022

The estimated project area of impact is approximately 1.8 acres. A pollution prevention plan (PPP) is required for this project due to the anticipated ground disturbance of less than 1 acre and/or lack the potential to discharge to Waters of the US.

If the Contractor's operations, including but not limited to, staging, waste, or material source disturbances result in a disturbed area 1 acre or more and there is a potential connection to discharge to Waters of the US, an active IPDES permit (or NPDES permit if on Tribal land) and associated SWPPP will be required as specified in 107.17. All monetary and time impacts required to establish a SWPPP will be borne by the Contractor. A draft SWPPP must be submitted to the Engineer for approval before filing the Notice of Intent.

ELECTRICAL WORK

01/18

This contract contains work for which the Department believes a licensed electrical firm will be required. Complete the sheet provided for compliance with 67-2310 Idaho Code, or provide an explanation as to why an electrical license is not required. "N/A" is not an appropriate explanation.

ON PAGE 18, SUBSECTION 101.03 – ACRONYMS

11/22

Add the following in alphabetical order:

BA Biological Assessment or Buy America

BABA Build America, Buy America

ON PAGE 19, SUBSECTION 101.04 – DEFINITIONS

11/22

Add the following in alphabetical order:

Construction Material. An article, material, or supply that consists primarily of: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cable); glass (including optic glass); lumber; or drywall. Items specifically excluded from this category are: products that are primarily iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives. To provide clarity to item, product, and material manufacturers and processors, items that consist of two or more of the listed materials that have been combined together through a manufacturing process, and items that include at least one of the listed materials combined with a material that is not listed through a manufacturing process, should be treated as manufactured products, rather than as construction materials. For example, a plastic framed sliding window should be treated as a manufactured product while plate glass should be treated as a construction material.

ON PAGE 36, SUBSECTION 105.04 – COORDINATION OF CONTRACT DOCUMENTS 11/22

Delete items 7 through 12 and add the following:

7. Quality Assurance (QA) Manual Supplementals (BA or otherwise)
8. QA Manual
9. Standard Supplementals
10. Standard Specifications
11. Standard Drawings
12. Electronic Files (if specified as part of the contract)

ON PAGE 59, SUBSECTION 106.01.A – BUY AMERICA 11/22

Delete the entire subsection and replace with the following:

A. Buy America.

For contracts that involve federal-aid funding or are specifically indicated in the special provisions to comply with Buy America, ensure iron or steel products, and construction materials permanently incorporated into the work are products of the United States. Provide certifications conforming to 106.04 prior to incorporating the item into the project. If foreign construction materials, steel, or iron in excess of the quantities allowed become incorporated into the work, the Contractor will remove such materials in excess of the allowable maximum and replace them with materials complying with these specifications at no additional cost to the Department. If the supporting documentation does not undeniably demonstrate to FHWA or the Department that the domestic iron or steel, or construction materials identified in the certificates of compliance were produced in the United States of America, then such iron, steel, construction materials will be considered unacceptable and must be replaced at no cost to the Department. If foreign steel, iron, or applied coatings for steel or iron in excess of the quantities allowed, or foreign construction materials become incorporated into the work, remove such materials in excess of the allowable maximum, and replace them with materials complying with these specifications at no additional cost to the Department. The burden of proof to meet the Buy America provision rests with the Contractor.

Iron and Steel Products

All manufacturing processes for iron and steel products, including the application of coatings for such materials, must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

Buy America requirements apply to any steel or iron components of a manufactured product regardless of the overall composition of the manufactured product and to miscellaneous steel or iron components and hardware (e.g., cabinets, covers, shelves, clamps, fittings, sleeves, washers, bolts, nuts, screws, tie wire, spacers, chairs, lifting hooks, faucets, or door hinges).

Obtain certifications from the manufacturer, that document that steel and iron have been manufactured and that coatings for steel or iron have been applied in the United States. Submit the required certifications to the Engineer before incorporating these materials into the work.

The Engineer may allow small quantities of foreign manufactured steel, iron, or applied coatings for steel or iron so long as their total cost does not exceed 0.1 percent of the total contract amount or \$2,500, whichever is greater.

The contractor needs to maintain a running total of the cost of products not meeting the Buy America criteria already incorporated into the contract work. Cost determination is based on invoice costs or going rates for items without invoices. The Engineer needs to make sure the contractor does not exceed the Buy America threshold for foreign and undocumented products, or a project may lose all or part of its federal funding.

Construction Materials

All construction materials must originate in the United States, including the final and the immediately preceding final, manufacturing process.

Obtain certifications from the manufacturer, that document that construction materials have been manufactured in the United States. Submit the required certifications to the Engineer before incorporating these materials into the work.

ON PAGE 64, SUBSECTION 106.15 – QPL AND NON-QPL PRODUCTS

11/22

Delete the entire subsection and replace with the following:

106.15 QPL and Non-QPL Products.

The Department will classify products as qualified product list (QPL) products or non-QPL products. Qualified products are proprietary products determined to meet specifications for an applicable QPL category, or categories. The Department website lists categories of products, covered by the QPL. Non-QPL products are proprietary products available on the market and not classified under a category covered in the QPL. Products listed on the QPL are not guaranteed to meet BA requirements. BA certification is required for products that apply to BA.

If testing required by the contract to determine product acceptability will take longer than 7 calendar days, the Engineer will notify the Contractor of the additional time necessary to make a decision.

ON PAGE 37, SUBSECTION 105.07 – UTILITY FACILITIES

4/23

Add the following to the end of the subsection:

PROJECT NO. A018(807); KEY NO. 18807

Page 5 of 27

Idaho Power Company

Contact: Judy Brack
Email: BJudy2@IdahoPower.com
Phone: 208-388-6047

Work Required:

- Pole relocation at the SW corner of River Street/Bullion Street. Light Pole and connecting overhead wire removal mid-block on River Street on the west side of the street between Bullion Street and Croy Street. This work should be completed prior to the start of sidewalk construction on the west side of River Street between Bullion Street and Croy Street.
- Electric service connection at the NW corner of River Street/Bullion Street for new electrical and street lighting improvements on River Street between Carbonate Street and Croy Street. This work should be completed in coordination with installation of the controller pedestal for the new electrical and street lighting improvements.

Intermountain Gas

Contact: Craig Chapin
Email: cchapin@intgas.com
Phone: 208-776-6142

Work Required: None

Century Link/Lumen

Contact: Jeff Schamber
Phone: 208-733-0278

Work Required: None

Cox Cable

Contact: Brandon Lister
Email: brandon.lister@cox.com

Work Required: None

City of Hailey

Contact: Brian Yeager
Email: brian.yeager@haileycityhall.org
Phone: 208-788-9815 ext. 4224

Work Required: Removal of City owned light poles at the east edge of the parking lot north and west of the River Street/Bullion Street intersection. This work should be done prior to the start of construction in this area.

Utility One Call Center:

Adams, Bannock, Bear Lake, Bingham, Blaine, Boise, Bonneville, Butte, Camas, Canyon, Caribou, Cassia, Clark, Clearwater, Custer, Elmore, Franklin, Fremont, Gem, Gooding, Idaho, Jefferson, Jerome, Latah, Lemhi, Lewis, Lincoln, Madison, Minidoka, Nez Perce, Oneida, Owyhee, Payette, Power, Teton, Twin Falls, Valley, Washington

Request locates of buried utility facilities by contacting the Utility One-Call Center by calling 1-800-342-1585, e-mailing digline@digline.com or faxing 1-800-342-1586.

Utility Service Requirements:

Idaho Power Company Electric Service -

Be responsible to coordinate with the Engineer to contact the appropriate utility company and arrange the initial utility hook up, when utility service (e.g., electrical, phone, water) for highway components (e.g., luminaries, signals, ITS) is required for the contract work. Supply utility service in a timely manner to allow for testing of highway components. Pay any fees charged by the utility company and provide the Engineer acceptable proof of payment for reimbursement.

ON PAGE 82 of 715, SUBSECTION 107.19 – SURVEY MONUMENT PRESERVATION

Under subsection 107.19.2, add the following after the first full sentence:

Research within the project limits in the MCPD for survey monuments within the work zone to determine the possible existence of survey monuments to preserve and protect or to be reestablished after construction. Document that this research has been completed.

ON PAGE 82 of 715, SUBSECTION 107.19 – SURVEY MONUMENT PRESERVATION

Under subsection 107.19.9.g., add the following at the end of the subsection:

The provisions of Section 107.08 will apply.

ON PAGE 87, SUBSECTION 108.01 - SUBLETTING OF CONTRACT

04/23

Delete the second sentence and substitute the following:

If the Engineer consents to subletting a portion of the work, the Contractor will use its own organization to perform work amounting to at least 30 percent of the original contract amount.

SPECIAL PROVISIONS

S605-640A – SP, ADJUST WATER METER COVERS

Description. Adjust water meter cover to finished grade.

Materials. None

Construction Requirements. Not specified.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

Final elevation for water meter cover shall be flush with surrounding pavement or sidewalk.

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S605-640A Adjust Water Meter Covers	Each

S901-05B – SP, RELOCATE FIRE HYDRANT

Commented [JB1]: The 30% is for federal aid contracts only.

If you change from the 50% to 30%, please let Chad Clawson know why so he can communicate with the AGC why this decision was made for this contract. The agreement between the AGC and the Department is the standard business practice will be 50%, but there will be certain contracts due to the specialty work required that this number can be adjusted downward from 50%. Thanks!

BTW, per 54-1902 Idaho Code for state contracts it is 20%. (Unless it's Design Build and CM/GC, where it is 30% per 40-904 and 40-905, Idaho Code, respectively).

Description. The existing fire hydrant will be relocated to a point that is outside the limits of the sidewalk or at least away from the main traveled way to provide adequate ADA compliance for sidewalk users. The existing equipment will be reused except that the hydrant lateral pipe between the fire hydrant valve and fire hydrant shall be extended so the hydrant can be moved to its new location.

Materials. The 6” hydrant lateral pipe matching existing materials from the hydrant assembly and meeting City requirements as noted in the City of Hailey Standard Drawings and meeting Idaho Standards for Public Works Construction (ISPMC) requirements for construction and backfill for hydrant assembly construction.

Construction Requirements. The work will be completed in accordance with installation details as shown in the City of Hailey Standard Drawings.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S901-05B Relocate Fire Hydrant	Each

S901-05C – SP, BUS SHELTER – CONCRETE PAD AND FOUNDATION

Description. The work includes construction of a new support structure and concrete pad for an existing bus stop shelter. The existing shelter cover will be removed and salvaged, the existing pad and foundation removed, and the new foundation and pad constructed. The work is detailed on the plan sheets.

Materials. Materials for the new foundation and concrete pad are detailed on the plans.

Provide concrete materials for exterior concrete work consistent with adjacent sidewalk construction. Material requirements shall be in accordance with ITD 2023 Standard Specifications for Highway Construction, Section 701 for Cement, Section 703.02 for Concrete Aggregates and Section 709 for concrete curing materials and admixtures. The Contractor shall submit a concrete mixture design for approval prior to beginning construction on this work.

Materials for bus shelter erection hardware to reset the existing shelter cover on the new foundation are noted on the plans.

Construction Requirements. As noted on the plan sheets.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

Method of Measurement is noted on the plan sheets.

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S901-05C Bus Shelter – Concrete Pad and Foundation	Each

S901-05D – SP, BOLLARDS

Description. The work includes construction of steel bollards set in concrete and filled with concrete. A detail for proposed bollard is included in the plan sheets.

Materials.

- A. Concrete –
 - 1. Portland cement shall conform to ASTM C150 Types I, II or III.
 - 2. Cast-in-place concrete materials and products shall conform to Section 700 of the Idaho Transportation Department Specifications for Highway Construction. Concrete shall have a minimum compressive strength of 3,000 psi.
- B. Metal –
 - 1. Metallic materials shall comply with ASTM A36/A36M, ASTM A500 and ASTM A501.

Construction Requirements.

- A. Verify that finished grades and other operations affecting mounting surfaces have been completed prior to installation of bollards.
- B. Installation –
 - 1. Parts: New parts shall be acquired from manufacturer. Substitute partes will not be accepted unless approved by manufacturer
 - 2. Assembly: When inspection of parts has been completed, bollards shall be assembled and anchored according to manufacturer’s instructions or as indicated.
 - 3. Install bollards plumb and true in accordance with approved manufacturer’s instructions.
 - 4. Bollards shall be set vertically in concrete having a minimum compressive strength of 3,000 psi.
- C. Restoration and Clean Up –
 - 1. When installation has been completed, clean up and protect site. Existing areas that have been damaged from installation operation shall be restored to original condition at Contractor’s expense.
 - 2. Clean site of all materials associated with installation. Bollard surfaces shall be cleaned of dirt, stains, fillings, and other blemishes occurring from shipment and installation.
 - 3. Cleaning methods and agents shall be according to manufacturer’s instructions or as indicated.
 - 4. Disposal of materials – Excess waste material shall be removed and disposed of off site.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

The quantity of Bollards will be paid on the basis of each bollard installed. Work will include installation of steel bollard, concrete foundation and concrete fill as described above.

Basis of Payment. The Bollard will be paid for at the contract unit price for each Bollard installed. The unit price includes, but is not limited to, subgrade preparation, excavation and backfill, setting the bollard, placing concrete foundation and concrete fill, and restoration and clean up of the surrounding site. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S901-05D Bollards	Each

S901-05E – SP, TREE WELLS

Description. The Tree Wells are a composite of products and materials necessary for the successful implementation of the landscape areas, and structural support underneath and within the landscape area. Each Tree Well is designed to provide approximately 500 CF of soil volume to improve growing conditions for the proposed trees within the Tree Wells. See Tree Well Section and Detail

Materials. Materials and Products are as follows:

- Silva Cell 2x – or approved equal
- Root Barrier
- Geogrid
- Geotextile Fabric
- Plastic Cable Ties
- Anchoring Spikes
- Root Barrier – 12” depth around the inside perimeter of the Tree Well
- Aggregate Base – 4 minimum depth.
- Topsoil – specified Topsoil

SILVA CELLS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Silva Cell system for planting and paving, including Silva Cell assemblies and related accessories.
 - 2. Other materials including, but not limited to, geotextile, geogrid, aggregate, subbase material, backfill, root barrier, Water + Air System, and planting soil.
- B. Materials Installed But Not Furnished Under This Section:
 - 1. Planting soils are furnished in Section 32 94 56 - Planting Soil for Silva Cells.
- C. Related Requirements:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 REFERENCES

- A. Definitions:
 - 1. **AGGREGATE BASE COURSE:** Aggregate material between the paving and the top of the Silva Cell deck below, designed to distribute loads across the top of the deck.
 - 2. **AGGREGATE SUBBASE:** Aggregate material between the bottom of the Silva Cell base and the compacted subgrade below, designed to distribute loads from the Silva Cell bases to the subgrade.

3. BACKFILL: The earth used to replace or the act of replacing earth in an excavation beside the Silva Cell system to the excavation extents.
4. FINISH GRADE: Elevation of finished surface of planting soil or paving.
5. PLANTING SOIL: Soil as defined in Division 32, Section 32 94 56 - Planting Soil for Silva Cells, intended to fill the Silva Cell system and other planting spaces.
6. SILVA CELL SYSTEM:
 - a. Silva Cell: One assembled unit made up of 1 base, 6 post assemblies, and 1 Silva Cell deck.
 - b. Silva Cell System: Two or more Silva Cells used in combination with each other and with required accessories.
7. SUBGRADE: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill.
8. WALK-THROUGH COMPACTION: A process for light compaction of soils by walking through the soil following placement.
 - a. Walk through compaction shall result in 75-85 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Do not exceed root limiting compaction for the given soil type.

B. Reference Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. AASHTO H-20
2. ASTM International (ASTM):
 - a. ASTM D448-12, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
 - b. ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ [600 kN-m/m³])
 - c. ASTM D1241-07, Standard Specification for Materials for Soil-Aggregate Subbase, Base, and Surface Courses
 - d. ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
 - e. ASTM D4491-99a(2014)e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity
 - f. ASTM D4533-D4533M-15, Standard Test Method for Trapezoid Tearing Strength of Geotextiles
 - g. ASTM D4632-D4632M-15, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
 - h. ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile
 - i. ASTM D4833/D4833M-07(2013)e1, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
 - j. ASTM D5262-07(2012), Standard Test Method for Evaluating the Unconfined Tension Creep and Creep Rupture Behavior of Geosynthetics
 - k. ASTM D6241-14, Standard Test Method for Static Puncture Strength of Geotextile and Geotextile-Related Products Using a 50mm Probe
 - l. ASTM D6637-11, Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Prior to installation of the Silva Cell system and associated Work, meet with the Contractor, Silva Cell system installer and their field supervisor, manufacturer's

technical representative, the Engineer, the Owner at the Owner's discretion, and other entities concerned with the Silva Cell system performance.

1. Provide at least 72 hours advance notice to participants prior to convening preinstallation conference.
 2. Introduce and provide a roster of individuals in attendance with contact information.
 3. The preinstallation conference agenda will include, but is not limited to the review of:
 - a. Required submittals both completed and yet to be completed.
 - b. The sequence of installation and the construction schedule.
 - c. Coordination with other trades.
 - d. Details, materials and methods of installation.
 - 1) Review requirements for substrate conditions, special details, if any, installation procedures.
 - 2) Installation layout, procedures, means and methods.
 - e. Mock-up requirements.
- B. Sequencing and Scheduling:
1. General: Prior to beginning Work of this Section, prepare a detailed schedule of the Work involved for coordination with other trades.
 2. Schedule utility installations prior to beginning Work of this Section.
 3. Where possible, schedule the installation of the Silva Cell system after the area is no longer required for use by other trades and Work. Where necessary to prevent damage, protect installed system if Work must occur over or adjacent to the installed Silva Cell system.

1.04 SUBMITTALS

- A. Action Submittals: Submit these to the Engineer for review and acceptance not less than 45 days prior to start of installation of materials and products specified in this Section.
1. Product Data: For each type of product, submit manufacturer's product literature with technical data sufficient to demonstrate that the product meets these specifications.
 2. Test and Evaluation Reports:
 - a. Submit results of compaction testing required by the Specifications for approval.
 - b. Include analysis of bulk materials including soils and aggregates, by a recognized laboratory that demonstrates that the materials meet the Specification requirements.
 3. Samples:
 - a. One full size sample of an assembled Silva Cell (copy of manufacturers brochure with images of product may be accepted in lieu of product sample).
 - b. Manufacturer's product data/specification sheet for geogrid.
 - c. Manufacturer's product data/specification sheet for geotextile.
 - d. Manufacturer's product data/specification sheet for Water+Air System components (when specified as part of the system)
 4. Manufacturer's Report: Submit Silva Cell system manufacturer's letter of review and approval of the Project, including Drawings and Specifications, Addenda, Clarifications and Modifications, and for compliance with product installation requirements.
 5. Qualification Statements:
 - a. Manufacturer:
 - 1) Submit list of completed projects demonstrating durability and longevity of in-place systems.
 - a) Include project name, location, and date of completion.
 - b. Installer:

- 1) Submit documentation of the qualifications of the Silva Cell system installer and their field supervisor, sufficient to demonstrate that both meet the requirements specified in Article 1.05 QUALITY ASSURANCE.
 - 2) Submit list of completed projects of similar scope and scale demonstrating capabilities and experience.
- B. Closeout Submittals: Submit these to the Engineer at completion of installation.
1. Warranty: Submit manufacturer's warranty, fully executed.

1.05 QUALITY ASSURANCE

- A. Comply with applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary permits/approvals from these authorities.
- B. Manufacturer Qualifications:
1. A manufacturer whose product is manufactured in an ISO/TS 16949 compliant and ISO 9001 - 2008 registered factory.
 2. A manufacturer with not less than 100 Silva Cell systems in-place, each system in use for not less than 7 years, confirming durability and longevity of the system.
 3. A manufacturer with documented written approval of their product for use as a stormwater treatment device by a minimum of 3 governmental jurisdictions.
 4. A manufacturer with an established and demonstrated utility service and repair process, including written procedure and photographs demonstrating work.
 5. A manufacturer with a published operating and maintenance manual
- C. Installer Qualifications: A qualified installer with not less than 5 years of successful experience installing Silva Cell systems or related products and materials, and whose work has resulted in successful installation of underground piping, chambers and vault structures, planting soils, and planter drainage systems of a similar scope and scale in dense urban areas.
- D. Installer's Field Supervisor: A full-time supervisor employed by the installer with not less than 5 years of successful experience similar to that of the installer and present at the Project site when Work is in progress. Utilize the same field supervisor throughout the Project, unless a substitution is submitted to and approved in writing by the Engineer.
- E. Mock-Up: Prior to the installation of the Silva Cell system, construct a mock-up of the complete installation at the Project site in the presence of the Landscape Architect.
1. Size and Extent: Minimum of 100 sq. ft. (10 sq. m.) in area and including the complete Silva Cell system installation with subbase, aggregate subbase, drainage installation, Silva Cell decks, posts, and bases, base course aggregate, geotextile, geogrid, backfill, planting soil, and necessary accessories.
 2. The mock-up area may remain as part of the installed Work at the end of the Project provided that it remains undamaged and meets the requirements of the Drawings and Specifications.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Silva Cell System: Protect Silva Cell system components from damage during delivery, storage and handling.
1. Store components on smooth surfaces, free from dirt, mud and debris. Store under tarp to protect from sunlight when time from delivery to installation exceeds one week.
 2. Perform handling with equipment appropriate to the size (height) of Silva Cells and site conditions; equipment may include, hand, handcart, forklifts, extension lifts, or small cranes, with care given to minimize damage to Silva Cell bases, posts, decks and adjacent assembled Silva Cells.

- B. Packaged Materials: Deliver packaged materials in original, unopened containers indicating weight, certified analysis, name and address of manufacturer, and indication of conformance with State and Federal laws, if applicable. Protect materials from deterioration during delivery and while on the Project site.
 - 1. Do not deliver or place backfill, soils, or soil amendments in frozen, wet, or muddy conditions.
 - 2. Provide protection including tarps, plastic and/or matting between bulk materials and finished surfaces sufficient to protect the finish material.
 - 3. Bring planting soil to the site using equipment and methods that do not overly mix and further damage soil peds within the soil mix.
- D. Provide erosion-control measures to prevent erosion or displacement of bulk materials and discharge of soil-bearing water runoff or airborne dust to adjacent properties, water conveyance systems, and walkways. Provide additional sediment control to retain excavated material, backfill, soil amendments and planting mix within the Project limits as needed.

1.07 FIELD CONDITIONS

- A. Existing Conditions: Do not proceed with Work when subgrades, soils and planting soils are in a wet, muddy or frozen condition.

1.08 WARRANTY

- A. The Contractor shall warrant the Silva Cell system to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by manufacturer's written warranty against defects in materials and workmanship as follows:
 - 1. DeepRoot® warrants to the original purchaser of its Silva Cell™ product that such product will be free from defects in materials and workmanship, and perform to DeepRoot's written specifications for the warranted product, when installed and used as specifically provided in the product's installation guidelines for a period of 20 years from the date of purchase. This warranty does not cover wear from normal use, or damage caused by abuse, mishandling, alterations, improper installation and/or assembly, accident, misuse, or lack of reasonable care of the product. This warranty does not apply to events and conditions beyond DeepRoot's control, such as ground subsidence or settlement, earthquakes and other natural events, acts of third parties, and/or Acts of God. If this warranty is breached, DeepRoot® will provide a replacement product. Incurred costs, such as labor for removal of the original product, installation of replacement product, and the cost of incidental or other materials or expenses are not covered under this warranty.
 - 2. Deeproot® makes no other warranties, express or implied, and specifically disclaims the warranty of merchantability or fitness for a particular purpose. Deeproot® shall not be liable either in tort or in contract for any direct, incidental or consequential damages, lost profits, lost revenues, loss of use, or any breach of any express or implied warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Acceptable Manufacturers (or approved equals):

DeepRoot Green Infrastructure, LLC
101 Montgomery Street, Suite 2850
San Francisco, CA, 94104

Phone: 415.781.9700

Toll Free: 800.458.7668
Fax: 415.781.0191
www.deeproot.com

- B. Substitutions: Manufacturers seeking approval of their products are required to comply with the Owner's Instructions to Bidders, generally contained in the Project Manual.

2.02 DESCRIPTION

- A. The term Silva Cell shall be used to refer to a single Silva Cell.
- B. Silva Cells shall be designed for the purpose of growing healthy trees and providing stormwater management.
- C. Silva Cells shall be modular, structural systems.
- D. Each Silva Cell shall be structurally-independent from all adjacent Silva Cells for incorporating utilities and other site features as well as for future repairs.
- E. Silva Cells shall be capable of supporting loads up to and including AASHTO H-20 (United States) or CSA-S6 87.5 kN (Canada) when used in conjunction with approved pavement profiles.
- F. Silva Cells shall be open on all vertical faces and horizontal planes and shall have no interior walls or diaphragms.
- G. Silva Cells shall be capable of providing a large, contiguous, continuous volume of planting soil that does not inhibit or prevent the following:
 - 1. Placement of planting soil
 - 2. Walk through compaction
 - 3. Compaction testing of planting soil, once in place
 - 4. Movement and growth of roots
 - 5. Movement of water within the provided soil volume, including lateral capillary movement
 - 6. Installation and maintenance of utilities placed within, adjacent to, or below the Silva Cell.
- H. Silva Cells shall be able capable of being filled with a variety of soil types and soils that include peds 2 inches (50 mm) or larger in diameter as is appropriate for the application, location of the installation, and tree species.

2.03 SILVA CELL MATERIALS AND ACCESSORIES

- A. Silva Cell System Components: Each "Silva Cell" soil cell module (hereafter Silva Cell or "cell") is composed of one base, 6 post assemblies, and one deck.
 - 1. 2x Silva Cell System:
 - a. Components: One base, six 2x posts, and one deck.
 - b. Assembled Dimensions (Each Cell): 47.2 inches long by 23.6 inches wide by 30.9 inches high (1200 mm long by 600 mm wide by 784 mm high).
- B. Silva Cell Materials and Fabrication:
 - 1. Bases and Posts: Homopolymer polypropylene.
 - 2. Decks: Fiberglass reinforced, chemically-coupled, impact modified polypropylene.
- C. Manufacturer's Related Silva Cell Installation Accessories:
 - 1. Strongbacks: An accessory designed to stabilize the Silva Cell posts temporarily, during soil placement, and removed for reuse prior to placing decks.
 - 2. Anchoring Spikes: 10" landscape spike for securing assembled Silva Cells to subbase.

2.04 RELATED PRODUCTS

- A. Root Barrier: Recyclable, black, injection molded panels manufactured with a minimum 50 percent post-consumer recycled polypropylene plastic with UV inhibitors, and integrated zipper joining system which allows instant assembly by sliding one panel into another; for redirecting tree roots down and away from hardscapes.
1. Panel Sizes:
 - a. No. UB12-2: 24 inches long by 12 inches deep by 0.080 inches thick (61 cm long by 30 cm deep by 2.03 mm thick); for use with 1x systems and for pavement profiles less than 12 inches (30 cm) deep.
 - b. No. UB18-2: 24 inches long by 18 inches deep by 0.080 inches thick (61 cm long by 46 cm deep by 2.03 mm thick); for use with 2x and 3x systems, and for pavement profiles 12 inches or more in depth.
 2. Products meeting this specification:
 - a. DeepRoot Tree Root Barrier (DeepRoot Green Infrastructure, LLC)
- B. Geogrid: Net-shaped woven polyester fabric with PVC coating, uniaxial or biaxial geogrid, inert to biological degradation, resistant to naturally occurring chemicals, alkalis, and acids; used to provide a stabilizing force within soil structure as the fill interlocks with the grid.
1. Tensile strength at ultimate (ASTM D6637):
 - a. 1850 lbs/ft (27.0 kN/m) minimum
 2. Creep reduced strength (ASTM D5262):
 - a. 1000 lbs/ft (14.6 kN/m) minimum
 3. Long term allowable design load (GRI GG-4):
 - a. 950 lbs/ft (13.9 kN/m) minimum
 4. Grid aperture size (MD):
 - a. 0.8 inch (20 mm) minimum
 5. Grid aperture size (CD):
 - a. 1.28 inch (32 mm) maximum
 6. Roll size: 6-foot (1.8-m) width is preferred, up to 18-foot (5.4-m).
 7. Products meeting this specification:
 - a. Stratagrid SG 150; <http://www.geogrid.com>
 - b. Miragrid 2XT; <http://www.tencate.com>
 - c. Fortrac 35 Geogrid; (<http://www.hueskerinc.com>)
 - d. SF 20 Biaxial Geogrid; <http://www.synteen.com>
- C. Geotextile: composed of high tenacity polypropylene yarns which are woven into a network such that the yarns retain their relative position and is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.
1. Tensile strength at ultimate (ASTM D4595):
 - a. 4800 lbs/ft (70.0 KN/m) MD minimum
 - b. 4800 lbs/ft (70.0 KN/m) CD minimum
 2. Tensile strength at 5% strain (ASTM D4595)
 - a. 2400 lbs/ft (35.0 KN/m) MD minimum
 - b. 3000 lbs/ft (43.8 KN/m) CD minimum
 3. Flow rate (ASTM D4491):
 - a. 30 gal/min/ft² (2648 l/min/m²) minimum
 4. Apparent opening size (ASTM D4751):
 - a. 30 sieve (0.60 mm)
 5. UV Resistance (at 500 hours):
 - a. 80 percent strength retained
 6. Products meeting this specification:
 - a. Mirafi HP570; <http://www.tencate.com>

- b. Geolon PP40; <http://www.tencate.com>
 - c. Nilex Woven 2044 (Nilex); <http://www.nilex.com>
- D. Plastic Cable Ties: A tensioning device or tool used to tie similar or different materials together with a specific degree of tension.

2.05 OTHER RELATED MATERIALS

- A. Wood Blocking: Nominal dimensioned untreated lumber used for spacing assembled Silva Cells.
- B. Drain and Distribution Pipes:
- C. Aggregate Subbase (Below Silva Cell Base):
 - 1. Aggregate meeting one of the following specifications:
 - a. Complying ASTM D1241, Type I, Gradation B; Type I mixtures shall consist of stone, gravel, or slag with natural or crushed sand and fine mineral particles passing a No. 200 sieve.

Sieve	Percent Passing
1-1/2 inches (37.5 mm)	100
1 inch (25 mm)	75 to 95
3/8 inch (9.5 mm)	40 to 75
No 4 (4.75 mm)	30 to 60
No 10 (2 mm)	20 to 45
No 40 (425 µm)	15 to 30
No 200 (75 µm)	5 to 15

- b. Local Department of Transportation (DOT) virgin aggregate that most closely meets the gradation of ASTM D1241.
- c. Ontario Provincial Standard Specification (OPSS) 1010 Granular A. Dense graded aggregates intended for use as granular base within the pavement structure, granular shouldering, and backfill.

Sieve	Percent Passing
26.5 mm	100
19 mm	85 to 100
13.2 mm	65 to 90
9.5 mm	50 to 73
4.75 mm	35 to 55
1.18 mm	15 to 40
300 µm	5 to 22
75 µm	2 to 8

- D. Aggregate Base Course (Above Silva Cell Deck):
 - 1. Same as aggregate subbase specified above.
- E. Aggregate Base Course for Porous Pavement (Above Silva Cell Deck):
 - 1. Aggregate complying with ASTM D448, No. 57.

Sieve	Percent Passing
1-1/2 inches (37.5 mm)	100
1 inch (25 mm)	95 to 100
1/2 inch (12.5 mm)	25 to 60
No 4 (4.75 mm)	0 to 10
No 8 (2.36 mm)	0 to 5

- F. Setting Bed for Unit Pavers (Above Silva Cell Deck):
 - 1. Aggregate complying with ASTM D448, No. 8.

<u>Sieve</u>	<u>Percent Passing</u>
1/2 inch (12.5 mm)	100
3/8 inch (9.5 mm)	85 to 100
No 4 (4.75 mm)	10 to 30
No 8 (2.36 mm)	0 to 10
No 16 (1.18 mm)	0 to 5

- G. Backfill Material (Adjacent to Silva Cells): Clean, compactable, coarse grained fill soil free of organic material, trash and other debris, and free of toxic material injurious to plant growth.
- H. Planting Soil: Refer to Section 32 94 56 - Planting Soil for Silva Cells.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the conditions under which the Silva Cells are to be installed.
 - 1. Carefully check and verify dimensions, quantities, and grade elevations.
 - 2. Carefully examine the Drawings to become familiar with the existing underground conditions before digging. Verify the location of aboveground and underground utility lines, infrastructure, other improvements, and existing trees, shrubs, and plants to remain including their root system.
 - 3. Notify the Contractor and the Engineer in writing in the event of conflict between existing and new improvements, of discrepancies, and other conditions detrimental to proper and timely completion of the installation.
 - 4. Obtain written approval of changes to the Work prior to proceeding. Proceed with installation only after changes have been made and unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Take proper precautions as necessary to avoid damage to existing improvements and plantings.
- B. Prior to the start of Work, layout and stake the limits of excavation and horizontal and vertical control points sufficient to install the complete Silva Cell system.
- C. Coordinate installation with other trades that may impact the completion of the Work.

3.03 TEMPORARY PROTECTION

- A. Protect open excavations and Silva Cell system from access and damage both when Work is in progress and following completion, with highly visible construction tape, fencing, or other means until related construction is complete.
- B. Do not drive vehicles or operate equipment over the Silva Cell system until the final surface material has been installed.

3.04 EXCAVATION

- A. General: Excavate to the depths and shapes indicated on the Drawings. Provide smooth and level excavation base free of lumps and debris.
- B. Confirm that the depth of the excavation is accurate and includes the full section of materials required to place the subbase aggregate, Silva Cell, and pavement profile as indicated on the Drawings.

- C. Over-excavate beyond the perimeter of the Silva Cell to allow for:
 1. The extension of aggregate subbase beyond the Silva Cell layout as shown on the Drawings.
 2. Adequate space for proper compaction of backfill around the Silva Cell system.
- D. If unsuitable subgrade soils are encountered, consult the Owner's geotechnical consultants for directions on how to proceed.
- E. If conflicts arise during excavation, notify the Engineer in writing and make recommendations for action. Proceed with Work only when action is approved in writing.

3.05 SUBGRADE COMPACTION

- A. Compact subgrade to a minimum of 95 percent of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method, or as approved by the Owner's geotechnical representative.
- B. Do not exceed 10 percent slope for subgrade profile in any one direction. If the 10 percent slope is exceeded, contact manufacturer's representative for directions on how to proceed.

3.06 INSTALLATION OF GEOTEXTILE OVER SUBGRADE

- A. Install geotextile over compacted subgrade.
 1. Lay geotextile flat with no folds or creases.
 2. Install the geotextile with a minimum joint overlap of 18 inches (450 mm).

3.07 INSTALLATION OF AGGREGATE SUBBASE BELOW SILVA CELL BASES

- A. Install aggregate subbase to the depths indicated on the Drawings.
- B. Extend subbase aggregate a minimum of 6 inches (150 mm) beyond the base of the Silva Cell layout.
- C. Compact aggregate subbase to a minimum of 95 percent of maximum dry density at optimum moisture content in accordance with ASTM D698, Standard Proctor Method.
- D. Do not exceed 10 percent slope on the surface of the subbase. Where proposed grades are greater than 10 percent, step the Silva Cells to maintain proper relation to the finished grade.

3.08 INSTALLATION OF SILVA CELL BASE

- A. Install the Silva Cell system in strict accordance with manufacturer's instructions and as specified herein; where requirements conflict or are contradictory, follow the more stringent requirements.
- B. Layout and Elevation Control:
 1. Provide layout and elevation control during installation of the Silva Cell system to ensure that layout and elevations are in accordance with the Drawings.
- C. Establish the location of the tree openings in accordance with the Drawings. Once the trees are located, mark the inside dimensions of the tree openings on the prepared subbase.
- D. Locate and mark other Project features located within the Silva Cell layout (e.g. light pole bases, utility pipes). Apply marking to identify the extent of the Silva Cell layout around these features. Follow the layout as shown on the Drawings to ensure proper spacing of the Silva Cell bases. Refer to the Drawings for offsets between these features and the Silva Cells.
- E. Check each Silva Cell component for damage prior to placement. Reject cracked or chipped units.
- F. Place the Silva Cell bases on the compacted aggregate subbase. Start at the tree opening and place Silva Cell bases around the tree openings as shown on the Drawings.

- G. Working from tree opening to tree opening, place Silva Cell bases to fill in the area between tree openings.
 - 1. Maintain spacing no less than 1 inch (25 mm) and no more than 6 inches (150 mm) apart, assuming geotextile covering the decks meets the specifications in section 2.04 paragraph C.
- H. Follow the Silva Cell layout plan as shown on the Drawings.
- I. Install Silva Cell bases around, over, or under existing or proposed utility lines, as indicated on the Drawings.
- J. Level each Silva Cell base as needed to provide full contact with subbase. Adjust subbase material, including larger pieces of aggregate, so each base sits solidly on the surface of the subbase. Silva Cell bases that rock or bend over any stone or other obstruction protruding above the surface of the subbase material are not allowed. Silva Cell bases which bend into dips in the subbase material are not allowed. The maximum tolerance for deviations in the plane of the subbase material under the bottom of the horizontal beams of each Silva Cell base is 1/4 inch in 4 feet (6 mm in 1200 mm).
- K. Anchor Silva Cell base with 2 anchoring spikes per base.
 - 1. For applications where Silva Cells are installed over waterproofed structures, use wood blocking or similar spacing system consistent with requirements of the waterproofing system to maintain required spacing.

3.09 INSTALLATION OF SILVA CELL POSTS

- A. 2x Silva Cell System:
 - 1. Attach 2x posts to the installed Silva Cell base. Each base will receive six 2x posts. Place the end of the post with tabs into the base. Rotate post clockwise to snap in place.

3.10 INSTALLATION OF STRONGBACKS, GEOGRID, BACKFILL AND PLANTING SOIL

- A. Install strongbacks on top of the Silva Cell posts by snapping into place over installed posts prior to installing planting soil and backfill.
 - 1. Strongbacks are required only during the placement and compaction of the planting soil and backfill.
 - 2. Move strongbacks as the Work progresses across the installation.
 - 3. Remove strongbacks prior to the installation of the Silva Cell decks.
- B. Install geogrid around the perimeter of the Silva Cell system where the compacted backfill and planting soil interface.
 - 1. Do not place geogrid between the edge of the Silva Cells and adjacent planting areas.
 - 2. Cut the geogrid to allow for a 6-inch (150-mm) overlap at the Silva Cell base and a 12-inch (300-mm) overlap at the Silva Cell deck.
 - 3. Provide a minimum 12-inch (300-mm) overlap between adjacent sheets of geogrid.
 - 4. Secure geogrid with cable ties below the top of the posts, along the post ridges.
- C. Place the first lift of backfill material loosely around the perimeter of the Silva Cell system, between the geogrid and the sides of the excavation. Place backfill to approximately the midpoint of the Silva Cell post. Do not compact.
- D. Place the first lift of planting soil in the Silva Cell system to approximately the midpoint of the Silva Cell post.
 - 1. Level the planting soil throughout the system.
 - 2. Walk-through the placed planting soil to remove air pockets and settle the soil.
 - a. Lightly compact soils by walking through the soil following placement.
 - b. Walk through compaction shall result in 75-85 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Do not exceed root limiting compaction for the given soil type.

- E. Compact the first lift of backfill material, previously spread, to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method or in accordance with Project Specifications for hardscape areas, whichever is greater.
- F. Add and compact additional backfill material so that the final finished elevation is at approximately the same level of the placed planting soil within the Silva Cells.
 - 1. Maintain the geogrid between the Silva Cell system and the backfill material at all times.
- G. Place the second lift of backfill material loosely around the perimeter of the Silva Cell system, between the geogrid and the sides of the excavation so that the material is 2 to 3 inches below the top of the posts. Do not compact.
- H. Place the second lift of planting soil inside of the Silva Cell to the bottom of the strongbacks. Walk through compact.

3.11 INSTALLATION OF IRRIGATION AND WATER HARVESTING SYSTEM (including but not limited to Deeproot Water+Air System components)

- A. Install irrigation and water harvesting system in accordance with the Drawings and Specifications. Remove only the minimum number of strongbacks needed to accommodate the Work and reinstall them immediately upon completion to maintain alignment of posts.

3.12 INSTALLATION OF SILVA CELL DECK

- A. Obtain final approval by the **Engineer** of planting soil installation prior to installation of the Silva Cell decks.
- B. Remove strongbacks, level out the planting soil, and immediately install decks over the posts below. Place deck over the top of the posts. Push decks down until the deck clips lock into the posts, snapping the deck into place.
- C. Fold the 12 inches (300 mm) of geogrid onto the top of the decks.

3.13 FINAL BACKFILL PLACEMENT AND COMPACTION

- A. Place and compact final lift of backfill material to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method, such that the backfill is flush with the top of the installed deck. Do not allow compacting equipment to come in contact with the decks.

3.14 INSTALLATION OF GEOTEXTILE AND AGGREGATE BASE COURSE OVER THE DECK

- A. Ensure geotextile meets the specifications in section 2.04 paragraph C.
- B. Place geotextile over the top of the deck and extend to the edge of the excavation. Overlap joints a minimum of 18 inches (450 mm). Leave enough slack in the geotextile for the aggregate base course to push the geotextile down in the gaps in between the decks.
- C. Install the aggregate base course (including aggregate setting bed if installing unit pavers) over the geotextile immediately after completing the installation of the fabrics. Work the aggregate from one side of the layout to the other so that the fabric and aggregate conform to the Silva Cell deck contours.
- D. Maintain equipment used to place aggregate base course completely outside the limits of the Silva Cell excavation area to prevent damage to the installed system.
- E. For large or confined areas, where aggregate cannot easily be placed from the edges of the excavated area, obtain approval for the installation procedure and types of equipment to be used in the installation from the Silva Cell manufacturer.

- F. Compact aggregate base course(s) to 95 percent of maximum dry density in accordance with ASTM D698, Standard Proctor Method. Utilize a vibration or plate compactor with a maximum weight of 800 lbs (362.87 kg).
- G. Do not drive vehicles or operate equipment over the completed aggregate base course.

3.15 INSTALLATION OF CONCRETE CURBS AT TREE OPENINGS, AGGREGATE SUBBASE AND PAVEMENT ABOVE THE SILVA CELL SYSTEM

- A. Place concrete curbs along planting areas and tree openings as shown on the Drawings to retain the aggregate base course from migrating into the planting soil.
- B. When staking concrete forms (e.g. curbs around the tree openings), prevent stakes from penetrating the Silva Cell decks.
- C. Turn down edge of concrete paving to the Silva Cell deck along the edges of tree openings or planting areas to retain the aggregate base course material.
- D. When paving type is a unit paver or other flexible material, provide a concrete curb under the paving at the edge of the Silva Cell deck to retain the aggregate base course material at the tree opening.
- E. Place paving material over Silva Cell system in accordance with the Drawings.
 - 1. The Silva Cell system does not fully meet loading strength until the final paving is installed. Do not operate construction equipment on top of the Silva Cell system until paving installation has been completed.
- F. Use care when placing paving or other backfill on top of Silva Cell system to prevent damage to the Silva Cell system or its components.

3.16 INSTALLATION OF ROOT BARRIERS

- A. Install root barrier in accordance with manufacturer's installation instructions.

3.17 INSTALLATION OF PLANTING SOIL WITHIN THE TREE PLANTING AREA

- A. Remove rubble, debris, dust and silt from the top of the planting soil within the tree opening that may have accumulated after the initial installation of the planting soil within the Silva Cells.
- B. Install additional planting soil within the tree openings, to the depths indicated on the Drawings.
 - 1. Use the same soil used within the Silva Cells for planting soil within the tree openings.
- C. Compact planting soil under the tree root ball as needed to prevent settlement of the root ball.
- D. Place trees in accordance with the Drawings.

3.18 PROTECTION

- A. Keep construction traffic away from the limits of the Silva Cells until the final pavement profile is in place. The Silva Cell system does not fully meet loading strength until the final paving is installed.
 - 1. Do not operate equipment directly on top of the Silva Cell system until paving installation has been completed.
 - 2. Provide fencing and other barriers to prevent vehicles from entering into the Silva Cell area.
- B. When the Silva Cell installation is completed and the permanent pavement is in place, limit traffic and construction related activities to only loads less than the design loads.

3.19 CLEAN UP

- A. Perform clean up during installation and upon completion of the Work. Maintain the site free of soil, sediment, trash and debris. Remove excess soil materials, debris, and equipment from the site following completion of the Work of this Section.
- B. Repair damage to adjacent materials and surfaces resulting from installation of this Work using mechanics skilled in remedial work of the construction type and trades affected.

Construction Requirements. Installation of Tree Well shall be using standard and best practices. Install per manufacturer's recommendations. Materials and products necessary to the successful completion and installation of the Tree Wells shall be incidental to the Tree Well.

Method of Measurement. The quantities will be based upon the Tree Well. Plants, Irrigation and materials required as part of the brick paver utility corridor, asphalt bike path and concrete sidewalk are not included in the area of the Tree Well

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S901-05E Tree Wells	Each

S901-05F – SP, CHIEF CLIFF BOULDERS

Description. The curb bulb outs are intended as landscape areas that will include plantings and ornamental boulders. The boulders shall be Chief Cliff stone, approximate sizes shown on plans. Chief Cliff stone are very hard argillites and quartzites quarried throughout northwestern Montana.

Materials. Chief Cliff Stone is a boulder that shall be rectangular or square and blocky in nature. Coloring shall be grays and red/orange rusted tints. Stone shall be approved by Owner before installation.

Construction Requirements. The work will be completed in accordance with installation details and notes. Approximately 1/4 to 1/3 of the boulder to be buried for stability. Boulders shall provide a horizontal plane on the top when installed.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

The Engineer will measure the boulders by each item provided and placed on site.

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S901-05F Chief Cliff Boulders	Each

S911-05A – SP, RIBBON CURB

Description. A 4” wide x 10” min depth concrete curb around the perimeter of the Tree Wells. These will be located on the edge of the Silva Cell cells, providing a structural edge.

Materials. Concrete to match color and standards of the proposed curb and gutter, in accordance with Section 615.02 of the 2023 Idaho Transportation Department, Standard Specifications for Highway Construction

Construction Requirements. Top of Ribbon Curb shall be placed flush with edge of concrete sidewalk and edge of asphalt bike lane. Bottom of Ribbon Curb shall extend down to the top of the Silva Cell. Install in accordance with standard construction practices for concrete installation. Work will include excavation and erecting of form work prior to placement of ribbon curb as detailed in the drawings, as well as removal of form work after sufficient curing of concrete, backfill adjacent to the ribbon curb and site clean up.

Method of Measurement. The quantity of Ribbon Curb will be measured longitudinally along center of curb per linear foot surrounding the perimeter of each Tree Well. 4”

Basis of Payment. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S911-05A Ribbon Curb	Linear Foot

S912-05A – SP, BRICK PAVER WITH SAND BASE

Description. This specification specifies the requirements for constructing a Brick Paver with Sand Base.

Materials.

Concrete Pavers: Concrete per ASTM C 936, Standard Specification for Solid Concrete Interlocking Paving Units. Color selection and surface texture as approved by the City. The intent is to match pavers previously installed in other areas in the City as closely as possible. The Contractor shall submit a sample for approval prior to beginning construction on this work.

Bedding Sand:

Gradation:

Sieve Size	% Passing
3/8 in.	100
No. 4	95-100
No. 8	85-100
No. 16	50-85
No. 30	25-60
No. 50	10-20
No. 100	2-10

Per ASTM C 33. Crusher screenings not allowed.

Paver Joint Filler

Gradation:

	NATURAL SAND	MANUFACTURED SAND
Sieve Size	% Passing	% Passing
No. 4	100	100
No. 8	95-100	95-100
No. 16	70-100	10-100
No. 30	40-75	40-75
No. 50	10-35	20-40
No. 100	2-15	10-25

No. 200	0	0-10
---------	---	------

Per ASTM C 144.

Construction Requirements.

A. General

1. Cross-section and patterns for installation of decorative pavers as specified in the contract documents or approved by the Engineer. Do not use broken pavers or materials with soiled or stained faces.

B. Sand Setting Bed

1. Distribute bedding sand evenly over PCC base and screed to 1 inch thickness or per contract documents
2. Use approved spreader method for spreading bedding sand. Surface variations must be within 3/8 inch when tested with a 10 foot straightedge.
3. Carefully maintain bedding sand in loose condition before and after screeding. Restrict pedestrians and equipment from screeded bedding prior to paver placement. Protect from rain. Remove any incidentally compacted bedding and return to profile in a loose condition.
4. Place and screed only the amount of bedding sand that will be paved the same day. Remove, loosen and rescreed unpaved bedding left overnight

C. Paver Installation

1. Clean pavers of stains and foreign material prior to usage. Do not use chipped, damaged or discolored pavers.
2. Place pavers according to patterns specified in the contract documents.
3. Place chalk or string lines on bedding course to maintain straight joint lines.
4. Install pavers from a minimum of 3 bundles simultaneously to assure dispersion and blending of color variations.
5. Place pavers hand-tight and maintain straight joint lines.
6. Use trimmed or cut pavers only along outer pavement boundaries or adjacent to manholes or other features within the pavement area.
7. Cut pavers with a double blade paver splitter or masonry saw.
8. Clean debris from pavement prior to compaction and inspection. Inspection will be made to identify damaged pavers, inadequate color blending, and irregular joint lines. Contractor shall remove and replace pavers as required.
9. Compact bricks using a 3 to 5 ton roller or machine with a low amplitude, high frequency vibratory plate weighing a minimum of 100 pounds.

Compactor Size

Paver Thickness	Compactive Force
2-3/8 inches	3000 pounds
2-3/4 inches	5000 pounds

3-1/8 inches	500 pounds
--------------	------------

10. Use urethane plate compactor pad.
11. Compact pavement surface with a minimum of 3 passes prior to application of joint filler.
12. Reinspect pavers, and remove and replace all damaged or misaligned units.
13. Sweep dry joint filler into paver joints until full. Recompact and repeat until joints remain full after compaction. Sweep and remove excess joint filler.

D. Quality Control

1. Ensure final surface is within 3/8 inch deviation when tested with a 10 foot straightedge.
2. Ensure all surfaces have positive drainage
3. Ensure surface elevation of pavers is 1/8 to 1/4 inch above adjacent drainage inlets, channels and curb tops.
4. Ensure adjacent paver elevations deviate no more than 1/8 inch.

Method of Measurement. The Engineer will measure acceptably completed work as follows:

The quantity of Brick/Paver Sidewalk with Sand Base will be paid per square yard for the area of brick paver placed on a sand base. The area of sand base will not be measured separately, but will be considered included with payment for brick paver with sand base. Area of manholes, intakes or other fixtures in the pavement will not be deducted from the measured area.

Basis of Payment. The Brick Paver with Sand Base will be paid for at the contract unit price per square yard. The unit price includes, but is not limited to, subgrade preparation, setting bed, setting the brick pavers and sand joint filler. The Department will pay for accepted quantities at the contract unit prices as follows:

Pay Item	Pay Unit
S912-05A Brick Paver with Sand Base	Square Yard

THE FOLLOWING ARE MODIFICATIONS TO THE QASP SA 10/21/2019 TO CORRECT AN ERROR IN THE FORMULA

ON SHEET 6 OF 15 QASP SA (10/21/2019) – 106.03.B.1.e QUALITY LEVEL ANALYSIS/STATISTICAL ANALYSIS

Delete and replace with:

$$A = \text{Maximum} \left[0, 0.5 - Q_U \times \frac{n^{0.5}}{2(n-1)} \right]$$

$$X = \text{Maximum} \left[0, 0.5 - Q_U \times \frac{n^{0.5}}{2(n-1)} \right]$$

ON SHEET 6 OF 15 QASP SA (10/21/2019) – 106.03.B.1.f QUALITY LEVEL ANALYSIS/STATISTICAL ANALYSIS

Delete and replace with:

$$A = \text{Maximum} \left[0, 0.5 - Q_L \times \frac{n^{0.5}}{2(n-1)} \right]$$

$$X = \text{Maximum} \left[0, 0.5 - Q_L \times \frac{n^{0.5}}{2(n-1)} \right]$$