Patricia Romo, P.E.
Deputy Director Transportation
County of Riverside
Transportation Department
4080 Lemon Street, 8th floor
Riverside, CA 92501
Phone: (951)955-6740
Fax: (951)955-3198
E-mail: PROMO@rctlma.org

- **1.01.05** The Contractor is responsible for determining and complying with all Federal, State and Local Governmental laws and regulations, including, but not limited to environmental laws and regulations (including but not limited to the Resource Conservation and Recovery Act, as amended; the Clean Water Act, the Oil Pollution Act, the Hazardous Materials Transportation Act, CERCLA), and health and safety laws and regulations. The Contractor hereby indemnifies, defends and holds harmless Railway for, from and against all fines or penalties imposed or assessed by Federal, State and Local Governmental Agencies against the Railway which arise out of Contractor's work under the Exhibit C-1 Agreement.

- **1.01.06** The Contractor must notify Patricia Romo, hereinafter referred to as **("County")** and Railway's Manager Public Projects, telephone number 909-386-4472 at least thirty (30) calendar days before commencing any work on Railway Property. Contractor's notification to Railway must refer to Railway's file ***BF10004340***.

- **1.01.07** For any bridge demolition and/or falsework above any tracks or any excavations located with any part of the excavations located within, whichever is greater, twenty-five (25) feet of the nearest track or intersecting a slope from the plane of the top of rail on a 2 horizontal to 1 vertical slope beginning at eleven (11) feet from centerline of the nearest track, both measured perpendicular to center line of track, the Contractor must furnish the Railway five sets of working drawings showing details of construction affecting Railway Property and tracks. The working drawing must include the proposed method of installation and removal of falsework, shoring or cribbing, not included in the contract plans and two sets of structural calculations of any falsework, shoring or cribbing. For all excavation and shoring submittal plans, the current "BNSF-UPRR Guidelines for Temporary Shoring" must be used for determining the design loading conditions to be used in shoring design, and all calculations and submittals must be in accordance with the current "BNSF-UPRR Guidelines for Temporary Shoring". All submittal drawings and calculations must be stamped by a registered professional engineer licensed to practice in the state the project is located. All calculations must take into consideration railway surcharge loading and must be designed to meet American Railway Engineering and Maintenance-of-Way Association (previously known as American Railway Engineering Association) Coopers E-80 live loading standard. All drawings and calculations must be stamped by a registered professional engineer licensed to practice in the state the project is located. The Contractor must not begin work until notified by the Railway that plans have been approved. The Contractor will be required to use lifting devices such as, cranes and/or winches to place or to remove any falsework over Railway's tracks. In no case will the Contractor be relieved of responsibility for results obtained by the implementation of said approved plans.

- **1.01.08** Subject to the movement of Railway's trains, Railway will cooperate with the Contractor such that the work may be handled and performed in an efficient manner. The Contractor will have no claim whatsoever for any type of damages or for extra or additional compensation in the event his work is delayed by the Railway.

1.02 Contractor Safety Orientation

- **1.02.01 No employee of the Contractor, its subcontractors, agents or invitees may enter Railway Property without first having completed Railway's Engineering Contractor Safety Orientation, found on the web site www.contractororientation.com. The Contractor must ensure that each of its employees, subcontractors, agents or invitees completes Railway's Engineering Contractor Safety Orientation through internet sessions before any work is performed on the Project. Additionally, the Contractor must ensure that each and every one of its employees, subcontractors, agents or invitees possesses a card certifying completion of the Railway Contractor Safety Orientation before entering Railway Property. The Contractor is responsible for the cost of the Railway Contractor Safety Orientation. The Contractor must renew the Railway Contractor Safety Orientation annually. Further clarification can be found on the web site or from the Railway's Representative.**

1.03 Railway Requirements

- **1.03.01** The Contractor must take protective measures as are necessary to keep railway facilities, including track ballast, free of sand, debris, and other foreign objects and materials resulting from his operations. Any damage to railway facilities resulting from Contractor's operations will be repaired or replaced by Railway and the cost of such repairs or replacement must be paid for by County.

- **1.03.02** The Contractor must notify the Railway's Division Engineer at 909-386-4504 and provide blasting plans to the Railway for review seven (7) calendar days prior to conducting any blasting operations adjacent to or on Railway's Property.

- **1.03.03** The Contractor must abide by the following temporary clearances during construction:

  - 15'-0" Horizontally from centerline of nearest track
  - 21'-6" Vertically above top of rail
  - 27'-0" Vertically above top of rail for electric wires carrying less than 750 volts
  - 28'-0" Vertically above top of rail for electric wires carrying 750 volts to 15,000 volts
  - 30'-0" Vertically above top of rail for electric wires carrying 15,000 volts to 20,000 volts
  - 34'-0" Vertically above top of rail for electric wires carrying more than 20,000 volts

- **1.03.04** Upon completion of construction, the following clearances shall be maintained:

  - 25' Horizontally from centerline of nearest track
  - 24.5' Vertically above top of rail

- **1.03.05** Any infringement within State statutory clearances due to the Contractor's operations must be submitted to the Railway and to County and must not be undertaken until approved in writing by the Railway, and until the County has obtained any necessary authorization from the State Regulatory Authority for the infringement. No extra compensation will be allowed in the event the Contractor's work is delayed pending Railway approval, and/or the State Regulatory Authority's approval.

- **1.03.06** In the case of impaired vertical clearance above top of rail, Railway will have the option of installing tell-tales or other protective devices Railway deems necessary for protection of Railway operations. The cost of tell-tales or protective devices will be borne by County.

- **1.03.07** The details of construction affecting the Railway's Property and tracks not included in the contract plans must be submitted to the Railway by COUNTY for approval before work is undertaken and this work must not be undertaken until approved by the Railway.

- **1.03.08** At other than public road crossings, the Contractor must not move any equipment or materials across Railway's tracks until permission has been obtained from the Railway. The Contractor must obtain a "Temporary Construction Crossing Agreement" from the Railway prior to moving his equipment or materials across the Railways tracks. The temporary crossing must be gated and locked at all times when not required for use by the Contractor. The temporary crossing for use of the Contractor will be constructed and, at the completion of the project, removed at the expense of the Contractor.

- **1.03.09** Discharge, release or spill on the Railway Property of any hazardous substances, oil, petroleum, constituents, pollutants, contaminants, or any hazardous waste is prohibited and Contractor must immediately notify the Railway's Resource Operations Center at 1(800) 832-5452, of any discharge, release or spills in excess of a reportable quantity. Contractor must not allow Railway Property to become a treatment, storage or transfer facility as those terms are defined in the Resource Conservation and Recovery Act or any state analogue.

- **1.03.10** The Contractor upon completion of the work covered by this contract, must promptly remove from the Railway's Property all of Contractor's tools, equipment, implements and other materials, whether brought upon said property by said Contractor or any Subcontractor, employee or agent of Contractor or of any Subcontractor, and must cause Railway's Property to be left in a condition acceptable to the Railway's representative.

1.04 Contractor Roadway Worker on Track Safety Program and Safety Action Plan

- **1.04.01** Each Contractor that will perform work within 25 feet of the centerline of a track must develop and implement a Roadway Worker Protection/On Track Safety Program and work with Railway Project Representative to develop an on track safety strategy as described in the guidelines listed in the on track safety portion of the Safety Orientation. This Program must provide Roadway Worker protection/on track training for all employees of the Contractor, its subcontractors, agents or invitees. This training is reinforced at the job site through job safety briefings. Additionally, each Contractor must develop and implement the Safety Action Plan, as provided for on the web site **www.contractororientation.com**, which will be made available to Railway prior to commencement of any work on Railway Property.

During the performance of work, the Contractor must audit its work activities. The Contractor must designate an on-site Project Supervisor who will serve as the contact person for the Railway and who will maintain a copy of the Safety Action Plan, safety audits, and Material Safety Datasheets (MSDS), at the job site.

1.05 Railway Flagger Services:

- **1.05.01** The Contractor must give Railway's **Roadmaster (telephone 909-386-4061)** a minimum of thirty (30) calendar days advance notice when flagging services will be required so that the Roadmaster can make appropriate arrangements (i.e., bulletin the flagger's position). If flagging services are scheduled in advance by the Contractor and it is subsequently determined by the parties hereto that such services are no longer necessary, the Contractor must give the Roadmaster five (5) working days advance notice so that appropriate arrangements can be made to abolish the position pursuant to union requirements.

- **1.05.02** Unless determined otherwise by Railway's Project Representative, Railway flagger will be required and furnished when Contractor's work activities are located over, under and/or within twenty-five (25) feet measured horizontally from centerline of the nearest track and when cranes or similar equipment positioned beyond 25-feet from the track centerline could foul the track in the event of tip over or other catastrophic occurrence, but not limited thereto for the following conditions:

- **1.05.02a** When, upon inspection by Railway's Representative, other conditions warrant.

- **1.05.02b** When any excavation is performed below the bottom of tie elevation, if, in the opinion of Railway's representative, track or other Railway facilities may be subject to movement or settlement.

- **1.05.02c** When work in any way interferes with the safe operation of trains at timetable speeds.

- **1.05.02d** When any hazard is presented to Railway track, communications, signal, electrical, or other facilities either due to persons, material, equipment or blasting in the vicinity.

- **1.05.02e** Special permission must be obtained from the Railway before moving heavy or cumbersome objects or equipment which might result in making the track impassable.

- **1.05.03** Flagging services will be performed by qualified Railway flaggers.

- **1.05.03a** Flagging crew generally consists of one employee. However, additional personnel may be required to protect Railway Property and operations, if deemed necessary by the Railways Representative.

- **1.05.03b** Each time a flagger is called, the minimum period for billing will be the eight (8) hour basic day.

- **1.05.03c** The cost of flagger services provided by the Railway will be borne by **COUNTY.** The estimated cost for one (1) flagger is approximately between $800.00-$1,600.00 for an eight (8) hour basic day with time and one-half or double time for overtime, rest days and holidays. The estimated cost for each flagger includes vacation allowance, paid holidays, Railway and unemployment insurance, public liability and property damage insurance, health and welfare benefits, vehicle, transportation, meals, lodging, radio, equipment, supervision and other costs incidental to performing flagging services. Negotiations for Railway labor or collective bargaining agreements and rate changes authorized by appropriate Federal authorities may increase actual or estimated flagging rates. **THE FLAGGING RATE IN EFFECT AT THE TIME OF PERFORMANCE BY THE CONTRACTOR HEREUNDER WILL BE USED TO CALCULATE THE ACTUAL COSTS OF FLAGGING PURSUANT TO THIS PARAGRAPH.**

- **1.05.03d** The current average train traffic on this route is 66 freight trains at 60 MPH and 22 passenger trains at 60 MPH.

1.06 Contractor General Safety Requirements

- **1.06.01** Work in the proximity of railway track(s) is potentially hazardous where movement of trains and equipment can occur at any time and in any direction. All work performed by contractors within 25 feet of any track must be in compliance with FRA Roadway Worker Protection Regulations.

- **1.06.02** Before beginning any task on Railway Property, a thorough job safety briefing must be conducted with all personnel involved with the task and repeated when the personnel or task changes. If the task is within 25 feet of any track, the job briefing must include the Railway's flagger, as applicable, and include the procedures the Contractor will use to protect its employees, subcontractors, agents or invitees from moving any equipment adjacent to or across any Railway track(s).

- **1.06.03** Workers must not work within 25 feet of the centerline of any track without an on track safety strategy approved by the Railway's Project Representative. When authority is provided, every contractor employee must know: (1) who the Railway flagger is, and how to contact the flagger, (2) limits of the authority, (3) the method of communication to stop and resume work, and (4) location of the designated places of safety. Persons or equipment entering flag/work limits that were not previously job briefed, must notify the flagger immediately, and be given a job briefing when working within 25 feet of the center line of track.

- **1.06.04** When Contractor employees are required to work on the Railway Property after normal working hours or on weekends, the Railway's representative in charge of the project must be notified. A minimum of two employees must be present at all times.

- **1.06.05** Any employees, agents or invitees of Contractor or its subcontractors under suspicion of being under the influence of drugs or alcohol, or in the possession of same, will be removed from the Railway's Property and subsequently released to the custody of a representative of Contractor management. Future access to the Railway's Property by that

employee will be denied.

- **1.06.06** Any damage to Railway Property, or any hazard noticed on passing trains must be reported immediately to the Railway's representative in charge of the project. Any vehicle or machine which may come in contact with track, signal equipment, or structure (bridge) and could result in a train derailment must be reported immediately to the Railway representative in charge of the project and to the Railway's Resource Operations Center at 1(800) 832-5452. Local emergency numbers are to be obtained from the Railway representative in charge of the project prior to the start of any work and must be posted at the job site.

- **1.06.07** For safety reasons, all persons are prohibited from having pocket knives, firearms or other deadly weapons in their possession while working on Railway's Property.

- **1.06.08** All personnel protective equipment (PPE) used on Railway Property must meet applicable OSHA and ANSI specifications. Current Railway personnel protective equipment requirements are listed on the web site, **www.contractororientation.com**, however, a partial list of the requirements include: a) safety glasses with permanently affixed side shields (no yellow lenses); b) hard hats c) safety shoe with: hardened toes, above-the-ankle lace-up and a defined heel; and d) high visibility retro-reflective work wear. The Railway's representative in charge of the project is to be contacted regarding local specifications for meeting requirements relating to hi-visibility work wear. Hearing protection, fall protection, gloves, and respirators must be worn as required by State and Federal regulations. **(NOTE – Should there be a discrepancy between the information contained on the web site and the information in this paragraph, the web site will govern.)**

- **1.06.09 THE CONTRACTOR MUST NOT PILE OR STORE ANY MATERIALS, MACHINERY OR EQUIPMENT CLOSER THAN 25'-0" TO THE CENTER LINE OF THE NEAREST RAILWAY TRACK. MATERIALS, MACHINERY OR EQUIPMENT MUST NOT BE STORED OR LEFT WITHIN 250 FEET OF ANY HIGHWAY/RAIL AT-GRADE CROSSINGS OR TEMPORARY CONSTRUCTION CROSSING, WHERE STORAGE OF THE SAME WILL OBSTRUCT THE VIEW OF A TRAIN APPROACHING THE CROSSING. PRIOR TO BEGINNING WORK, THE CONTRACTOR MUST ESTABLISH A STORAGE AREA WITH CONCURRENCE OF THE RAILWAY'S REPRESENTATIVE.**

- **1.06.10** Machines or vehicles must not be left unattended with the engine running. Parked machines or equipment must be in gear with brakes set and if equipped with blade, pan or bucket, they must be lowered to the ground. All machinery and equipment left unattended on Railway's Property must be left inoperable and secured against movement. (See internet Engineering Contractor Safety Orientation program for more detailed specifications)

- **1.06.11** Workers must not create and leave any conditions at the work site that would interfere with water drainage. Any work performed over water must meet all Federal, State and Local regulations.

- **1.06.12** All power line wires must be considered dangerous and of high voltage unless informed to the contrary by proper authority. For all power lines the minimum clearance between the lines and any part of the equipment or load must be; 200 KV or below - 15 feet; 200 to 350 KV - 20 feet; 350 to 500 KV - 25 feet; 500 to 750 KV - 35 feet; and 750 to 1000

KV - 45 feet. If capacity of the line is not known, a minimum clearance of 45 feet must be maintained. A person must be designated to observe clearance of the equipment and give a timely warning for all operations where it is difficult for an operator to maintain the desired clearance by visual means.

1.07 Excavation:

- **1.07.01** Before excavating, the Contractor must determine whether any underground pipe lines, electric wires, or cables, including fiber optic cable systems are present and located within the Project work area. The Contractor must determine whether excavation on Railway's Property could cause damage to buried cables resulting in delay to Railway traffic and disruption of service to users. Delays and disruptions to service may cause business interruptions involving loss of revenue and profits. Before commencing excavation, the Contractor must contact **BNSF's Field Engineering Representative (909-386-4079).** All underground and overhead wires will be considered HIGH VOLTAGE and dangerous until verified with the company having ownership of the line.

  It is the Contractor's responsibility to notify any other companies that have underground utilities in the area and arrange for the location of all underground utilities before excavating.

- **1.07.02** The Contractor must cease all work and notify the Railway immediately before continuing excavation in the area if obstructions are encountered which do not appear on drawings. If the obstruction is a utility and the owner of the utility can be identified, then the Contractor must also notify the owner immediately. If there is any doubt about the location of underground cables or lines of any kind, no work must be performed until the exact location has been determined. There will be no exceptions to these instructions.

- **1.07.03** All excavations must be conducted in compliance with applicable OSHA regulations and, regardless of depth, must be shored where there is any danger to tracks, structures or personnel.

- **1.07.04** Any excavations, holes or trenches on the Railway's Property must be covered, guarded and/or protected when not being worked on. When leaving work site areas at night and over weekends, the areas must be secured and left in a condition that will ensure that Railway employees and other personnel who may be working or passing through the area are protected from all hazards. All excavations must be back filled as soon as possible.

1.08 Hazardous Waste, Substances and Material Reporting:

- **1.08.01** If Contractor discovers any hazardous waste, hazardous substance, petroleum or other deleterious material, including but not limited to any non-containerized commodity or material, on or adjacent to Railway's Property, in or near any surface water, swamp, wetlands or waterways, while performing any work under the Exhibit C-1 Agreement, Contractor must immediately: (a) notify the Railway's Resource Operations Center at 1(800) 832-5452, of such discovery: (b) take safeguards necessary to protect its employees, subcontractors, agents and/or third parties: and (c) exercise due care with respect to the release, including the taking

1.09 Personal Injury Reporting

- **1.09.01** The Railway is required to report certain injuries as a part of compliance with Federal Railroad Administration (FRA) reporting requirements. Any personal injury sustained by an employee of the Contractor, subcontractor or Contractor's invitees while on the Railway's Property must be reported immediately (by phone mail if unable to contact in person) to the Railway's representative in charge of the project. The Non-Employee Personal Injury Data Collection Form contained herein is to be completed and sent by Fax to the Railway at 1(817) 352-7595 and to the Railway's Project Representative no later than the close of shift on the date of the injury.

NON-EMPLOYEE PERSONAL INJURY DATA COLLECTION

(If injuries are in connection with rail equipment accident/incident, highway rail grade crossing accident or automobile accident, ensure that appropriate information is obtained, forms completed and that data entry personnel are aware that injuries relate to that specific event.)

Injured Person Type:

- ☐ Passenger on train (C)
- ☐ Non-employee (N) *(i.e., emp of another railroad, or, non-BNSF emp involved in vehicle accident, including company vehicles)*
- ☐ Contractor/safety sensitive (F)
- ☐ Contractor/non-safety sensitive (G)
- ☐ Volunteer/safety sensitive (H)
- ☐ Volunteer/other non-safety sensitive (I)
- ☐ Non-trespasser (D) - to include highway users involved in highway rail grade crossing accidents who did not go around or through gates
- ☐ Trespasser (E) - to include highway users involved in highway rail grade crossing accidents who went around or through gates
- ☐ Non-trespasser (J) - Off Railway Property

If train involved, Train ID: _____

Transmit attached information to Accident/Incident Reporting Center by:
Fax 1-817-352-7595 or by Phone 1-800-697-6736 **or email to:** **Accident-Reporting.Center@BNSF.com**

Officer Providing Information:

_____ _____ _____
(Name) (Employee) (Phone #)

REPORT PREPARED TO COMPLY WITH FEDERAL ACCIDENT REPORTING REQUIREMENTS AND PROTECTED FROM DISCLOSURE PURSUANT TO 49 U.S.C. 20903 AND 83 U.S.C. 490

NON-EMPLOYEE PERSONAL INJURY DATA COLLECTION

INFORMATION REQUIRED TO BE COLLECTED PURSUANT TO FEDERAL REGULATION. IT SHOULD BE USED FOR COMPLIANCE WITH FEDERAL REGULATIONS ONLY AND IT IS NOT INTENDED TO PRESUME ACCEPTANCE OF RESPONSIBILITY OR LIABIITY

1. Accident City/St: _____ 2:
Date:_____ Time:: _____

County: _____ 3. Temperature:
_____ 4. Weather: _____

(if non BNSF location)
Mile Post / Line Segment _____

5. Driver's License No. (and state) or other ID:
_____ **SSN(required):** _____
_____

6. Name (last, first, mi):
_____
_____

7. Address: _____ City:
_____ St: _____ Zip: _____

8 Date of Birth: _____ and/or Age:
_____ Gender: _____

(If available)
Phone Number: _____
Employer:_____

9. Injury: _____ 10. Body
Part: _____

(i.e. laceration, etc.)
(i.e. Hand, etc.)
11. Description of Accident (To include location, action, result, etc.)_____
_
_____
_____
_____
_____
_____
_____
_____

12. Treatment:
☐ First Aid Only
_____
_____

☐ Required Medical Treatment

☐ Other Medical Treatment

13. Dr. Name: _____ Date: _____

14: Dr. Address:
Street; _____City: _____St: _____Zip: _____

15: Hospital Name: _____

16: Hospital Address:
Street; _____City: _____St: _____Zip: _____

17: Diagnosis: _____

REPORT PREPARED TO COMPLY WITH FEDERAL ACCIDENT REPORTIING REQUIREMENTS
AND PROTECTED FROM DISCLOSURE PURSUANT TO 49 U.S.C. 20903 AND 83 U.S.C. 490

EXHIBIT "C-1"

Agreement
Between
BNSF RAILWAY COMPANY
and the
CONTRACTOR

BNSF RAILWAY COMPANY
Attention: Manager Public Projects

Railway File: *BF10004340*
Agency Project: Magnolia Ave Overpass Riverside County – 026517B

The undersigned (hereinafter called, the "Contractor"), has entered into a contract (the "Contract") dated _____, 2013, with the **COUNTY of RIVERSIDE ("County")** for the performance of certain work in connection with the following project: **Construction of the Magnolia Ave Grade Separated Overpass Riverside County, CA, USDOT# 026517B on BNSF's San Bernardino Subdivision.**

Performance of such work will necessarily require Contractor to enter **BNSF RAILWAY COMPANY** ("Railway") right of way and property ("Railway Property"). The Contract provides that no work will be commenced within Railway Property until the Contractor employed in connection with said work for **COUNTY** (i) executes and delivers to Railway an Agreement in the form hereof, and (ii) provides insurance of the coverage and limits specified in such Agreement and Section 3 herein. If this Agreement is executed by a party who is not the Owner, General Partner, President or Vice President of Contractor, Contractor must furnish evidence to Railway certifying that the signatory is empowered to execute this Agreement on behalf of Contractor.

Accordingly, in consideration of Railway granting permission to Contractor to enter upon Railway Property and as an inducement for such entry, Contractor, effective on the date of the Contract, has agreed and does hereby agree with Railway as follows:

Section 1. RELEASE OF LIABILITY AND INDEMNITY

Contractor hereby waives, releases, indemnifies, defends and holds harmless Railway for all judgments, awards, claims, demands, and expenses (including attorneys' fees), for injury or death to all persons, including Railway's and Contractor's officers and employees, and for loss and damage to property belonging to any person, arising in any manner from Contractor's or any of Contractor's subcontractors' acts or omissions or any work performed on or about Railway's Property. **THE LIABILITY ASSUMED BY CONTRACTOR WILL NOT BE AFFECTED BY THE FACT, IF IT IS A FACT, THAT THE DESTRUCTION, DAMAGE, DEATH, OR INJURY WAS OCCASIONED BY OR CONTRIBUTED TO BY THE NEGLIGENCE OF RAILWAY, ITS AGENTS, SERVANTS, EMPLOYEES OR OTHERWISE, EXCEPT TO THE EXTENT THAT SUCH CLAIMS ARE PROXIMATELY CAUSED BY THE WILLFUL MISCONDUCT OR SOLE NEGLIGENCE OF RAILWAY.**

THE INDEMNIFICATION OBLIGATION ASSUMED BY CONTRACTOR INCLUDES ANY CLAIMS, SUITS OR JUDGMENTS BROUGHT AGAINST RAILWAY UNDER THE FEDERAL EMPLOYEE'S LIABILITY ACT, INCLUDING CLAIMS FOR STRICT LIABILITY UNDER THE SAFETY APPLIANCE ACT OR THE LOCOMOTIVE INSPECTION ACT, WHENEVER SO CLAIMED.

Contractor further agrees, at its expense, in the name and on behalf of Railway, that it will adjust and settle all claims made against Railway, and will, at Railway's discretion, appear and defend any suits or actions of law or in equity brought against Railway on any claim or cause of action arising or growing out of or in any manner connected with any liability assumed by Contractor under this Agreement for which Railway is liable or is alleged to be liable. Railway will give notice to Contractor, in writing, of the receipt or dependency of such claims and thereupon Contractor must proceed to adjust and handle to a conclusion such claims, and in the event of a suit being brought against Railway, Railway may forward summons and complaint or other process in connection therewith to Contractor, and Contractor, at Railway's discretion, must defend, adjust, or settle such suits and protect, indemnify, and save harmless Railway from and against all damages, judgments, decrees, attorney's fees, costs, and expenses growing out of or resulting from or incident to any such claims or suits.

In addition to any other provision of this Agreement, in the event that all or any portion of this Article shall be deemed to be inapplicable for any reason, including without limitation as a result of a decision of an applicable court, legislative enactment or regulatory order, the parties agree that this Article shall be interpreted as requiring Contractor to indemnify Railway to the fullest extent permitted by applicable law. **THROUGH THIS AGREEMENT THE PARTIES EXPRESSLY INTEND FOR CONTRACTOR TO INDEMNIFY RAILWAY FOR RAILWAY'S ACTS OF NEGLIGENCE.**

It is mutually understood and agreed that the assumption of liabilities and indemnification provided for in this Agreement survive any termination of this Agreement.

Section 2. TERM

This Agreement is effective from the date of the Contract until (i) the completion of the project set forth herein, and (ii) full and complete payment to Railway of any and all sums or other amounts owing and due hereunder.

Section 3. INSURANCE

Contractor shall, at its sole cost and expense, procure and maintain during the life of this Agreement the following insurance coverage:

A. Commercial General Liability insurance. This insurance shall contain broad form contractual liability with a combined single limit of a minimum of $5,000,000 each occurrence and an aggregate limit of at least $10,000,000 but in no event less than the amount otherwise carried by the Contractor. Coverage must be purchased on a post

2004 ISO occurrence form or equivalent and include coverage for, but not limit to the following:

- Bodily Injury and Property Damage
- Personal Injury and Advertising Injury
- Fire legal liability
- Products and completed operations

This policy shall also contain the following endorsements, which shall be indicated on the certificate of insurance:

- The definition of insured contract shall be amended to remove any exclusion or other limitation for any work being done within 50 feet of railroad property.
- Waver of subrogation in favor of and acceptable to Railway.
- Additional insured endorsement in favor of and acceptable to Railway.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

It is agreed that the workers' compensation and employers' liability related exclusions in the Commercial General Liability insurance policy(s) required herein are intended to apply to employees of the policy holder and shall not apply to ***Railway*** employees.

No other endorsements limiting coverage as respects obligations under this Agreement may be included on the policy with regard to the work being performed under this agreement.

B. Business Automobile Insurance. This insurance shall contain a combined single limit of at least $1,000,000 per occurrence, and include coverage for, but not limited to the following:

- Bodily injury and property damage
- Any and all vehicles owned, used or hired

The policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railway.
- Additional insured endorsement in favor of and acceptable to Railway.
- Separation of insureds.
- The policy shall be primary and non-contributing with respect to any insurance carried by Railway.

C. Workers Compensation and Employers Liability insurance including coverage for, but not limited to:

- Contractor's statutory liability under the worker's compensation laws of the state(s) in which the work is to be performed. If optional under State law, the insurance must cover all employees anyway.
- Employers' Liability (Part B) with limits of at least $500,000 each accident, $500,000 by disease policy limit, $500,000 by disease each employee.

This policy shall also contain the following endorsements or language, which shall be indicated on the certificate of insurance:

- Waiver of subrogation in favor of and acceptable to Railway.

D. Railroad Protective Liability insurance naming only the ***Railway*** as the Insured with coverage of at least $5,000,000 per occurrence and $10,000,000 in the aggregate. The policy Must be issued on a standard ISO form CG 00 35 12 04 and include the following:

- Endorsed to include the Pollution Exclusion Amendment
- Endorsed to include the Limited Seepage and Pollution Endorsement.
- Endorsed to remove any exclusion for punitive damages.
- No other endorsements restricting coverage may be added.
- The original policy must be provided to the ***Railway*** prior to performing any work or services under this Agreement
- Definition of "Physical Damage to Property" shall be endorsed to read: "means direct and accidental loss of or damage to all property owned by any named insured and all property in any named insured' care, custody, and control arising out of the acts or omissions of the contractor named on the Declarations.

In lieu of providing a Railroad Protective Liability Policy, Licensee may participate (if available) in Railway's Blanket Railroad Protective Liability Insurance Policy.

Other Requirements:

Where allowable by law, all policies (applying to coverage listed above) shall contain no exclusion for punitive damages.

Contractor agrees to waive its right of recovery against ***Railway*** for all claims and suits against ***Railway***. In addition, its insurers, through the terms of the policy or policy endorsement, waive their right of subrogation against ***Railway*** for all claims and suits. Contractor further waives its right of recovery, and its insurers also waive their right of subrogation against ***Railway*** for loss of its owned or leased property or property under Contractor's care, custody, or control.

Allocated Loss Expense shall be in addition to all policy limits for coverages referenced above.

Contractor is not allowed to self-insure without the prior written consent of ***Railway***. If granted by ***Railway***, self-insured retention or other financial responsibility for claims shall be covered directly by Contractor in lieu of insurance. Any and all ***Railway*** liabilities that would

otherwise, in accordance with the provisions of this ***Agreement***, be covered by Contractor's insurance will be covered as if Contractor elected not to include a deductible, self-insured retention or other financial responsibility for claims.

Prior to commencing the Work, Contractor shall furnish to ***Railway*** an acceptable certificate(s) of insurance from an authorized representative evidencing the required coverage(s), endorsements, and amendments. The certificate should be directed to the following addresses:

BNSF Railway Company
c/o CertFocus
P.O. Box 140528
Kansas City, MO 64114
Toll Free: 877-576-2378
Fax number: 817-840-7487
Email: BNSF@certfocus.com
www.certfocus.com

Contractor shall notify ***Railway*** in writing at least 30 days prior to any cancellation, non-renewal, substitution, or material alteration.

Any insurance policy must be written by a reputable insurance company acceptable to ***Railway*** or with a current Best's Guide Rating of A- and Class VII or better, and authorized to do business in the state(s) in which the service is to be provide.

If coverage is purchased on a "claims made" basis, Contractor hereby agrees to maintain coverage in force for a minimum of three years after expiration, cancellation or termination of this contract. Annually, Contractor agrees to provide evidence of such coverage as required hereunder.

Contractor represents that this ***Agreement*** has been thoroughly reviewed by Contractor's insurance agent(s)/broker(s), who have been instructed by Contractor to procure the insurance coverage required by this ***Agreement***.

Not more frequently than once every five years, ***Railway*** may reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

If any portion of the operation is to be subcontracted by Contractor, Contractor shall require that the subcontractor shall provide and maintain the insurance coverage(s) set forth herein, naming ***Railway*** as an additional insured, and shall require that the subcontractor shall release, defend, and indemnify ***Railway*** to the same extent and under the same terms and conditions as Contractor is required to release, defend, and indemnify ***Railway*** herein.

Failure to provide evidence as required by this section shall entitle, but not require, ***Railway*** to terminate this ***Agreement*** immediately. Acceptance of a certificate that does not comply with this section shall not operate as a waiver of Contractor's obligations hereunder.

The fact that insurance (including, without limitation, self-insurance) is obtained by Contractor shall not be deemed to release or diminish the liability of Contractor including,

without limitation, liability under the indemnity provisions of this ***Agreement***. Damages recoverable by ***Railway*** shall not be limited by the amount of the required insurance coverage.

In the event of a claim or lawsuit involving ***Railway*** arising out of this agreement, Contractor will make available any required policy covering such claim or lawsuit.

These insurance provisions are intended to be a separate and distinct obligation on the part of the Contractor. Therefore, these provisions shall be enforceable and Contractor shall be bound thereby regardless of whether or not indemnity provisions are determined to be enforceable in the jurisdiction in which the work covered hereunder is performed.

For purposes of this section, ***Railway*** means "Burlington Northern Santa Fe LLC", "BNSF RAILWAY COMPANY" and the subsidiaries, successors, assigns and affiliates of each.

Section 4. EXHIBIT "C" CONTRACTOR REQUIREMENTS

The Contractor must observe and comply with all provisions, obligations, requirements and limitations contained in the Contract, and the Contractor Requirements set forth on Exhibit "C" attached to the Contract and this Agreement, , including, but not be limited to, payment of all costs incurred for any damages to Railway roadbed, tracks, and/or appurtenances thereto, resulting from use, occupancy, or presence of its employees, representatives, or agents or subcontractors on or about the construction site.

Section 5. TRAIN DELAY

Contractor is responsible for and hereby indemnifies and holds harmless Railway (including its affiliated railway companies, and its tenants) for, from and against all damages arising from any unscheduled delay to a freight or passenger train which affects Railway's ability to fully utilize its equipment and to meet customer service and contract obligations. Contractor will be billed, as further provided below, for the economic losses arising from loss of use of equipment, contractual loss of incentive pay and bonuses and contractual penalties resulting from train delays, whether caused by Contractor, or subcontractors, or by the Railway performing work under this Agreement. Railway agrees that it will not perform any act to unnecessarily cause train delay.

For loss of use of equipment, Contractor will be billed the current freight train hour rate per train as determined from Railway's records. Any disruption to train traffic may cause delays to multiple trains at the same time for the same period.

Additionally, the parties acknowledge that passenger, U.S. mail trains and certain other grain, intermodal, coal and freight trains operate under incentive/penalty contracts between Railway and its customer(s). Under these arrangements, if Railway does not meet its contract service commitments, Railway may suffer loss of performance or incentive pay and/or be subject to penalty payments. Contractor is responsible for any train performance and incentive penalties or other contractual economic losses actually incurred by Railway which are attributable to a train delay caused by Contractor or its subcontractors.

The contractual relationship between Railway and its customers is proprietary and confidential. In the event of a train delay covered by this Agreement, Railway will share information relevant to any train delay to the extent consistent with Railway confidentiality obligations. Damages for train delay are currently $382.20 per hour per incident. **THE RATE THEN IN EFFECT AT THE TIME OF PERFORMANCE BY THE CONTRACTOR HEREUNDER WILL BE USED TO CALCULATE THE ACTUAL COSTS OF TRAIN DELAY PURSUANT TO THIS AGREEMENT.**

Contractor and its subcontractors must give Railway's representative (BNSF Project Engineer, 909-386-4079) four (4) weeks advance notice of the times and dates for proposed work windows. Railway and Contractor will establish mutually agreeable work windows for the project. Railway has the right at any time to revise or change the work windows due to train operations or service obligations. Railway will not be responsible for any additional costs or expenses resulting from a change in work windows. Additional costs or expenses resulting from a change in work windows shall be accounted for in Contractor's expenses for the project.

Contractor and subcontractors must plan, schedule, coordinate and conduct all Contractor's work so as to not cause any delays to any trains.

Kindly acknowledge receipt of this letter by signing and returning to the Railway two original copies of this letter, which, upon execution by Railway, will constitute an Agreement between us.

_____	
Contractor	**BNSF Railway Company**
By: _____	By: _____
Printed Name: _____	Name: _____
	Manager Public Projects
Title: _____	Accepted and effective this _____day of 2013.
Contact Person: _____	
Address: _____	
City: _____	
State: _____ Zip: _____	
Fax: _____	
Phone: _____	
E-mail: _____	

EXHIBIT D

Cost Estimate for Railroad Work

Track:

• Flagging Estimate:	$800,000
• Inspection Estimate:	$200,000
• Track Work	
▪ Temp at-grade detour xing (both tracks):	$400,000
▪ Temp contractor at-grade xing - pipe gate/lock:	$60,000
▪ Removal/Renewal to Standard of all xings and areas between:	$800,000

Signal:

• Signal Detour:	$250,000
• Signal Removal:	$200,000

TOTAL: $2,710,000

EXHIBIT E

[Public Projects Manager's letterhead]

Date: _____

Ms. Patricia Romo, P.E.
Riverside County Transportation Department
4080 Lemon Street, 8th Floor
Riverside, CA 92501

Re: Final Approval of Plans and Specifications dated _____, 20__, drafted by AECOM **(hereinafter called, the "Plans and Specifications")**

Dear Ms. Romo:

This letter serves as BNSF RAILWAY COMPANY's ("BNSF") final written approval of the Plans and Specifications covering the construction of Magnolia Avenue Grade Separation Project on BNSF's San Bernardino Subdivision, US DOT# 026517B. This final written approval is given to the County of Riverside ("Agency") pursuant to Article III, Section 1 of that certain Overpass Agreement between BNSF and Agency, dated _____, 2013.

If the Plans and Specifications are revised by Agency subsequent to the date set forth above, this letter shall no longer serve as final written approval of the Plans and Specifications and Agency must resubmit said Plans and Specifications to BNSF for final written approval.

It is understood that the approvals contained in this letter do not cover, the approvals of plans and specifications for any falsework, shoring, and demolition that may be subsequently submitted to BNSF by Agency or its contractor for approval.

BNSF review was limited exclusively to potential impacts on train operations. BNSF has not reviewed the design details or calculations for structural integrity or engineering accuracy. BNSF accepts no responsibility for errors or omissions in the design of the project.

Regards,

_____
Melvin Thomas

EXHIBIT F

BNSF Bridge Requirements

BRIDGE DESIGN, PLANS & SPECIFICATIONS:

Except for the design of temporary falsework and shoring, BNSF review of the Structure plans will be limited to the vertical and horizontal clearances, sight distance for existing train signals, foundation dimensions and drainage characteristics as they relate to existing and future tracks. BNSF will not review structural design calculations for the permanent Structure unless a member or members are influenced by railroad live loads.

Temporary falsework and shoring plans and calculations must be reviewed and approved by BNSF prior to beginning construction. The Agency shall perform an independent review of the design calculations for temporary falsework and shoring prior to submitting them to BNSF for approval. Temporary construction clearances must be no less than 15 feet measured horizontally from the centerline of the nearest track and 21 feet-6inches measured vertically from the top of rail of the most elevated track to the bottom of lowest temporary falsework member. State regulatory agencies may have more restrictive requirements for temporary railroad clearances.

For the permanent Structure, the Agency will submit plans showing the least horizontal distance from the centerline of existing and future tracks to the face of the nearest member of the proposed Structure. The location of the least horizontal distance must be accurately described such that BNSF can determine where it will occur in both the horizontal and vertical plane. If the permanent member is within 25 feet of the nearest track (or future track), collision walls shall be incorporated into the permanent Structure design according to American Railway Engineering and Maintenance Association Manual of Recommended Practice - Chapter 8 - Article 2.1.5.

For the permanent Structure, the Agency will submit plans showing the least vertical clearance from top of the most elevated rail of existing and future tracks to the lowest point of the proposed Structure. A profile of the existing top of rail elevation shall be plotted on the bridge plans. The profile shall extend for 500 feet in each direction of the proposed overpass and a separate profile shall be plotted for each track. If the existing top of rail profile(s) is not uniform such that a sag exists in the vicinity of the proposed Structure, the permanent Structure vertical clearance shall be increased sufficiently to accommodate a raise in the track profile to remove the sag. Prior to beginning construction of the permanent Structure, the top of rail elevations should be checked and verified that they have not changed from the assumed elevations utilized for the design of the bridge.

Prior to issuing any invitation to bid on construction of the Structure, the Agency should conduct a pre-bid meeting where prospective Providers have the opportunity to

communicate with BNSF personnel regarding site specific train speeds, train density, and general safety requirements for men and equipment working near live tracks. Any invitation to bid and specifications for the Structure must be submitted to BNSF for review and approval prior to letting of bids for the Project.

BRIDGE CONSTRUCTION:

After awarding the bid, but prior to the Provider entering BNSF's right-of –way or property, the Agency should conduct a pre-construction meeting with BNSF personnel in attendance to reiterate the safety requirements of construction activity adjacent to live tracks.

During construction, BNSF may require an independent engineering inspector to be present during certain critical activities of the Project, including but not limited to: driving foundation piles, erecting falsework, construction of shoring and retaining walls, placing concrete, placing soil backfill and compaction processes. The Agency shall reimburse BNSF for all costs of supplemental inspection services.

Within 90 days of the conclusion of the Project and final acceptance by BNSF, the Agency will provide BNSF with a complete electronic set of the bridge plans labeled "As Built". Those plans will reflect any and all deviations from the original plans that occurred during construction. The "As Built" plans will be submitted in Micro Station *.dgn electronic format (preferred) or AutoCAD *.dwg format. Electronic plans are to be submitted in the original format used for CAD plan preparation and not converted to another format prior to submission. Actual measured "as constructed" clearances shall be shown as well as depth, size and location of all foundation components. The plans shall show dimensioned locations of existing and relocated utilities.

BRIDGE MAINTENANCE:

The Agency will be responsible for maintenance and repair of the Structure including the earth retention components, embankment slopes, erosion control, surface drainage, fencing, deck drains, landscaping, paint, walkways, handrails, lighting, and other improvements associated with the Project.

Fencing and other pedestrian access controls within BNSF's right-of-way and incorporated into the Project shall be designed and maintained by the Agency. Trespasser control shall be the responsibility of the Agency. Graffiti removal will be the responsibility of the Agency.

BRIDGE INSPECTION:

The Agency will conduct annual routine structural inspections. In the event of an earthquake, fire, flood, damage from vehicular impacts or other emergent situations, the Agency will provide an immediate inspection by qualified personnel and notify BNSF of damage that may affect safe passage of trains. If necessary the Agency will embargo weights or provide lane closures or other such measures to protect the structural integrity of the Structure such that there can be continuous safe passage of trains until repairs are made.

BRIDGE ALTERATIONS:

Except as provided otherwise by this Agreement, there will be no alterations made to the Structure that will alter the railroad vertical or horizontal clearances provided by the original design. Pipelines will be not be added or attached to the Structure without first submitting plans and calculations to BNSF for review and approval.

EXHIBIT G

Magnolia Avenue Grade Separation Project
Estimated Total Project Cost

Appendix G

BNSF Railway

Contractor Permit Information

BNSF RAILWAY

GENERAL LICENSE PROCESS INSTRUCTIONS

Licensing Process:

1. Once the application package is received by Jones Lang LaSalle Brokerage, Inc. (JLL), the application and drawing will be forwarded to the engineering firm to prepare the Exhibit "A" drawings for the contract. **This process takes approximately 10 to 15 working days.**

2. When the Exhibit "A" is completed, a contract will be prepared and two (2) copies will be forwarded to you for an original signature. A letter will be sent to you that will provide directions regarding insurance and any additional fees.

3. Return the signed contracts (2 contracts with original signatures), along with the appropriate payment to JLL's Permits Department.

4. The final contracts, with original signatures, will be presented for execution provided payment has been received and insurance has been approved.

5. Once the contract is executed, one original will be returned to you for your files.

6. Prior to commencing any work on the Premises, Licensee shall complete and shall require its contractor (all parties who will be working on the site) to complete the safety training program at Internet Website www.contractororientation.com . This training must be completed no more than one year in advance of Licensee's entry on the Premises.

7. The cover letter and the executed contract will list the Roadmaster's name and phone number. **You will need to contact the Roadmaster ten (10) days prior to beginning work.**

Process Time:

Please be advised that the average time period for completion of this process is 4 weeks from the time that the application is received. Every effort will be made to complete this process in a timely manner.

Insurance Requirements for the following Agreement:

Commercial General Liability Insurance	Contractual Liability with a combined single limit of a minimum of $2,000,000 each occurrence and an aggregate limit of at least $4,000,000.
Business Automobile Insurance	Combined single limit of at least $1,000,000 per occurrence.
Workers Compensation and Employers Liability Insurance	Employers' Liability with limits of at least $500,000 each accident, $500,000 by disease policy limit, $500,000 by disease each employee.
Railroad Protective Liability Insurance	Coverage of at least $2,000,000 per occurrence and $6,000,000 in the aggregate, with the exception of New Mexico in which coverage is $5,000,000 per occurrence and $10,000,00 in the aggregate. .
Please note: These limits are subject to change without notice. An Agreement will be provided to you, which contains details concerning insurance requirements.	

Please send the following so we may process your License request:

1. **Completed Application.**
2. **$600 non-refundable processing fee.** Check should be made payable to BNSF Railway Company.
3. **One set of drawings** (no larger than 11 x 17) for the area to be occupied. (Include: streets, distance from tracks and streets, mileposts if available and any distinguishing land marks.) Please ensure all information is accurate, as each change will add an additional $600 to the processing fee.

Forward to:
Jones Lang LaSalle Brokerage, Inc.
Attn: Permit Services
4300 Amon Carter Blvd.
Suite 100
Ft. Worth, TX 76155

BNSF RAILWAY

APPLICATION FOR LICENSE AGREEMENT

Jones Lang LaSalle Brokerage, Inc.
ATTN: Permit Services
4300 Amon Carter Blvd.
Suite 100
Fort Worth, Texas 76155

Applicants Tax ID #
or SS #

We submit for your approval the following application to occupy **BNSF RAILWAY COMPANY'S** right-of-way, as shown on the enclosed location plan and detailed sketch.

Legal Name of company / municipality who will occupy the property: _____
State in which incorporated: _____ (If not incorporated, please attach name(s) of owners or partners.)
Name of Contact for ownership entity: _____ Phone # _____
EMail Address: _____ FAX: _____
Mailing Address: _____

Is this project **ARRA** funded? Yes ☐ No ☐
Is this a condemning authority? Yes ☐ No ☐
Is Applicant a Railroad Shipper? Yes ☐ No ☐
If yes, BNSF Marketing Rep name: _____ Phone # _____
Was this service requested by BNSF? Yes ☐ No ☐
If yes, BNSF person requesting service _____ Phone # _____
Is this in conjunction with a track or track expansion project? Yes ☐ No ☐
If yes, BNSF contact name _____ Phone # _____

Purpose of License _____
Name of nearest town on RR _____ County _____ State _____
Name of nearest roadway crossing RR _____
Location of proposed occupancy: _____ 1/4 Section _____ Township _____ Range _____
Railroad Milepost _____ Latitude _____ Longitude _____
Will this project be located entirely within the limits of a public street? Yes ☐ No ☐
Total cost of project $ _____
What type of improvements will be located on the property? _____

Culvert:

Contents to be handled through culvert: _____

	CULVERT
Length of culvert on RR property (plastic pipe must be encased full width of ROW)	ft.
Inside diameter of pipe	in.
Pipe Material	
Specification & grade (Minimum yield strength casing 35,000 psi)	
Wall thickness (minimum wall thickness of casing pipe under 14 in. – 0.188 in E-80 Loading)	
Actual working pressure	
Type of Joint	Mechanical ☐ Welded ☐
Coating	
Distance from base of rail to top of culvert (Flammable contents, steam, water or non-flammable – minimum 5 ½ ft. under main track) (uncased gaseous products – minimum 10' under track)	
Minimum ground cover on RR property (minimum 3 ft.)	
Cathodic protection casing (flammable substance)	

Type of insulators or support: _____ Size: _____ Space: _____
Number of Vents (flammable substances require 2 vents) _____ Size: _____ Height Above Ground: _____

Method of Crossing:	Jacking ☐ (Jacking pit location min. 30 ft. from centerline of track. Pit must not be open more than 48 hrs. and must be protected when not in use.)	Trench ☐ (RR to furnish flagman at applicant's expense)	Dry Bore Only ☐ (Jacking pit location min. 30 ft. from centerline of track. Pit must not be open more than 48 hrs. and must be protected when not in use.)

Does culvert support an oil or gas well? Yes ☐ No ☐
If yes, distance from RR property. _____ ft. Name of well: _____

Attached to this sheet are a location plan and a detailed sketch outlining the type of improvements that will be located on the property. Exact dimensions should be shown on the sketch of the project area. Distances to the centerline of nearest railroad track and road crossing, bridge or other railroad structure should be included.

I understand that submission of this application <u>does not</u> authorize occupancy of the property. Exact fees and insurance requirements will be forwarded after the application has been reviewed and approved by BNSF Railway Company.

Date: _____

Signed: _____
Print Name: _____
Title: _____
Phone #: _____ FAX: _____

If you require additional assistance, please contact your <u>Jones Lang LaSalle Brokerage, Inc.</u> representative.

PRIVATE CROSSINGS PROCESS INSTRUCTIONS

In an effort to improve safety for the communities we serve, our customers and our employees a goal, of the BNSF Railway Company, is to reduce the overall number of grade crossings. With this in mind, you should exhaust all other options before submitting an application for a new grade crossing. A crossing may be denied by BNSF for safety and operational reasons and the $600.00 processing fee *will not* be refunded, if denied.

Licensing Process:

1. Once the application package is received by Jones Lang LaSalle (JLL), the application and drawing will be forwarded to the engineering firm to prepare the Exhibit "A" drawings for the contract. **This process takes approximately 10 to 15 working days.**

2. When the Exhibit "A" is completed, the package will be forwarded to BNSF's Director of Field Safety for approval. **This process will take a minimum of 30 days.**

    a. If this is a new crossing, an estimate by BNSF Engineering will be prepared. Costs for private crossings will be determined by BNSF and forwarded to you for approval and payment prior to any work being done. **This will take an additional 30 days.**

3. Once approvals have been received, a contract will be prepared and two (2) copies will be forwarded to you for an original signature. A letter will be sent to you that will provide directions regarding insurance and any additional fees.

4. Return the signed contracts (2 contracts with original signatures), along with the appropriate **payment** to JLL's Permit Department.

5. The final contracts, with original signatures, will be presented for execution provided payment has been received and insurance has been approved.

6. Once the contract is executed, one original will be returned to you for your files.

7. The cover letter and the executed contract will list the Roadmaster's name and phone number. **You will need to contact the Roadmaster ten (10) days prior to beginning work.**

Process Time:

Please be advised that the average time period for completion of this process is 4 weeks from the time that the application is received. Every effort will be made to complete this process in a timely manner.

Insurance Requirements for the following Agreements:

Commercial General Liability Insurance	Contractual Liability with a combined single limit of a minimum of $2,000,000 each occurrence and an aggregate limit of at least $4,000,000. *If crossing is for private residential use personal Liability Insurance will be required.
Business Automobile Insurance	Combined single limit of at least $1,000,000 per occurrence.
Workers Compensation and Employers Liability Insurance	Employers' Liability with limits of at least $500,000 each accident, $500,000 by disease policy limit, $500,000 by disease each employee.

Railroad Protective Liability Insurance	Coverage of at least $2,000,000 per occurrence and $6,000,000 in the aggregate. Appendix G
Please note: These limits are subject to change without notice. An Agreement will be provided to you, which contains details concerning insurance requirements.	

Please send the following so we may process your License request:

1. **Completed Application**.
2. **$600 non-refundable processing fee**. Check should be made payable to BNSF Railway Company.
3. **Two sets of drawings** for the area to be occupied. (Include: streets, distance from tracks and streets, mileposts if available and any distinguishing land marks.) Please ensure all information is accurate, as each change will add an additional $600 to the processing fee.

Forward to:
Jones Lang LaSalle
Attn: Permit Services-Private Crossings
3017 Lou Menk Drive
Ft. Worth, TX 76131-2800

BNSF RAILWAY

APPLICATION FOR PRIVATE CROSSING

Jones Lang LaSalle
ATTN: Permit Services
3017 Lou Menk Drive
Fort Worth, Texas 76131-2800

Applicants Tax ID #
or SS #

We submit for your approval the following for a private crossing we propose to build across **BNSF RAILWAY COMPANY'S** right-of-way, as shown on the enclosed sketch.

Applicant understands he or she will be requested to sign a crossing permit, which will provide that Applicant will:

1) assume the cost to construct the crossing,
2) furnish insurance as requested by BNSF Railway Company,
3) reimburse BNSF Railway Company for expenses incurred to maintain this crossing and
4) if crossing is temporary assume the cost to remove the crossing.

Legal Name to be shown on Permit: _____
If a corporation, State in which incorporated: _____ If not incorporated, attach name(s) of owners or partners.)
Address: _____
Phone #: _____ FAX: _____
Contact Name: _____ Email Address: _____

Is this project **ARRA** funded: Yes ☐ No ☐
Is Applicant a Railroad Shipper? Yes ☐ No ☐
If yes, BNSF Marketing Representative name: _____ Phone # _____

Crossing Location:
City _____ County _____ State _____
Highway Name / Number _____ Crossing is located at RR Milepost _____ DOT # _____
_____ 1/4 Section _____ Township _____ Range _____ Latitude _____ Longitude _____

Is Crossing New ☐ or Existing? ☐ If Existing does it require rehab? Yes ☐ No ☐
Type of Crossing:
plank ☐ concrete ☐ other ☐ Describe: _____
Width of Crossing _____
Is Crossing Permanent ☐ or Temporary ☐ If Temporary, specify time period crossing will be required. _____
Is the Crossing for Residential ☐ Farm ☐ or Commercial ☐ Number of vehicle crossings a day _____
Type of user vehicle:
Auto ☐ Pickup ☐ Van ☐ Industrial ☐ If Industrial, type. _____
Other private crossings in the vicinity? Yes ☐ No ☐
If yes, give distance / direction from the crossing: _____
What is the distance to the nearest public crossing in either direction: _____

Do you own or lease the land on either side of your crossing: Own ☐ Lease ☐
If leased, provide owners name _____ Phone # _____
If leased please attach written authorization from legal owner with application.

If this is an existing crossing, how many families are using it now? _____ If known, attach names and addresses.
If Cooperative use, please attach names and permit numbers held by others and provide proof of land ownership.
What are the future plans for this property? _____

Date: _____

Signed: _____
Print Name: _____
Title: _____
Phone #: _____ FAX _____

If you require additional assistance, please contact Heather Calhoun at (817) 230-2633 or Heather.Calhoun@am.jll.com .

Appendix H

Landscaping and Irrigation

Specifications and Drawing Details

SECTION 320533
LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.01 SUMMARY

A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work indicated on the Drawings and as specified. The conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.02 RELATED REQUIREMENTS:

A. Section 328400 Irrigation System
B. Section 328400-R Recycled Water Irrigation System
C. Section 329300 Landscaping

1.03 DEFINITIONS:

A. Pesticide: Includes any of the following:
1. Fumigant
2. Herbicide
3. Insecticide
4. Fungicide
5. Rodent repellents.

C. Planting Bed: An area comprised of trees, shrubs, flowers, and ground cover, excluding grass.

1.04 DELIVERY, STORAGE AND HANDLING OF MATERIALS FOR PERMENANTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES AND FLAT AREAS:

A. Fertilizer, Gypsum, and Iron Sulphate: Deliver to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, and gypsum may be furnished in bulk with a certificate indicating the above information.

B. Pesticides: Deliver to the site in original containers with legible label indicating Environmental Protection Agency (EPA) registration number and manufacturer's registered uses.

1.05 STORAGE FOR PERMANENTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:

A. Fertilizer, Gypsum, Iron Sulphate, and Mulch: Store in dry locations away from contaminants.

B. Pesticides: Do not store with other maintenance material. Store herbicides "downwind," relative to the airflow from other pesticides.

1.06 HANDLING FOR PERMANENTLY IRRIGATED AND TEMPORARILY IRRIGATED SLOPES and FLAT AREAS:

A. Do not drop or dump materials from vehicles.

PART 2 - PRODUCTS

2.01 PH ADJUSTERS:

A. See Specification Section: 329300 Landscaping

2.02 SOIL CONDITIONERS:

A. See Specification Section: 329300 Landscaping

2.03 PLANTING BACKFILL:

A. See Specification Section: 329300 Landscaping

2.04 FERTILIZERS:

A. See Specification Section: 329300Landscaping

2.05 WATER:

A. See Specification Section: 329300 Landscaping

2.06 PESTICIDES:

A. See Specification Section: 329300 Landscaping

PART 3 - EXECUTION

3.01 MAINTENANCE REQUIREMENTS DURING THE NINETY (90) DAY MAINTENANCE PERIOD:

A. Shrubs, and Vines:

1. The contractor is responsible for the restoration and maintenance of all vegetation included in these specifications for the duration of the maintenance period. During the first two weeks of the maintenance period, the contractor shall conduct a survey of all areas and identify by quantity, species, and location, all dead, dying, and diseased vegetation. The contractor shall be responsible for restoring dying and diseased vegetation to a healthy state in accordance with accepted Horticultural Practice and Treatment. The architect and/or owners representative will be the final authority in determining which vegetation is considered dead or irreparably damaged. Restoration and replacement of vegetation is considered routine maintenance and shall be accomplished as often as necessary during the maintenance period. Vegetation replacement shall be

accomplished within 5 days after the contractor discovers or has been notified of the situation. Diseased or dead vegetation shall be removed and replaced with healthy plants of the same species. All replacement plants must be approved by the architect and/or owner's representative before planting.

2. Planting beds shall be cultivated, pruned, trimmed, weeded, irrigated, fertilized, mulched, and otherwise maintained in a manner that presents a professionally landscaped appearance at all times. Plant beds shall be kept weed, gopher, squirrel, rabbit and pest free. Ground cover shall not be allowed to grow into flowers, shrubs or trees. Planting beds shall be maintained in a manner that provides balance between the various types of vegetation, and prevents dominance of any one species. The contractor shall provide and maintain a minimum of three-inch layer of mulch in all planting beds with a slope gradient of 3:1 or less. The contractor shall provide for the special needs of various species. Diseased or dead vegetation shall be removed and replaced with healthy plants of the same species.

3. The contractor shall not use steel bow type rakes or equipment of similar design to clean plant beds. Lightweight fan rakes or vacuum equipment may be used. The contractor shall maintain the soil level in the plant beds, and ensure all surface root systems and irrigation piping are covered as required. The contractor shall be responsible for damage caused by contractor operations at no additional cost to the owner.

4. Shrubs and Vines shall be trimmed pruned, irrigated, fertilized to present a healthy and manicured appearance. Shrubs and Vines will not be allowed to encroach into grass areas. A definite break shall be maintained between grass and shrub areas. In such areas the contractor shall maintain a healthy and well-balanced landscape.

5. All shrubs, vines, and other cultivated plants shall be trimmed and pruned according to their natural growth characteristics for proper health and attractive appearance. All clippings shall be removed and disposed of by the end of each day. Pruning shall be accomplished as necessary in accordance with conditions (a) through (d) specified below. Shrubs and vines shall be trimmed to shape for aesthetic appearance and health at the frequency specified in this section.

   a. Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections. Shrubs around perimeter of buildings shall be trimmed to maintain natural growth characteristics.

   b. Remove dead, damaged or diseased branches or limbs and crossing, rubbing and interfering branches.

   c. Evenly form and balance the shrub to natural growth characteristics. Hedges are to be trimmed to maintain their natural growth characteristics and not allowed to obstruct pedestrian walkways. Shrubs shall be allowed to completely fill planter beds. Shrubs, hedges and vines shall not be trimmed into round, square and or geometric shapes. Side growth shall be allowed to grow unless growth is in front of windows, over

entrance ways, streets, driveways, parking area or walks, and/or any growth which will obstruct vision at street intersections.

d. Remove growth against or over structures and into any type of electrical or telephone lines (leave growth on block walls).

6. Shrubs shall be pruned to evenly form and balance plant to natural growth characteristics. Shoots, suckers, and branches of shrubs not conforming to desired shape and size shall be removed. Retain typical growth habit of individual plants with as much height and spread as is practical. Shrubs shall be allowed to completely fill planter beds.

7. Any depression or mound around the base of shrubs intended to retain water in place for proper irrigation shall be maintained in good condition to permit the most efficient application of water and reduce waste.

8. Do not fertilize native plant material as shown on the planting legend during the maintenance period.

B. Trees:

1. Tree maintenance and care is considered routine on going maintenance and shall be accomplished as specified or as often as necessary during the maintenance period. Tree maintenance and care includes, staking trees, adjustment of ties and supports, removal of stakes, watering, fertilization, pest control, pruning, turf clearance, mulch clearance, removal of broken limbs and branches, tree removal/replacement, and fall cleanup.

2. The contractor shall maintain and/or replace tree staking and guying as necessary as specified in section 329300 Landscaping for the duration of the maintenance period. Stakes, ties and supports shall be inspected and adjusted monthly to prevent girdling and rubbing, and to promote natural development of trees. Stakes, ties, and supports shall be removed when the tree becomes capable of supporting itself.

3. Trees shall be pruned according to their natural growth characteristics to evenly form and balance the tree and to promote proper health and growth in accordance with accepted standards and horticultural practices of the National Aboriculture Society, of the Western Chapter. All tree maintenance must be performed in compliance with ANSI Z133.1 Safety Standards. Tree pruning shall include all areas of the project, which are permanently and/or temporarily irrigated for the duration of the maintenance period. All sucker growth shall be removed from and around the trees. All trees are to be inspected monthly to identify pruning needs. Pruning or trimming shall be accomplished at any time during the maintenance period as required in accordance with conditions (a) through (h) below:

a. Remove dead, damaged or diseased wood, or structurally weak limbs that may cause a safety hazard. Remove interfering branches, crossing and rubbing branches.

b. Remove branches which endanger roofs, eaves, and windows or hang within eight feet of sidewalks, parking lot driveways, and which obstruct traffic signs or streetlights. This includes removal of dead or broken branches on the ground or still hanging in the tree.

c. Provide clearance for buses, moving vans and similar vehicles along streets.

d. Eliminate and prevent growth into electrical or telephone transmission lines. Anticipate the effects of wind on branches, which might fall on transmission lines. Shape the entire tree rather than notch the top.

e. Prevent growth of trees in front of windows, over entranceways and walkways and which will obstruct vision at street intersections.

f. Remove partially attached broken limbs and branches from trees regardless of diameter or length. Provide stakes or braces as required for future protection.

g. "Skirting-Up" and "pollarding" a tree is prohibited.

l. Topping of trees is prohibited.

C. Weeds, Rodent and Pest Control:

1. Weed and pest control shall be performed to prevent encroachment of undesirable vegetation and noxious weeds, and infestation of pest (rodent, insect and fungus) into established landscapes, including lawns and around trees, shrubs, flower beds, etc. Noxious weeds in landscaped and natural growth areas, plant beds and landscaped areas shall not be allowed to establish themselves and be maintained weed free. Additionally, weed control is to be performed to eliminate grass and weeds in cracks and joints on all paved and concreted areas. Weed control is to be performed to prevent the encroachment of vegetation into perimeter fences and fire breaks. Rodent control shall be performed as required to maintain healthy vigorous plant growth. Live or dead rodents shall be removed within 24 hours from the project property and properly disposed of. Trees, shrubs, turf and vegetation shall be protected from all varieties of insect and rodent damage. Pesticides may be used to control pests. Pesticides and herbicides shall be used in a manner, which will not affect landscape plants health.

2. All pesticides, including herbicides, insecticides, fungicides, etc., shall be applied only by persons holding a valid state license for each category of pest control work involved. Any required state, county, or local permits for possession, procurement, or use of any pesticide shall be obtained and complied with at no additional expense to the owner.

3. All pesticides shall be procured, transported, stored, handled, and applied in strict accordance with the manufacturer's label, which shall be registered with the Environmental Protection Agency and the State of California. The contractor shall comply with the requirements of the Federal Insecticide, Fungicide, and

Rodenticide Act, 40 CFR 170-171, CCR Title 3, and CCR Title 8. All pesticide containers shall be managed in accordance with the requirements of CCR Title 3, Section 6684 and disposed of in accordance with CCR Title 22. Each pesticide formulation shall be registered for use under the particular environmental conditions under which it was applied. The contractor shall exercise extreme care to prevent any damage or illegal contamination by pesticides to vegetation, water, fish, animals, and humans. The contractor shall be held responsible and liable for all damage, contamination, and effects resulting from contractor's pesticide use.

4. Pesticide spraying shall be performed only on still days and will be stopped when unfavorable weather or other conditions exist which would unduly increase the hazard to personnel or desirable vegetation by drift, runoff, or leaching through the soil. Any project property or desirable vegetation damaged by the contractor due to pesticide applications shall be repaired or replaced at no additional cost to the owner.

5. Pesticide rinse water or excess pesticides from contractor operations shall be collected by the contractor in an appropriate receptacle and disposed of at an approved disposal site; or shall be applied to a similar target area to which the original application was made and in the same manner of application if allowed by the EPA registered label.

6. Job site pesticide applications shall be made by personnel capable of identifying the pest species to be controlled, knowledgeable of control techniques, and able to apply pesticide active ingredients at prescribed dosages and rates of application, as required by the label to achieve the required control under job site conditions, without danger to people, pets or other non-target animals, plants, or property.

7. The contractor shall be responsible for having a spill kit on service vehicles and for reporting and cleaning pesticide spills as required by state laws and regulations. The contractor shall submit a written report of spills on or in project property, within 8 hours of incident to the owner on company letterhead.

D. Irrigation and Irrigation System Maintenance:

1. The contractor shall plan and adjust irrigation schedules for automatic, hand or portable irrigation systems based on minimal water requirements with the following considerations:
   a. the precipitation rates of irrigation components
   b. soil water infiltration rate and holding capacity
   c. exposure
   d. plant material
   e. site climate conditions
   f. ET (Evapotranspiration) rate
   g. Slope

   It shall be the contractor's responsibility to adjust controllers and/or hand/portable irrigation application to compensate for weekly environmental

changes for the duration of the maintenance period. The contractor shall perform irrigation in a manner that promotes the health, growth, color and appearance of cultivated vegetation while preventing over watering, water run-off, erosion and ponding.

2. Irrigation includes watering of shrubs, vines, trees and plants for both permanently irrigated slopes and flat areas. Care shall be exercised by regulating the time and equipment to prevent wasting of water. Sprinkler heads shall be adjusted to prevent water spray on buildings, sidewalks, walls, monuments and adjacent hardscape. It shall be the contractor's responsibility to apply enough water to assure and maintain the health and vigor of all shrubs, trees, and planted areas. Irrigation controllers shall be programmed for no irrigation during periods of rain that exceed twelve hours of rainfall in one day or during rain storms of one day or more. Once rain has subsided controllers shall be reprogrammed for irrigation operations. Controllers shall also be checked and reset if necessary after power outages.

3. The contractor shall provide all equipment necessary to perform all irrigation operations. For temporarily irrigated slopes, flat areas and trees within future private lots that require manual irrigation, the contractor shall provide hoses and irrigation equipment to adequately irrigate this plant material for the duration of the maintenance period. In the event that an area has no water supply due to a system failure, the contractor shall provide a supply by either hose or truck. All valves and valve box covers shall be kept closed at all times except when in actual use.

4. Irrigation equipment shall be kept clear of any obstructions including plant material. Dirt or other debris surrounding sprinkler heads, which prevents proper operation, shall be removed. The contractor shall be held responsible for any damage to project property caused by careless handling of irrigation equipment including slope failure at no additional cost to the owner.

5. The contractor is responsible for the maintenance and repair of all components of the irrigation system for the duration of the maintenance period. This includes irrigation equipment items as shown on the original irrigation drawings. Maintenance and repairs of irrigation equipment during the maintenance period shall be done at no additional cost to the owner. Maintenance shall include but not be limited to the following:

   a. Repair or replace broken, missing, or inoperative pop-up spray heads and pop-up rotors.

   b. Repair or replace defective sprinkler head risers, rotors on risers, fittings, swing arms and breaks in piping. Adjust and align risers. Repairs shall include all fittings as specified in the original irrigation drawings.

   c. Clean and adjust pop-up sprayheads, pop-up rotors, sprinkler head risers and rotors on risers and their gears and/or mechanisms, check and adjust for proper coverage.

d. Remove dirt and debris from around pop-up spray heads and pop-up rotors.

e. Repair or replace defective or malfunctioning control valves (Electric and/or Manual) flow sensors and master valves. Clean and service valves. The contractor shall replace any damaged or missing valve boxes or valve lids. Valve box lids shall be kept in place at all times. Barricades shall be placed over any valve boxes with missing lids until replaced. Valve boxes shall be kept level with existing grade as shown on the drawings.

f. Maintain, service, repair or replace central controller systems as specified by the product manufacturer.

g. System repairs and replacement shall be accomplished with new parts and equipment that are identical to existing.

h. The contractor is responsible for required irrigation by any means during the periods of system breakdown.

E. Fertilizer Application During the Maintenance Period:

1. Apply fertilizer in a manner that promotes health, growth, color and appearance of cultivated vegetation at applications rates described in sections 329300 Landscaping and 329200 Turf for the duration of the maintenance period.

F. Fallen Vegetation and Debris Removal:

1. The contractor shall police the entire project area including all paved areas, planters, lawn areas, sidewalks (including common area sidewalks) and trash enclosures and collect fallen leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks, and any and all other debris to prevent unsightly and inordinate accumulations during normal maintenance working hours. Sidewalks shall be swept or washed as necessary to keep free of trash and graffiti. Collected items shall be promptly removed and taken to a legal disposal site.

G. Removal of Dead Animals:

1. Removal and legal disposal of animal carcasses are considered a normal maintenance task for the duration of the maintenance period. Dead carcasses shall be legally removed immediately when discovered by the contractor.

H. Erosion Control:

1. The contractor is responsible for daily visual inspection of slopes and immediately reporting areas experiencing erosion to the landscape architect and/or owner's representative on the same day noticed. If the contractor fails to notify the landscape architect and/or owner's representative of areas experiencing erosion on the same day noticed, then the contractor assumes full responsibility

for any erosion control measures and/or repairs as directed by the landscape architect and/or owner's representative at no additional cost to the owner.

2. Upon notification and agreement of the applicable erosion control measure by the landscape architect, the owner and the contractor, the contractor is responsible for immediately repairing and correcting any progressive rilling that may occur.

3. Erosion control measures may include but not be limited to:
   a. Filling
   b. Raking
   c. Redirecting runoff
   d. Properly programming irrigation operations
   e. Replanting
   f. Providing additional erosion control materials such as:
      1. jut matting
      2. filter fabric
      3. hay bales
      4. hay rolls
      5. silt fencing
      6. sand bags
      7. and/or other erosion control items as required to maintain healthy plant material and stable slopes.

3. Additional erosion control measures required due to irrigation operations programmed by the contractor that did not take into account cycle and soak functions of the controller will be installed and/or repaired as directed by the landscape architect and/or owner's representative at no additional cost to the owner.

I. Frequency of Maintenance Operations:

TASK:	FREQUENCY:
Shrub and Vine Restoration and Replacement:	As Required
Weeding:	Daily
Pruning:	As Required
Tree Replacement:	As Required
Tree Staking:	As Required
Pesticide Applications:	As Required
Debris Removal & Disposal:	As Required
Irrigation System Maintenance:	As Required
Fertilizer Application:	As Required
Fallen Vegetation and Debris Removal:	Twice Weekly
Removal of Dead Animals:	As Required
Re-Mulching (Maintained at 3 Inches):	As Required
Erosion Control:	As Required

J. At the end of the ninety (90) day maintenance period, the contractor shall request a post-maintenance walk through with the landscape architect. Prior to requesting this walk through the following requirements must be entirely satisfied:

1. Any outstanding maintenance items that were previously directed to be completed by the restoration specialist.

K. Preliminary Post Maintenance Walk Through: Once the above requirements have been met a preliminary post maintenance walk through may be scheduled. At the preliminary post maintenance walk through, the following procedures will be used:

1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

2. A visual walk through of the entire landscape area will take place consisting of an examination of planting areas and noting any remaining maintenance items to be completed.

3. Once the preliminary post maintenance walk through has been completed, the landscape architect shall prepare a punch list of outstanding items to be completed and will provide a copy of this list to the owner and contractor for review and use. It is the contractor's responsibility to repair, replace, and adjust all items on the punch list prior to requesting a final post maintenance walk through.

L. Final Post Maintenance Walk Through: Before commencement of a final post maintenance walk through, each item on the preliminary post maintenance walk through punch list must be thoroughly satisfied, addressed, and resolved by the contractor. Once the above requirement has been met a final post maintenance walk through may be requested. At the final post maintenance walk through, the following procedures will be used:

1. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

2. Only those items as indicated on the preliminary post maintenance walk through punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the preliminary post maintenance walk through, and examining outstanding items. Any remaining deficiencies in the maintenance of the wetlands mitigation will be noted.

3. Once the final post maintenance walk through is completed and any outstanding items created on the final punch list have been addressed the maintenance period may end. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

END OF SECTION 320533

SECTION 328400
IRRIGATION SYSTEM

PART 1 - GENERAL

1.01 SUMMARY:

A. This section covers the furnishings of all materials and performing all operations to provide a complete operable landscape irrigation system as shown on the drawings including the following:

1. Trenching, stockpiling excavated materials and refilling trenches.

2. Irrigation system components including but not limited to: piping, backflow prevention devices and enclosures, valves, fittings, rotors, spray heads, central control system controllers, wiring and final adjustments as determined by the architect to insure efficient and uniform distribution.

3. Pipe connections to irrigation pump stations, water meters and backflow prevention devices.

4. Testing and inspection of irrigation system.

5. Clean-up and maintenance

B. The conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.02 GENERAL REQUIREMENTS:

A. Code Requirements shall be those of State and Municipal Codes and Regulations locally governing this work, providing that any requirements of the Drawings and Specifications, not conflicting therewith but exceeding the Code Requirements shall govern, unless written permission to the contrary is granted by the Architect.

B. Conform to the requirements of the reference information listed below except where more stringent requirements are shown or specified in the most current set of construction documents:

1. American Society for Testing Material (ASTM), for test methods specifically referenced in this section.

2. Underwriter's Laboratories (UL), for UL wires and cables.

C. Work involving substantial plumbing for installation of brass piping, backflow prevention devices and other related work shall be executed by a licensed and bonded plumbing contractor. Any necessary permits shall be obtained prior to beginning work.

D. Specified depths of pressure supply lines, laterals and pitch of pipes as stated in this section are minimums. Settlement of trenches lower than grades specified on the final grading plans is cause for removal of finish grade treatment, refilling trenches, recompacting and repairing of finish grade treatment.

E. Follow current printed manufacturer's specifications and drawings for items or information not specified or graphically indicated in the most current set of construction drawings.

F. Scaled dimensions are approximate and at times it is not possible to indicate offsets, fittings and other related equipment graphically on the construction drawings. Contractor shall be responsible for minor changes caused by actual site conditions. Before proceeding with any work, the Contractor shall carefully check and verify all dimensions of related architectural elements, utilities and landscaping and furnish and install required fittings.

G. Do not install the irrigation system as shown on the construction drawings when it is obvious that actual field conditions such as physical obstructions, grading discrepancies and field dimensions vary from those recorded on the construction drawings. Immediately bring any such discrepancies to the attention of the architect prior to proceeding with work. If immediate notification is not given and such discrepancies exist, the contractor shall assume full responsibility for necessary revisions, as determined by the architect.

H. All central control system telephone communication and/or radio communication shall be tested and certified in writing by the appropriate manufacturer's representative and shall also be tested on line with the central computer system prior to requesting a walk through for substantial completion.

1.03 EXISTING FIELD CONDITIONS:

A. Preserve and protect all existing trees, plants, monuments, structures, hardscape and architectural elements from damage due to work in this section. In the event that damage does occur to inanimate object and structures, the contractor will repair or replace such damage to the satisfaction of the owner or owner's representative. Damage or injury to living plant material will be replaced by the contractor at the contractor's expense.

B. Trenching or other work required in this section under the limb spread of existing trees shall be done by hand or by other methods so as to prevent damage or harm to limbs, branches and roots.

C. Trenching in areas where root diameter exceeds 2 inches shall be done by hand. Exposed roots of this size shall be heavily wrapped with moistened burlap to avoid scarring or excessive drying. Where a trenching machine is operated in proximity to roots that are less than 2 inches, the wall of the trench shall be hand trimmed , making clean cuts through roots.

D. Trenches adjacent to or under existing trees shall be closed within 24 hours , and when this is not possible, the side of trench closest to the tree or trees affected shall be covered with moistened burlap.

E. Protect, maintain and coordinate work with other contracts, specifications, trades, and utilities. Extreme care shall be exercised in excavating and working in the area due to existing utilities. Contractor shall be responsible for damages caused by their operations. In the event that damage does occur, the costs of such repairs shall be paid by the contractor unless other arrangements have been made with the owner.

F. Use caution where trenches and piping cross existing roadways, sidewalks, hardscape, paths or curbs. In the event that damage does occur, the contractor will repair such damage at the contractor's expense.

1.04 REQUIRED DOCUMENTS:

A. Submittals

1. Submit (6) six sets of all irrigation equipment to be used, manufacturer's brochures, service manuals, guarantees, and operating instructions for approval to the architect prior to beginning work. Submittals should be in a bound form complete with table of contents. The contractor shall not proceed with work in the field until this submittal is approved in its entirety by the architect.

B. Service Manuals

1. The Contractor shall furnish (4) four service manuals to the owner prior to scheduling a walk through for substantial completion. Manuals shall be submitted in a bound form complete with a table of contents, and workmanship form on company letterhead copy of contractor's warranty, copy of the letter of certification for the central control system on the central control system manufacturer's letterhead and shall contain complete enlarged drawings of all equipment installed showing component warranties and catalog numbers together with the manufacturer's name and address. Manuals shall include operation instructions. Manuals shall be subject to approval by the owner or owner's representative as to completeness.

C. Record Drawings/As-builts

1. Prior to beginning work in the field the contractor shall secure a complete set of irrigation plans at the original scale complete with details and specifications. The contractor shall be responsible for making a set of blueline prints for every week on the project. At the end of each working day, the contractor shall record all work accomplished for that day on the set of blueline prints in red ink. These record drawings shall be brought up to date at the end of each work week by a qualified draftsperson. The drawings should indicate the following:

a. Any zoning changes.

b. Dimension from two permanent points of reference (building corners, fixed hardscape corners, road intersections, permanent existing utilities) the location of the following items:

.1 Water meters.
.2 Pump stations.
.3 Connection to existing water lines.
.4 Routing of pressure supply lines at every 100' along routing.
.5 Backflow Prevention Devices
.6 Flow Sensors
.7 Master Valves
.8 Isolation Ball Valves
.9 Quick Coupling Valves
.10 Air Release Valves
.11 Electric Control Valves
.12 Drip Valve Assemblies
.13 Flush Valve Assemblies
.14 Swing Check Valves
.15 Central Control System Controllers
.16 Grounding rods.
.17 Control wire routing (if routed separately from pressure supply line).
.18 Control wire splices that are outside of the controller.
.19 Weather Station Equipment
.20 Communication Equipment for Central Control System
.21 Other equipment as directed by the architect.

2. Prior to scheduling a walk through for substantial completion, provide a record set of field as-built drawings as described above to the architect for review. After review, the architect will return the as-built set to the field foreman requesting further information or will notify the owner that the record set of field as-builts drawings are complete. After approval from the owner, a walk through for substantial completion may be scheduled.

3. Prior to scheduling the final walk through, the final set of irrigation as-built drawings shall be professionally drafted in auto-cadd by the architect.

4. The architect and the contractor shall verify the final as-builts at the time of the final walk through and once successful the architect shall deliver the final set of as-built drawings to the owner or owner's representative prior to initiating the maintenance period for the contractor.

D. Controller Charts

1. Prior to scheduling a walk through for substantial completion, provide a record set of field controller charts which have color coded each station within each controller to the architect for review. After review, the architect will return the controller charts to the field foreman requesting further information or will notify the owner that the record set of controller charts are complete. After approval from the owner, a walk through for substantial completion may be scheduled.

2. Prior to scheduling a final walk through, one set of controller charts shall be professionally drafted in auto-cadd by the architect for each controller unit installed on the project. The controller drawings shall be an actual auto-cadd reduction of the area covered by that controller unit and shall be at the maximum allowable scale that will fit inside the controller door without folding the drawing.

3. The architect and the contractor shall verify each controller chart at the time of the final walk through and once successful the architect shall deliver the final set of controller charts to the owner or owner's representative prior to initiating the maintenance period for the contractor. The controller chart sent to the owner shall be hermetically sealed between two (2) pieces of minimum 20 mils thick plastic.

4. The architect shall then deliver one controller chart to the contractor who will permanently fix the controller chart to the inside of the applicable controller.

PART 2 - PRODUCTS

2.01 PIPING

A. General Piping:

1. Pipe sizes shown are nominal inside diameter unless otherwise noted.

2. Pipe shall be identified with the following indelible markings:

a. Manufacturer's name.
b. Nominal pipe size.
c. Schedule or class.
d. Pressure rating.
e. NSF (National Sanitation Foundation) seal of approval.
f. Date of extrusion.

B. Solvent Weld Pressure Supply Line:

1. Solvent Weld Pressure Supply Line: (downstream of Backflow prevention device) PVC CL315BE (1" - 3")

   a. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B.
   b. Type 1, Grade 1.

2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.

   a. Threads- Injection molded type (where required)
   b. Tees and Ells- side gated

3. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

4. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

C. Gasket-End Pressure Supply Line:

1. Gasket-End Pressure Supply Line: (downstream of Backflow prevention device) PVC Class 200 (4" and larger).

   a. Manufactured from virgin polyvinyl chloride (PVC) compound in accordance with ASTM D2241 and ASTM D1784; cell classification 12454-B,
   b. Type 1, Grade 1.

2. Fittings: Cast Iron or Epoxy coated steel; complying with ASTM D1784 and D2466, cell classification 12454-B.

3. Gaskets: Factory installed in pipe and fittings, having a metal or plastic support within the gasket or a plastic retainer ring for gasket.

4. Lubricant: As recommended by manufacturer of pipe fittings.

D. Non-Pressure Lines Below Grade:

1. Non-Pressure Lines: (downstream of electric remote control valve) PVC SCH 40.

2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.

   a. Threads- Injection molded type (where required)
   b. Tees and Ells- side gated
   c. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

3. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

E. Non-Pressure Lines Above Grade:

1. Non-Pressure Lines: (downstream of electric remote control valve) Ultraviolet Resistant PVC SCH 40, conforming to ASTM D1785-83.

2. Fittings: Standard weight, Schedule 40, injection molded PVC, complying with ASTM D1784 and D2466, cell classification 12454-B.

   a. Threads- Injection molded type (where required)
   b. Tees and Ells- side gated
   c. Threaded Nipples: ASTM D2464, Schedule 80 with molded threads.

3. Joint Cement and Primer: Type as recommended by manufacturer of pipe and fittings.

4. On-Grade Pipe Stabilizer Bars: 5/16" hot rolled "J" Hook with protective vinyl tubing, welded to #4 rebar stake.

F. Sleeving and Conduit:

1. All PVC sleeving for pressure supply line and non- pressure supply line shall be twice the nominal size of the pipe within and used for sleeves below grade as indicated in the following sleeve and conduit schedule:

2. Sleeving and Conduit Material Under Hardscape:

   a. PVC SCH 40 for 1"-2 1/2" pressure supply line.
   b. PVC SCH40 for 3" and larger pressure supply line.
   c. PVC SCH 40 for non- pressure lines.
   d. (1) one ¾" PVC SCH. 40 conduit for up to 5 wires.
   e. (1) one 1" PVC SCH. 40 conduit for up to 8 wires.
   f. (1) one 1 ¼" PVC SCH. 40 conduit for up to 15 wires.
   g. (1) one 1 ½" PVC SCH. 40 conduit for up to 20 wires
   h. (1) one 2" PVC SCH 40 conduit for up to 30 wires.
   i. (1) one 2 ½"" PVC SCH 40 conduit for up to 35 wires.
   j. (1) one 3/4" PVC SCH 40 wire conduit for flow sensing cable.
   k. (1) one 3/4" PVC SCH 40 wire conduit for master valve wire.

3. Flow sensing cable and master valve wires shall be installed each in their own conduit separate and apart from all other wires.

4. Sleeving and Conduit Material Over Concrete V-Ditches:

a. Galvanized SCH. 40 for 1"-2 1/2" pressure supply line.
b. Galvanized SCH.40 for 3" and larger pressure supply line.
c. Galvanized SCH. 40 for non- pressure lines.
d. (1) one ¾" Galvanized SCH. 40 conduit for up to 5 wires.
e. (1) one 1" Galvanized SCH. 40 conduit for up to 8 wires.
f. (1) one 1 ¼" Galvanized SCH. 40 conduit for up to 15 wires.
g. (1) one 1 ½" Galvanized SCH. 40 conduit for up to 20 wires
h. (1) one 2" Galvanized SCH. 40 conduit for up to 30 wires.
i. (1) one 2 ½"" Galvanized SCH. 40 conduit for up to 35 wires.
j. (1) one 3/4" Galvanized SCH. 40 wire conduit for flow sensing cable.
k. (1) one 3/4" Galvanized SCH. 40 wire conduit for master valve wire.

5. On-Grade Pipe Stabilizer Bars: 5/16" hot rolled "J" Hook with protective vinyl tubing, welded to #4 rebar stake.

G. Brass Pipe and Fittings:

1. Pressure Supply line (from point of connection through Backflow Prevention Device) Brass pipe shall be regular weight, 85% red brass, ANSI Schedule 40 screwed pipe.

2. Fittings: Medium brass, screwed at 125 pound class.

2.02 BACKFLOW PREVENTION DEVICE 2" AND SMALLER

A. Backflow Prevention Device: Reduced pressure principal Backflow assembly shall consist of an approved brass or bronze body, brass check valves, hydraulically actuated relief valve, inlet and discharge shutoffs and field test cocks, as specified on drawings.

B. Backflow prevention units shall be approved by the Foundation for Cross-Connection Control and Hydraulic Research.

C. Backflow device enclosure shall be constructed of stainless steel tube and wire construction and have a smooth surface to protect against handling industry. Enclosure shall have a full release locaking mechanism and provide easy access for service and repairs.

2.03 BACKFLOW PREVENTION DEVICE 2 ½" AND LARGER

A. Backflow Prevention Device: Double check assembly shall consist of an approved ductile iron grade 65-45-12 with fusion epoxy coated (interior and exterior) body and NRS resilient wedge gate valves with stainless steel springs and flanged fittings.

2.04 ATMOSPHERIC VACUUM BREAKER

A. Atmospheric vacuum breaker shall consist of and approved brass or bronze body with non spilling type bronze bonnet rated to 150 PSI.

2.05 BOOSTER PUMP

A. Booster pump shall be single stage end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal, back pullout design. Impeller shall be keyed and locked to the shaft with a hex head impeller nut and washer. Pump shaft shall be high strength S.A.E. 1045 carbon steel protected in the stuffing box area by a replaceable bronze shaft sleeve. Pump shall be directly coupled to a C-face electric motor.

B. Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall have horsepower ratings such that the motor will carry the maximum possible load to be developed under the designed pumping conditions and not overload the motor beyond the nameplate rating of the motor. Motor shall have a 1.15 service factor. The motor shall conform to the latest NEMA Standards for motor design and construction.

C. Pump Control Panel shall have a NEMA 4X plain front non-metallic enclosure with padlock latches. This Includes power and control re-settable thermal circuit breakers, heavy duty magnetic starter with adjustable overload protection, Hand-Off-Auto switch to select mode of operation, and heavy duty numbered terminal strips for power and control wiring lead terminations.

D. Metal oxide varistor protected pump start relay(s) incorporated in panel to start pump with signal from each irrigation controller.

E. All system piping shall be type "L" copper. All fittings shall be copper or brass, with unions or flanges to allow for system disassembly or major component removal. System shall incorporate an integral full pipe size bypass line with isolation valve to allow for pump removal and repair without disrupting water supply to system.

F. Isolation valves shall be all brass quarter turn ball valves with hard chrome ball on lines 2" and less. Isolation valves shall be lug style butterfly valves with Buna-N elastomeric seats, ductile iron nickel coated disc, and stainless steel stem with handle and 10 position galvanized memory plate on lines 2½" and greater.

G. Gauges shall be 2½" diameter face, glycerin filled with stainless casing and brass internals.

H. Flow activated paddle style magnetically coupled flow switch, sensitive to flows as low as 1 fps, mounted on piping and interconnected to time delay relay to shut down pump on no-flow conditions, time delay relay adjustable from 0 to 5 minutes.

I. Pump system shall be mounted on a structural aluminum skid with mounting flanges on front and back to allow for mounting of skid to concrete pad. Skid equipped with pipe support on suction and discharge piping. All nuts and bolts and washers to be heavy zinc coated steel on skid and piping. Skid shall include mounting hardware for integral aluminum enclosure.

J. The system enclosure shall be vandal and weather resistant, marine grade aluminum alloy 5052-H32 construction with rectangular punch-outs for viewing and heat dissipation. The enclosure shall be low profile hinged top design with padlock provision. The cover shall be secured to the concrete pad with stainless steel hardware.

K. Pump Assembly shall include the following option(s):

(ATT) Where specified by the System Design Parameters, Sound Attenuation foam shall be installed on interior of enclosure with baffles on venting to reduce sound emanating from the booster system.

(VFD) Where specified by the System Design Parameters, a Variable Frequency Drive system to convert incoming 1 phase power to 3 phase power for the motor. VFD system to receive feedback signal from system mounted stainless steel pressure transducer, and in conjunction with internal software driven PID control loop maintain customer adjustable constant system discharge pressure by varying the speed of the pump in response to varying system load.

(FSW) Where specified by the System Design Parameters, Flow activated non-adjustable pivoting vane style magnetically coupled Flow Switch, with 300 series stainless vane, brass body and weatherproof enclosure. Flow switch sensitive to flows as low as 1 fps, with electrical contact ratings of 5 Amps at 125/250 VAC, pressure rated to 250 PSI, mounted on piping and interconnected to time delay relay to shut down pump on no-flow conditions, time delay relay adjustable from 0 to 5 minutes. (Option: Flow switch to provide on-off control of pumping unit)

L. The services of a factory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct the operating personnel. A startup report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the Owner.

M. Four sets of operating and maintenance manuals shall be provided to the owner after startup and shall include parts manuals for major components, performance curve for pump, general sequence of operation, and electrical schematic for control panel.

2.06 BASKET STRAINER

A. Basket strainer shall be manufactured with a steel powder coat or stainless steel body with an 80-mesh filtration element and stainless steel basket.

B. Specify basket strainer at P.O.C. directly down stream of the backflow device. Install per filter detail.

2.07 WYE STRAINER

A. Wye strainer shall be bronze construction with a stainless steel screen element. Wye strainer shall have a standard filtration size of 80 mesh.

2.08 PRESSURE REGULATING VALVE

A. Pressure reducing valves shall be of bronze and stainless steel construction and be adjusted from 25 P.S.I. to 125 P.S.I.

2.09 MASTER VALVES

A. The master valve shall be normally closed, pressure reducing, surge protecting, supplying constant downsream pressure when opened. Operating voltage of 16-40 VAC. Regulating and surge anticipation control piolot frange from 5 125 psi with accuracy within =/1 5 percent of setting. Capable of operating within a range of .01 to 400 GPM. Copper encased solenoids that area corrosion resistant and provide heat dissipation for prolonged coil life, cast iron, epoxy coated body and bronse trim fully guided, 600 psi rated diaphragm assembly, with manual on-off capability.

2.10 FLOW SENSORS

A. The flow meter shall use two #14 AWG; one red, and one black in 1"PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller shall be 2000 ft. The flow meter shall send low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and shall resist any moisture entry.

B. It is intended that all wire runs between the controller and flow meter shall be direct pulls and shall have no splices. If wire splices are unavoidable, they shall be installed in a valve box with water proof connectors and properly labeled valve boxes.

C. Each flow meter shall have the following characteristics:
1. Housing to be a Sch 80 polyvinyl chloride tee or bronze tee
2. Have a pulsing output that operates at 9V DC and a pulse rate that is proportionate to the GPM
3. Fully compatible with the internal interface at each field controller
4. Powered by the controller
5. Replaceable metering insert shall feature a six-bladed design with a proprietary, non-magnetic sensing mechanism
6. Supplied by the same manufacturer as the irrigation controller.

D. Irrigation zones must be sized so that the specified flow meter is capable of reading the minimum and maximum gallons per minute for all proposed zones.

E. Install down stream of master valve.

2.11 ISOLATION VALVES

A. Isolation Ball PVC Valves: Industrial grade sealed unit socket weld schedule 80 PVC ball valve (Use for mainline pipe 1-1/2" and smaller) as manufactured by Spears model 2122 or approved equal.

B. Isolation Gate Valve: Bronze, screw-in-bonnet, non-rising stem, cross handle, solid wedge, threaded valve (Use on mainline pipe 2" and 2-1/2 " in size) as manufactured by Nibco model T-113-K, or approved equal.

C. Isolation Gate Valve: Iron bolted bonnet with 2" square operating nut, non-rising stem, resilient wedge type, soft seat, flanged end epoxy coated, bronze trimmed iron body. (Use on pipe 3" and greater) as manufactured by Nibco model F-619-RW flanged, or approved equal.

2.12 QUICK COUPLING VALVES

A. Quick coupler valves shall have a body constructed of red brass with a wall thickness guaranteed to withstand normal working pressure of 150 P.S.I. without leakage with female threads (penning at base). Quick coupler valve shall have a hinge cover constructed of red brass with leather like vinyl cover bonded to it on such a manner that it becomes permanent type of cover. Quick couplers used with potable water shall have vinyl covers yellow in color. Quick coupler valves used for reclaimed water shall have vinyl covers purple in color with the appropriate reclaimed water warnings in English and Spanish as well as the international "Do Not Drink" symbol.

B. All quick coupler valves must have a schedule 80 ball valve to isolate mainline from quick coupler valve. Mainline shall be the size of quick coupler valve from mainline tee to quick coupler.

2.13 HOSE BIB

A. Hose bib shall be a one-piece body with ¾" FIPT inlet and ¾" hose thread non-kink, angled outlet.

B. Hose bib shall have optional recessed locking nut.

2.14 AIR RELIEF VALVES FOR PRESSURE SUPPLY LINE

A. Air relief valve shall be composed of schedule 80 PVC material and be continuous acting in type. Air relief valve shall have a minimum inlet size of 1" MIPT.

2.15 ELECTRIC CONTROL VALVES

A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.

B. Isolation Ball Valve at Manifold and/or Electric Control Valve:

1. Ball Valve: PVC threaded true union ball valve, with heavy bodied PVC construction, buttress threaded double union nuts, safe-t-block seal carrier, PTFE ball seat, high impact polypropylene handlesafe-t-shear stem, full schedule 80 bore, 235PSI rating, NSF listed.

2.16 DRIP VALVE ASSEMBLIES:

A. Electric Remote Control Valves: Electric control valves with pressure regulating feature two way solenoid, pilot operated made of synthetics, non corrosive material; diaphragm activated and slow closing. Include freely pivoted seat seal, retained (mounted) without attachment to diaphragm.

B. Wye Strainer: 150 mesh screen for point to point drip and sub surface

C. Isolation Ball Valve: Ball Socket Ball Valve with thermoplastic molded one piece construction and teflon seat with EDPM cushions.

2.17 HARD PIPED POINT TO POINT DRIP IRRIGATION:

A. Riser Assembly For Hard Piped Point to Point Drip Irrigation:

1. 12" Long, ½" IPS flexible PVC tubing with factory attached ½" schedule 40 PVC MIPT adapters on both ends.

B. Emitters For Hard Piped Point to Point Drip Irrigation:

1. Pressure compensating single outlet emitter with ½" FIPT base and 20 mesh screen. ½ GPH, 1 GPH or 2GPH. Mulch Camo Brown in color.

2.18 MULTI OUTLET POINT TO POINT DRIP IRRIGATION:

A. Drip Tubing For Point to Point Drip Irrigation with Multi-Port Adapter:

1. DuraPolyHose 1/4", manufactured of flexible vinyl chloride conforming to ASTM D2855M, D380 and D1599.

B. 6 Outlet Manifold for Point to Point Drip Irrigation

1. Emission Device with ½" FPT inlet thread for ½" MIPT threaded riser, providing a manifold with six free-flowing ¼" barb outlets. Each barb outlet shall be sealed with a durable, removable, plastic cap that can be removed for additional emission devices.

C. Emitters For Point to Point Drip Irrigation with Multi-Port Adapter:

1. ¼" barbed pressure compensating emitter with a high quality diaphragm for improved pressure compensation and uniformity over a wide range of pressure.

Emitter shall have a take apart feature for inspection and cleaning as well as an outlet baffle to deter entry of insects.

Emitters shall be installed according to the following schedule:
1 Gallon Shrub – (2) .5 GPH Emitters
5 Gallon Shrub – (2) .5 GPH Emitters
15 Gallon Shrub/Tree – (3) 1 GPH Emitters
24" Box Tree – (4) 1 GPH Emitters
36" Box Tree – (6) 1 GPH Emitters
48" Box Tree – (8) 1 GPH Emitters

D. Tubing Stakes For Point to Point Drip Irrigation with Multi-Port Adapter:

1. 6" galvanized, 9 gauge, pvc coated tubing stake.

2.19 SUB SURFACE DRIP IRRIGATION:

A. Drip Tubing For Subsurface Drip Tubing:

1. The drip tubing shall be a pre-bonded emitter type. The tubing shall have emitters spaced at 12 or 18 inches and in flow rates of .53 or 1.0 gallons per hour.

   Water distribution shall be via an integrated turbulent flow path emitter with dual discharge ports on opposing sides of the tubing. The tubing shall consist of nominal-sized, linear low-density 5/8" (15,8mm) polyethylene with an outside diameter (O.D.) of approximately .710" (18mm) and an inside diameter (I.D.) of approximately .620" (16mm). The emitters shall be molded from virgin polyethylene. The tubing shall be available in pressure-compensating version that shall incorporate a circular silicon rubber disk designed to flush at startup, shutdown and during the irrigation cycle to inhibit debris collection.

B. Pressure Regulator Valves For Subsurface Drip Tubing:

1. The pressure regulator valve(s) shall be a spring-operated piston type with an externally accessible regulation unit that can be serviced without removing the valve from the system. The valve shall be constructed from molded black plastic with six different colored tops with interchangable springs denoting different pressure regulation and flow ranges. The regulator shall have a built-in indicator that shows when the proper outlet pressure is reached. Operating ranges for the valves shall be from 15-50 PSI in 5-PSI increments. Inlet and outlet ports of the valve shall be a combination of male/female threads.

C. Air /Vacuum Relief Valves for Subsurface Drip Tubing:

1. Air / vacuum relief valves shall be constructed of grey and/or black plastic with an internal sliding poppet valve that is capable of venting air or preventing vacuum.. The main body shall have a ½" male pipe thread (MPT). Operating pressure range for the air/vacuum relief valve shall be 7 PSI minimum to 140 PSI maximum.

2.20 CHECK VALVES:

A. Swing Check Valves: PVC, Slip x Slip check valves, for non-pressure lateral line applications on slopes.

B. Spring Check Valves: for pop-up sprayheads and sprayheads on risers and ¾" for pop-up rotors and rotors on risers.

2.21 FLUSH VALVE ASSEMBLIES:

A. Schedule 80 Ball Valve, threaded schedule 80 nipples and fittings with polyethylene tubing for flush hose.

2.22 VALVE BOXES:

A. Jumbo rectangular valve boxes shall be 14-7/8 inch wide by 21-3/8 inch long and 12 inch high. Rectangular valve boxes shall be 11-3/4 inch wide by 17 inch long and 12 inch high. Round valve boxes shall be 10-inch diameter and 10 1/2 inch high. All valve boxes shall be constructed of rigid polyolefin.

B. Valve boxes shall have locking covers secure with a 3/8-inch stainless steel bolt and washer.

C. Jumbo rectangular valve boxes shall be used for master control valves.

D. Rectangle valve boxes shall be used for control valves, pressure regulators, flow sensors, wye strainers, filtration devices, ball valves and pull boxes.

E. Round valve boxes shall be used for gate valves quick coupler valves, flush valve assemblies and spare wires.

F. All valve boxes to be green in color unless otherwise specified for use of reclaimed water.

G. Heat brand all box lids with the appropriate two-inch high identification letters and/or numbers.

H. All valve boxes shall receive landscape fabric. Landscape fabric shall be constructed of 5.0 oz. weight proven polypropylene weed barrier with burst strength of 225 P.S.I. and capable of 12 gallons per minute of water flow and puncture strength of 60 lbs. Dewitt Pro, Mirify or approved equal.

I. All valve boxes shall receive 2 cubic feet of 3/4-inch gravel.

J. Valve Tag: Manufactured from UV stabilized plastic with 180lbs pull out resistance and hot stamped for maximum visibility. Top hole shall be designed to pass a 16 gauge or smaller solenoid pigtail or attach with a nylon tie.

2.23 IRRIGATION HEADS (GENERAL):

A. All irrigation heads shall be the size, type, and provide the same rate of precipitation with the same radius of spray, pressure and discharge in G.P.M. as listed on drawings

B. All spray head sprinklers shall have stainless steel screw adjustment for radius of spray.

C. All irrigation heads shall have a factory installed check valve or have an after market check valve installed.

D. All other requirements for non-pressure lateral line pipe to be as specified in fitting specification section.

E. In no case shall the irrigation head spacing exceed the maximum manufacturer's recommendation.

F. Irrigation heads along walks, curbs, paving, etc. shall be positioned 1 inch above finish grade. Irrigation in turf areas shall be positioned 2 inches above finish grade.

G. All sprinkler heads shall be set perpendicular to finish grades.

H. All sprinklers in turf areas shall have a minimum pop-up height of six (6) inches.

I. All sprinklers in planter/slope areas shall have a minimum pop-up height of twelve (12) inches.

2.24 BUBBLERS:

A. Bubblers shall be constructed of heavy duty plastic and be pressure compensation full circle. The bubbler shall have a 20 mesh screen to protect it from clogging.

B. Bubblers shall be from .25 - 1.0 GPM and operate between 20-90 PSI.

2.25 POP UP SPRAY HEADS:

A. The spray head body, nozzle, stem and screen shall be molded out of heavy duty plastic.

B. Pop-up height shall be as listed in drawings and in no case shorter than 4 inches.

C. The spray head shall have an adjustment screw used for regulating flow and radius with matched precipitation rate (MPR) nozzle.

D. The spray head shall have a removable screen to protect it from clogging.

E. The spray head shall have a stainless steel spring for proper pop down.

F. The spray head shall be equipped with a factory installed check valve identified on the cap and capable of holding water up to 10 feet of elevation change.

G. The spray head shall be equipped with a factory installed pressure-regulating device constructed of stainless steel and heavy-duty plastic capable of maintaining a pressure of 35-70 P.S.I. to 30 P.S.I. for operation of the sprinkler.

H. All spray head bodies shall have universal male thread risers to accept universal female threaded nozzles.

2.26 SPRAY HEADS ON RISER:

A. The spray head adapter body, nozzle, stem and screen shall be molded out of heavy duty plastic.

B. Spray head adapter and nozzle shall be mounted on an Schedule 80 riser a minimum height of 6" from finish grade.

C. The spray head shall have an adjustment screw used for regulating flow and radius with matched precipitation rate (MPR) nozzle.

D. The spray head shall have a removable screen to protect it from clogging.

E. The spray head shall be equipped with an external check valve capable of holding water up to 10 feet of elevation change.

2.27 POP UP ROTOR:

A. All pop-up rotors shall have a rubber cover and be constructed of heavy duty plastic except for wiper seal, bearing spring and bearing washers. The riser shall be constructed of plastic or of plastic encased in a stainless steel sleeve. All rotors to have a reinforced rib design with flange encasement.

B. Pop-up height shall be as listed in drawings and in no case be shorted than 3-1/2 inches.

C. The rotor shall have a diffuser pin for regulating flow and radius.

D. The rotor shall have a screen to protect it from clogging and have a minimum inlet of 3/4 inch.

F. Medium Range rotors shall be capable of covering 16-55 feet radius at 20-60 PSI with a rate of .5 - 9.2 GPM. and be adjustable from 1-360 degrees. Long range rotor shall be capable of covering 16-55 feet radius at 40-74 PSI with a rate of 3.8 - 27.5 GPM. and be adjustable from 1-360 degrees.

2.28 ROTOR ON RISER

A. All rotors mounted on risers shall have a rubber cover and be constructed of heavy duty plastic except for wiper seal, bearing spring and bearing washers. The rotor riser shall be constructed of plastic.

B. Rotor shall be mounted on an ultraviolet resistant riser a minimum height of 12" from finish grade supported by a rebar stabilizer stake and sprinkler ties.

C. The rotor shall have a diffuser pin for regulating flow and radius.

D. The rotor shall have a screen to protect it from clogging and have a minimum inlet of 3/4 inch.

E. Medium Range rotors shall be capable of covering 16-55 feet radius at 20-60 PSI with a rate of .5 - 9.2 GPM. and be adjustable from 1-360 degrees. Long range rotor shall be capable of covering 16-55 feet radius at 40-74 PSI with a rate of 3.8 - 27.5 GPM. and be adjustable from 1-360 degrees.

2.29 CENTRAL CONTROL SYSTEM CONTROLLER AND COMMUNICATION HUB MANUFACTURED BY CALSENSE

All controllers/hubs shall the most current Calsense version and model and shall have the following specifications and capabilities:

A. Shall be capable of fully automatic, semi-automatic, and manual operation using a keypad that is an integrated part of the controller. Each controller shall be capable of storing irrigation schedules, monitor and manage flow all without the Central Computer (i.e. if the Central Computer is turned off, removed, or if communication from/to the Central Computer fails, the field controllers will continue to perform weather and flow management functions).

B. Backlit display shall have a minimum of sixteen (16) lines by forty (40) characters so that scrolling through menus is minimized. The display shall allow the user to easily move from screen to screen through an intuitive, self-prompting display so that it is easier for the user to program, read and understand the controller. The controller shall display an area description for each station including the station's location, the type of plant material irrigated and type of irrigation equipment used.

C. The controller shall have the built-in capacity for sensing flow via a flow meter input and utilizing a master valve without the addition of sensor boards, decoders, or other pieces of equipment.

D. There shall be a minimum of seven (7) regular irrigation programs with individual station cycle and soak watering, plus two additional syringe/propagation programs each with minimum of six (6) start times, adjustable station run times and with automatic programming capability up to a specific data. When the date is reached the controller shall automatically cease irrigating the manual program.

E. The controller shall have a water budget feature that provides monthly water volume allotments proportionate to historical evapo-transpiration (ET) which is interactive with all programs, and able to alert the user (via on screen alarms) when the controllers' water usage is more than the user set water budget.

F. A full year master schedule to allow twelve (12) month programming shall be a standard feature of the controller.

G. Programming shall be based on a seven (7), fourteen (14), twenty-one (21) or twenty-eight (28) day scheduling and shall be able to irrigate in minutes and as a % of ETo.

H. The controller shall be able to receive real-time weather data directly from an ET gage and tipping rain bucket, and as a stand-alone controller automatically use the data to calculate appropriate run times for each station without use of a central control system.

I. The controller shall be able to irrigate with the use of soil moisture sensing whereas the soil moisture sensor overrides programmed irrigation minutes, or minutes calculated when using real-time weather data. The soil moisture sensor used with the irrigation control system shall be by the same manufacturer.

J. The controller shall have flow management capability as a standard feature whereas the controller shall learn each station's expected GPM flow rate automatically at night over several irrigations, and use the mainline GPM capacity programmed, to operate up to four (4) valves at the same time plus the master valve to shorten the water window.

K. Alerts shall be able to be processed and responded to at both the field controller location and at the Central Computer location.

L. When an alert, such as High Flow is indicated on the controller, the station with the High Flow shall still attempt to come on each watering cycle and then shut off, rather than having the alert keep the station off until someone clears the alert from the central computer or at the field controller.

M. The controller shall have built-in amperage meter to accurately measure and diagnose valve solenoid electrical problems such as "no current", "station short", "under current", "over current", etc.

N. The controller shall have an irrigation test program or "walk-thru" program that has a delay time to allow a user to walk to a certain area before valves come on. The controller shall then manually water a sequence of predetermined stations for set program times. The programmable delay time shall be an integral part of the irrigation test program. The controller shall be capable of operating a test program without affecting the controller's normal program station times or without terminating a regular watering schedule.

O. The system shall be capable of allowing the user to make changes to the irrigation program via either at the Central Computer or at the field controller without requiring the user to go back to the Central Computer to accept the change.

P. The controller shall allow for operator-set water window, which prevents irrigation from continuing beyond a set end time. Remaining run-times shall be carried in a hold-over table and shall be applied at the next scheduled irrigation with the system prioritizing which valve to operate based on accumulated ET and the hold-over time.

Q. The system shall provide a multi-level access control up to four (4) levels for controlling who programs what at each controller. The controller shall have the ability to track and report on when an access code or "individual" user logged into the

controller, what keys were pushed while there, and when an access code logged out of the controller. These shall be date and time stamped.

R. The controller shall be able to display for the user a detailed water usage report categorizing for each month the usage during scheduled irrigation, test and manual key operation, and for non-controller usage such as bleeding valves on manually, using quick couplers or hose bibs.

S. Optional Radio Remote receiver board, (model–RRe) shall be built-in the controller and a hand-held radio remote transmitter (model RRe-TRAN) will be supplied so that the end user can trouble shoot valves remotely without having to go the controller itself. The hand-held transmitter shall display operational information such as valve on, gallon per minute flow rate and electrical draw in amps.

T. The field controller(s) shall be capable of utilizing a single mode or a combination of communication modes such as hardwire cable, standard telephone, Ethernet, WiFi, point-to-point spread spectrum radio, local radio in the 450-470 MHz range, fiber optic modems, or GPRS wireless modem application as communication links to the central computer. The field controllers shall be capable of directly receiving, storing, and operating commands downloaded from the central computer.

U. The controller shall operate on a minimum of 120 volts A.C. power input and shall be capable of operating up to four 5.5 VAC 24 volt A.C. remote control valves at once. The controller shall have a reset circuit breaker to protect the controller from overloading.

V. Install one extra 1-1/2" inch conduit to controller for future use.

2.30 CENTRAL CONTROL SYSTEM CONTROLLER ENCLOSURE MANUFACTURED BY CALSENSE

A. The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304-grade stainless steel, and the top shall be 12 gauge and the body 14 gauge. The main housing shall be louvered upper and lower body to allow for cross flow ventilation. A stainless steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The stainless steel backboard shall be mounted on four stainless steel bolts that will allow for easy removal of the backboard.

B. The 38-inch height with flip top shall provide easy access for programming from a standing position under normal installations.

C. The pre-assembled vandal resistant enclosure by Calsense shall come complete with lightning and surge protection and all terminals shall be factory labeled. The pre-assembled enclosure shall come provided with an On/Off switch to isolate the controller along with a GFI receptacle. An optional radio antenna shall be pre-mounted and connected on SSE-R enclosure. The enclosure shall include 2-7/8", 1-1/2" thick, 6-pin cylinder, die-cast steel padlock with unique shackles design.

D. Factory pre-assembled enclosure with controller shall carry a full UL listing.

E. The enclosure and Controller installed equipment within shall carry a five (5) year warranty.

2.31 ET GAGE FOR CENTRAL CONTROL SYSTEM MANUFACTURED BY CALSENSE

A. The Central Control system shall include a remote connected ET gage where shown on the plans and specifications. The ET measuring device shall be powered by the selected field controller. ET is measured directly in 0.01" increments and pulses from the gage shall be sent directly to the field controller. The daily, on-site ET data shall be stored in a 28-day table in the controller.

B. Cable shall be installed in conduit and shall be run from the location of the ET gage back to the controller. Maximum length of cable shall be 1,000 feet. Wire runs shall be direct pulls without underground splices.

C. The top surface of the gage shall be 3'4" above grade. The location shall be representative of the area to be irrigated, free of any obstructions to sunlight and wind. The location of the gage shall be located in an area where water from sprinkler heads does not hit the top surface of the gage. Calsense shall be called at 800-572-8608 for assistance in correct placement of the ET Gage.

D. A vandal-resistant stainless-steel enclosure shall be used to protect the ET gage. The ET gage shall be mounted on a poured concrete base 18"x18"x 6" with the enclosure metal base and stake embedded into the slab. The horizontal plate shall be one inch (1") below the poured concrete, and the finish grade shall be two inches (2") below top of the concrete base.

2.32 RAIN BUCKET AND WIND SENSOR FOR CENTRAL CONTROL SYSTEM MANUFACTURED BY CALSENSE

A. The Central Control system shall include a remote connected Tipping Rain Bucket where shown on the plans and specifications. The rain-measuring device shall be wired using the 60' of 2-conductor cable supplied with the Tipping Rain Bucket to the selected field controller. The cable should be installed in conduit and the connections are to be made at a terminal strip inside the enclosure. Maximum length of cable run shall be 200 feet.

B. The Rain Bucket shall accurately measure rainfall in 0.01" increments by means of a tipping and emptying device mounted below the center of the collection dish.

C. The controller shall provide the following programming parameters for rain:
Stop Irrigation after x.xx inches
Maximum Rain in One Hour is x.xx inches
Maximum Rain in 24 Hours is x.xx inches
Let Rain only build up to x.xx inches

2.33 ELECTRIC CONTROL VALVE WIRE

A. Low Voltage:

1. AWG UF UL approved No. 14 direct burial copper wire for all control wires and No. 14 direct burial copper wire for all common wires.

2. Wire Colors:

   a. Control Wires- As specified on drawings
   b. Common Wires- As specified on drawings.
   c. Master Valve Wires- Blue.
   d. Spare Wires- Green (labeled at termination)

3. Wire Splice Connectors: 3M DBY Direct Bury Splice Kits.

B. High Voltage:

1. Type required by local codes and ordinances, of proper size to accommodate needs of equipment serviced.

2.34 PIPE JOINT RESTRAINTS

A. All pressure line fittings 4 inch and larger shall be iron ductile deep bell type constructed of grade 65-45-12 and shall be in accordance with ASTM A536. Rubber for gaskets in fittings shall be in accordance with ASTM-477. All iron ductile fittings shall have stainless steel exterior lugs to secure a joint restraint system.

2.35 SAND BEDDING

A. Sand bedding shall be construction grade.

PART 3 - EXECUTION

3.01 PREPARATION

A. Examine field conditions prior to beginning work described in this section. Grading operations shall be completed and approved prior to beginning work.

B. Verify all sleeve locations below future hardscape and/or across concrete v-ditches prior to beginning work in this section. Flag all existing sleeves and conduits installed by other trades. Report any conflicts and discrepancies to the architect immediately.

C. Irrigation system shall be constructed to the sizes and grades at the locations shown on the drawings. Mark with powdered lime or marking paint routing of pressure supply line and stake the location of each sprayhead, rotor, electric control valve and other related equipment for the first three zones. Architect shall review staking and direct any necessary changes with the contractor prior to proceeding to other zones. This review does not in any way alleviate the contractor from the responsibilities associated with proper uniformity and distribution of head placement after staking.

D. Install sleeves, to accommodate pipes and wires, under paving, hardscape areas, sidewalks, and paths prior to asphalt and concrete operations. Compact backfill around

sleeves to 95% Modified Proctor Density within 2% of optimum moisture content in accordance with ASTM D1557.

3.02 EXCAVATION AND BACKFILLING OF TRENCHES

A. Trench excavation shall as much as possible follow the layout shown on the drawings. Trenches shall be straight in alignment and support pipe continuously on bottom of trench. Remove rocks and debris greater than 1" in diameter. Over excavate as required for bedding material.

B. Depth of Trench (in landscape areas):

Pressure Supply Line (3" and smaller): 18" from top of pipe to finish grade.
Non-Pressure Line (12" pop-up Rotors): 18" from top of pipe to finish grade.
Non-Pressure Line (6" and smaller pop-up Rotors): 12" from top of pipe to finish grade.
Non-Pressure Line (12" pop-up Spray Heads): 18" from top of pipe to finish grade.
Non-Pressure Line (6" and smaller pop-up Spray Heads): 12" from top of pipe to finish grade
Control Wiring: directly at side and bottom of pressure supply line.
Pressure Supply line Locator Tape: 6" above top of pipe.

C. Depth of Trench (under asphalt paving or concrete):

Pressure Supply Line (3" and smaller): 24" from top of pipe to aggregate base.
Non-Pressure Line: 24" from top of pipe to aggregate base.
Control Wiring: directly at side and bottom of pressure supply line.
Pressure Supply line Locator Tape: 6" above top of pipe.

1. Piping located under asphalt paving or concrete shall be installed with the appropriate sized sleeve and backfilled with sand bedding (6" below pipe and 6" above pipe).

2. Compact backfill material in 6" lifts at 90% maximum density determined in accordance with ASTM D1557 using manual or mechanical tamping device.

3. Set in place, cap, and pressure test piping in the presence of the owner or owner's representative prior to backfilling.

D. Width of Trench:

Pipe Greater than 3": 14" minimum.
Pipe Less than 3": 7" minimum.

E. Width between Trenches:

Irrigation Trench to Irrigation Trench: 6" minimum.
Irrigation Trench and other Trade Trenches: 12" minimum.

F. Boring: Boring will only be permitted where pipe must pass under an obstruction that cannot be avoided or removed. Backfill shall match surrounding soil density and grain.

Boring under existing paving, sidewalks, or hardscape may be permitted at contractor's own risk. Contractor is responsible for any repairs or damage to such items at their own expense.

G. Backfilling: Backfilling of trenches may not be done until all required testing for the irrigation system has been completed.

1. Material: Excavated material is generally considered to be adequate for backfilling operations. Before beginning the backfilling operation, insure that backfill material is free from debris and rocks greater than 1" in diameter, and is not mixed with topsoil. These materials after separated from backfill, shall be legally disposed of at contractor's expense.

2. Bedding: Bed pressure supply line with construction grade sand 6" above and 6" below pipe as shown on details. Remaining backfill may be as described above.

3. Bed all electrical control wire trenched separate from pressure supply line, with construction grade sand 6" above and 6" below wires.

4. When backfilling, slightly mound filled trenches for settlement after backfilling is compacted. Compact backfill to a 90% maximum density in accordance with ASTM D1557 with a mechanical tamper. Do not leave trenches open for a period greater than 48 hours. Open trenches shall be protected in accordance with current OSHA regulations.

5. Smooth trenches to finish grade prior to requesting a walk through for substantial completion with the architect.

3.03 POINT OF CONNECTION(S)

A. Point of connection shall be approximately as shown on drawings. Connect new underground piping and valves and provide all flanges, adapters, or other necessary fittings.

3.04 INSTALLATION OF SOLVENT WELD POLYVINYL CHLORIDE PIPE (PVC)

A. Polyvinyl chloride pipe shall be cut with an approved PVC pipe cutter designed only for that purpose.

B. All plastic-to-plastic solvent weld joints shall use only the solvent recommended by the pipe manufacturer. Do not install solvent weld pipe when temperature is below 40° F.

C. Pipe ends and fittings shall be wiped with MEK, or approved equal, before welding solvent is applied. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.

D. Pipe shall be snaked from side-to-side on trench bottom to allow for expansion and contractions.

E. All changes of direction over 15 degrees shall be made with appropriate fittings.

F. When pipe laying is not in progress at the end of each working day, close pipe ends with tight plug or cap.

G. Install pressure supply line locating tape along the entire length of pressure supply line.

H. Coordinate pressure supply line with sand bedding operations.

I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.

J. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

3.05 INSTALLATION OF GASKET-END POLYVINYL CHLORIDE PIPE

A. Lay pipe and make pipe to fitting or pipe to pipe joints following OR70 recommendations (Johns- Manville Guide for Installation of Ring-Tite Pipe), or pipe manufacturer's recommendations.

B. Pipe shall be snaked from side-to-side of trench bottom to allow for expansion and contractions.

C. All changes of direction over 15 degrees shall be made with fittings.

D. Install pipe joint restraints on all gasket end fittings as specified above and as shown on details.

E. When pipe laying is not in progress and at the end of each working day, close pipe ends with tight plug or cap.

F. Install pressure supply line locating tape along the entire length of pressure supply line.

G. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.

H. Coordinate pressure supply line with sand bedding operations.

I. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.

3.06 INSTALLATION OF BRASS PIPE:

A. Brass piping shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or by means of a hand hacksaw. All pipe shall be reamed and rough edges or burrs removed so that a smooth and unobstructed flow is obtained.

B. Eccentric reducing fittings shall be used where any change in pipe size occurs. Bushings shall not be used unless specifically authorized by the architect.

C. Joint compound shall be carefully and smoothly placed on the male thread only. All screwed joints must be tightened with tongs or wrenches. Caulking of any kind will not be permitted.

D. All exposed piping under structural slabs shall be stenciled with "Irrigation Main" or "Irrigation Lateral" as required, at ten foot (10') intervals in black lettering, 3/4" minimum high.

3.07 BACKFLOW PREVENTION DEVICE

A. Install Backflow prevention device, enclosure and associated equipment at the location as specified on drawings.

B. Coordinate installation with local governing codes and ordinances.

3.08 FLOW SENSORS

A. Install flow sensors as specified on drawings and per manufacturer's specifications.

B. Install flow sensing cable in a separate conduit and connect to terminal strip at controller.

3.09 MASTER VALVES

A. Install master valves as specified on drawings and per manufacturer's specifications.

B. Install master valve wire in a separate conduit and connect to terminal strip at controller.

3.10 ISOLATION BALL VALVES

A. Install isolation ball valves in separate valve boxes as specified on the drawings.

3.11 QUICK COUPLING VALVES

A. Install quick coupling valves in separate valve box as specified on the detail drawings.

B. Angled nipple relative to pressure supply line shall be no greater than 45° and no less than 10°.

3.12 AIR RELIEF VALVES

A. Install air release valves in separate valve boxes as specified on the drawings.

3.13 ELECTRIC CONTROL VALVES

A. Install each electric control valve in a separate valve box so that cross handle is 3" min. below valve box cover as specified on the detail drawings.

B. Group electric control valves together as specified on the drawings allowing a maximum of 12 " between each valve box. Install valve boxes in the same direction and parallel with one another and perpendicular to paving, hardscape, sidewalks and paths.

C. Install electric control valves on slopes within two feet from toe of slope. Use same trench as toe of slope non-pressure lateral line for pressure supply line and wire routing see section 3.02 B and C for pipe and wire depths.

3.14 CHECK VALVES

A. Install swing check valves as specified on drawings.

B. Install spring check valves as specified on drawings.

3.15 VALVE BOXES

A. Install valve boxes with each type of irrigation equipment so that top of valve box is above finish grade as specified on the detail drawings. Valve box extensions are not acceptable.

B. Place gravel sump below and around each valve box prior to installing valve box as specified on the drawings. Place remaining portion of gravel inside valve box allowing full access in and around all fittings. Valve box shall be fully supported by gravel sump. No brick or wood supports are allowed.

C. Brand valve box lid of associated equipment as follows:

Electric control valve box lid with "Controller Letter and Station Number".
Quick coupling valve box lid with the letters "QC".
Isolation ball valve box lid with the letters "BV".
Air relief valve box lid with the letters "AR".
Spare Wire box lids with the letters "SW"
Wire Splice box lid with the letters "WS".

Letter and number size of brand shall be no less than 1" and no greater than 1 1/2" in height and shall be 1/8" maximum in depth. Provide sample branding to the owner or owner's representative prior to commencement of work.

D. Walk through for substantial completion will not be allowed until all branding is complete.

3.16 SPRAY HEADS AND ROTORS

A. Install spray heads and rotors as specified on drawings allowing minimum distance between paving, hardscape, sidewalks, and paths.

B. Spray heads and rotors shall not exceed the maximum head and row spacing specified on the drawings or staked in the field by the architect. In no case may spray heads or rotors be installed at a distance between heads that exceeds the manufacturer's recommended distance.

C. Angled nipples on swing joints below spray heads and rotors shall not exceed 45° nor be less than 10°.

D. After installation adjust nozzle sizes, arcs and radius of throw to allow head to head uniform distribution. Adjust all spray heads and rotors to correct height above sod as detailed. Adjust all shrub nozzles on risers and rotors on riser's perpendicular to finish grade and as specified on the drawings. No over spray will be allowed on paving, hardscape, sidewalks, and paths.

E. Adjust adjacent plant material so that it does not interfere with uniform distribution of each spray head or rotor.

F. Architect may request nozzle changes and/or adjustments without additional cost to the owner.

3.17 AUTOMATIC CONTROLLER UNIT

A. Verify electrical power at location of automatic controller unit prior to installation of automatic controller unit. Notify architect immediately if power source is not available.

B. Hardwire controller to the on/off switch and existing power source. Controller shall not be plugged into socket provided for other equipment.

C. Install automatic controller unit where shown on drawings per manufacturer's specifications. Controller shall be tested with complete electrical connections. The Contractor shall be responsible for temporary power to the Controller for operation and testing purposes.

D. Connect electric control valve wiring to controller unit in the same numerical sequence as indicated on the drawings and label within 1" of the terminal strip. Label all spare wires as "spare".

E. Connect flow sensing and master valve wiring to controller unit and label within 1" of the terminal strip.

F. Install a separate ground rod and wire for each controller unit as specified on the drawings and per manufacturer's specifications.

G. Above ground conduit shall be rigid galvanized pipe with the appropriate fittings. Below ground conduit shall be PVC SCH 40 pipe with appropriate fittings.

H. Label each automatic controller unit with the letter or number designated on the drawings. Letter or number shall be located in a visible location on the inside panel cover with 3" high vinyl letters.

I. Each automatic controller unit shall be completely operable prior to scheduling a walk through for substantial completion.

3.18 ELECTRICAL WIRE

A. Low Voltage Wiring:

1. Bury control wiring in same trench as pressure supply line as specified.

2. Bundle all 24 volt wires at 20' intervals with electrical tape.

3. Provide expansion loops at every pressure supply line angle fitting and at 250' length intervals along routing. Form expansion loop by wrapping wire a minimum of 10 times around a 3/4" pipe and withdrawing pipe as specified on the drawings.

4. Limit splicing of electrical wiring. Provide each splice made at intervals or in electric control valve and drip valve assembly valve boxes with 3M DBY Direct Bury Splice Kits.

5. Wire splices occurring at intervals outside electric control valve boxes shall be installed in a separate valve box.

6. Provide (1) one electrical control wire for every electric control valve. Piggy backing like zones on the same electrical control wire is not allowed.

7. Install (2) two spare #14-1 electrical control wires from the automatic controller unit pedestal to the last electric control valve on each leg of pressure supply line. Locate the spare wires in their own valve box as specified on the drawings. In addition to these spare wires, check the drawings for any additional wires that may be required and locate them in the same valve box as the spare wires.

B. High Voltage Wiring:

1. Install 120 volt power from power source to automatic controller unit following local governing codes and ordinances.

3.19 QUALITY CONTROL

A. Preconstruction Meeting: The contractor is responsible for contacting the architect prior to beginning construction and/or ordering materials to establish a meeting to review and discuss project objectives, concerns and to review the construction documents to insure a complete understanding of required installation procedures.

B. General Observation: The architect will visit the construction site at interim times during the construction process to access construction progress regarding installation of irrigation equipment to be in compliance with the drawings, details, specifications and site conditions. The architect will prepare a site report after each visit noting progress of installation, verbal communication with the contractor and identifying any field adjustments necessary which require modifications to the designed irrigation system. A copy of this site report will be delivered to both the owner and the contractor. The

contractor is responsible to immediately address each item on the site report before proceeding with further construction.

C. Pressure Testing the Pressure Supply Line: After backfilling, flushing, and prior to the installation of each electric control valve, isolation ball valve and quick coupling valve the irrigation system shall be pressure tested.

1. Pressure testing shall be performed in the presence of the architect and owner or owner's representative utilizing the following procedure:

   a. Pressurize the irrigation system to 40 psi greater than the designated static pressure or 150 psi whichever is greater for a period of no less than 2 hours. The pressure gauge used for the pressure test shall not exceed readings greater than 300psi. Pressure pump and other equipment necessary for the test shall be furnished by the contractor.
   b. Test is acceptable if no leakage occurs within the system for the duration of the testing period.
   c. If leaks occur, repair said leaks and begin pressure test again. Repeat this operation until no leaks occur in the irrigation system.
   d. Before requesting a walk through for substantial completion, the entire irrigation system shall remain under pressure for a period of no less than 48 hours.

2. The contractor is responsible for notifying the architect one day in advance of the pressure test.

D. Flushing: Center load all piping prior to flushing. After all new irrigation piping and risers are in place and connected and all necessary diversion work has been completed and prior to the installation of sprinkler heads, rotors and quick coupling valves, thoroughly flush piping system under full head of pressure. After the furthermost riser from the point of connection begins to flush, continue flushing for a duration of five minutes. After the system is thoroughly flushed, cap all risers.

E. Walk Through For Substantial Completion:

1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:

   a. The entire irrigation system is completely installed, flushed and satisfactorily pressure tested. If the contractor failed to notify the architect for the pressure test and flushing procedures stated above than the contractor assumes full responsibility for any design modifications directed by the architect during the walk through for substantial completion regarding pressure and flushing issues.
   b. All valve boxes have been branded.
   c. All automatic controllers are fully operable and communication has been certified in writing and checked at central control system by the central control system manufacturer on their letter head.
   d. Record as-built drawings have been submitted to the architect for review as to completeness.

e. (4) Four Services manuals have been delivered to the owner or owner's representative.

2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:

a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
b. All valve box lids shall be removed from valve boxes and placed face up adjacent to the valve box prior to beginning the walk through.
c. The walk through will be divided into (2) two sections and proceed as follows:

.1 Visual Walk Through: This will consist of walking through the entire irrigation system and examining all components of the system without turning on zones. A punch list will be established of deficiencies in the construction and workmanship of the irrigation system as compared to the construction drawings, details, and specifications.

.2 Operational Walk Through: This will consist of walking through the entire irrigation system observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric control valves will not be acceptable). A punch list will be established of deficiencies in the operation of each zone in the irrigation system evaluating but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing, as compared to the construction drawings, details, and specifications.

3. Once the Walk Through for Substantial Completion has been completed the architect will provide a copy of all punch list items to the owner for review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

F. Final Walk Through:

1. Before commencement of a final walk through is requested, the following requirements must be entirely satisfied:

a. Each item on the walk through for substantial completion has been thoroughly addressed and resolved by the contractor.
b. All final record as-built drawings and controller charts have been produced by the architect for review by the architect and contractor at the final walk through.

2. Once the above requirements have been met a final walk through may be requested. The following procedures will be used:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.
   b. Only those valve box lids shall be removed from valve boxes as indicated on the walk through for substantial completion punch list. The valve box lids shall be placed faced up adjacent to the valve box prior to beginning the final walk through.
   c. The final walk through will be divided into (2) two sections and proceed as follows:

      .1 Visual Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion, examining all components of the system without turning on zones. Any remaining deficiencies in the construction and workmanship of the irrigation system as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.

      .2 Operational Walk Through: This will consist of walking through the punch list items created at the time of the walk through for substantial completion and observing each zone in a fully operable condition. Valves must be activated from the automatic controller unit (Manual bleeding of individual electric control valves will not be acceptable). Any remaining deficiencies in the operation of each zone in the irrigation system including but not limited to head spacing, row spacing, nozzle sizing, correct radius of throw, correct stationing as compared to the punch list generated at the time of the walk through for substantial completion construction drawings, details, and specifications.

3. Once the Final Walk Through is completed and all items created on the final punch list have been addressed the maintenance period may begin. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

3.21 MAINTENANCE PERIOD

A. The Maintenance Period shall be for ninety (90) days after notification from the architect of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the architect to the owner.

   1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.

2. At the end of the maintenance period and prior to turning the project over to the owner, the contractor shall deliver the following to the owner:

   a. Five (5) pop-up spray heads with nozzles of each type used, for every 100 pop-up spray heads installed on the project.

   b. Five (5) rotor heads with nozzles of each type used, for every 100 rotors installed on the project.

3. Once the contractor has fulfilled all maintenance agreement obligations an has provided the above items to the owner, the maintenance period will end see section 320533 Landscape Maintenance, for maintenance responsibilities.

END OF SECTION 328400

SECTION 329300
LANDSCAPING

PART 1 - GENERAL

1.01 SUMMARY:

A. The work includes all services, labor, materials, transportation and equipment necessary to perform the work indicated on the Drawings and as specified. The conditions of the Contract and Division 1 apply to this section as fully as if repeated herein.

1.02 RELATED REQUIREMENTS:

A. Section 328400 Irrigation System
B. Section 328400-R Recycled Water Irrigation System
C. Section 320533 Landscape Maintenance

1.03 SUBMITTALS:

A. Submit certificates of compliance and invoices for soil amendments, fertilizers, and plant materials, with quantities of each.

B. Tree Samples: Deliver to the site, a minimum of one sample of each tree variety and size indicated, 15 gallons in size and larger, a minimum of 15 days before planting operations. At the Contractor's option and expense, he may retain the services of the Landscape Architect to review trees 15 gallon and larger tagged at the nursery or at its place of growth, or as otherwise indicated.

C. Shrub and Tree Samples: Submit 3 samples of each variety and size of plant materials at the site a minimum of 15 days before planting operations. Accepted samples shall remain on the site and shall be maintained as standards of comparison for plant materials to be furnished. Samples may be incorporated into the work.

D. A sample of the soil amendments and proposed mulch material(s), including manufacturer or supplier certificate or invoice, shall be delivered to the Landscape Architect within thirty-five (35) days after recording of the Contract.

1.04 GUARANTEES AND REPLACEMENTS:

A. Shrubs, vines and groundcovers shall be guaranteed to remain healthy and vigorously growing for a period of ninety (90) days from date of final acceptance of Maintenance Period of project.

B. Trees shall be guaranteed to live in a healthy condition for a period of one (1) year from date of final acceptance of Maintenance Period of project.

C. Plants found to be dead or not in a vigorous condition within the Maintenance and Guarantee Periods shall be replaced within fourteen (14) days at Contractor's expense.

D. Plants used for replacement shall be the same kind and size as specified in the plant list. They shall be furnished, planted and fertilized as originally specified. The expense of all repair work on existing improvements damaged during replacement shall be borne by the Contractor.

1.05 QUALITY ASSURANCE:

A. Reviews herein specified shall be made by the Landscape Architect or Landscape Inspector. The Contractor shall request review in writing a minimum of 48 hours in advance, for the following parts of work:

1. Pre-job meeting to introduce Landscape Architect, Landscape Inspector, Contractor, job project manager and job superintendent and to discuss the particular requirements of the job.

2. Incorporation of soil conditioning and fertilizing into the soil. Observation shall begin prior to amendments being rototilled into the soil. Amendment materials shall be distributed in piles around the site in quantities corresponding to the soils analysis recommendations "per 1,000 sq. ft.". Invoices showing materials and quantities purchased shall be available for review.

3. Upon completion of grading prior to planting. Review of plant materials is to coincide with this review.

4. When trees, shrubs and vines are spotted in place for planting, but before planting holes are excavated.

5. Upon completion of finish grades and planting. Application of pre-emergent herbicide is to coincide with this review.

6. When planting, and all other indicated and specified work, except the Maintenance Period, has been completed. Acceptance, in writing, shall establish beginning of the Maintenance Period.

7. Final review at the completion of the Maintenance Period. Contingent on acceptance, this review shall establish the beginning date for the Guarantee Period.

1.06 MAINTENANCE:

A. The Contractor shall continuously maintain all involved areas during the progress of the work and during the maintenance period until the final acceptance of the work.

B. The Maintenance Period begins on the first day after written acceptance of planting operations is received from the Landscape Architect, and shall continue thereafter for no less than ninety (90) continuous calendar days.

C. The contract completion date of the contract maintenance period will be extended, when in the opinion of the Landscape Architect, improper maintenance or possible poor or unhealthy condition of planted material or poorly established non-covering turf areas are evident at the termination of the scheduled maintenance period. The

Contractor shall be responsible for additional maintenance of the work until work is completed and acceptable.

D. See Section 320533 for specific Maintenance Requirements.

1.07 GENERAL REQUIREMENTS:

A. The term "Planting Area" shall mean all areas to be planted with trees, shrubs, groundcovers, sod and seed.

B. Actual planting shall be performed during those periods when weather and soil conditions are suitable in accordance with locally accepted horticultural practice.

C. All rock and other growth or debris accumulated during the duration of the project shall be removed from the site.

D. Prior to excavation for planting or placing of plant materials, locate all underground improvements, utility lines, etc. and take proper precautions to avoid damage. In the event of a conflict between such lines and plant locations, notify Landscape Architect and receive direction prior to proceeding. The Contractor assumes responsibility for making repairs for damages resulting from work as herein specified.

E. Grading and soil preparation work shall be performed only during the period when beneficial and optimum results may be obtained. If the moisture content of the soil should reach such a level that working it would destroy soil structure, spreading and grading operations shall be suspended until the moisture content is increased or reduced to acceptable levels and the desired results are likely to be obtained.

F. Scaled dimensions are approximate. Before proceeding with work, carefully check and verify dimensions and immediately inform the Landscape Architect of discrepancies between the drawings and specifications and actual conditions.

G. Quantities for plant materials are shown for convenience only, and not guaranteed. Check and verify count and supply sufficient number to fulfill intent of drawings.

H. Adequately stake, barricade, and protect irrigation equipment, manholes, utility lines, and other existing property during all phases of the soil amending and grading operations.

I. Rejection and Substitution: Plants not conforming to the requirements herein specified shall be considered defective, and such plants, whether in place or not, shall be marked as rejected and be immediately removed from the site of the work and replaced with acceptable plant materials. The plant materials shall meet all applicable inspections required by law. Plants shall be of the species, variety, size, age, flower color and condition as specified herein and/or as indicated on the drawings. Under no condition will there be any substitution of plant specie, variety, or reduced sizes for those listed on the accompanying drawings, except with the expressed written consent of the Landscape Architect.

J. All utilities (water and electricity) used during the installation and maintenance of the landscaping and irrigation systems for this project shall be paid for by the Owner.

1.08 FINAL SOIL AMENDMENT QUANTITIES:

A. Upon completion of all backfill and/or rough grading of planted areas, a minimum of six (6) representative samples of existing soil found in the planting areas shall be taken by the Contractor and at his/her expense sent to an independent soil testing laboratory for an agricultural suitability analysis and recommendations for quantity and application rate of amendments and include any corrective measures required to adjust pH or salt to acceptable levels. These recommendations shall then be compared with those listed in Paragraphs 2.02 and 3.01 and the contract modified accordingly.

1.09 SOIL PREPARATION CONFORMANCE

A. Amendment materials shall be distributed in piles around the site in quantities corresponding to the soils analysis "per 1,000 sq. ft." recommendations. Invoices showing materials and quantities purchased shall be available for review. The Landscape Architect will compare the distribution piles and total quantities of each material furnished against the soils analysis recommendations. If the minimum rates of application have not been met, the Landscape Architect will require the distribution of additional quantities of these materials to fulfill the minimum application requirements specified. After approval by the Landscape Architect of the distribution and quantities of soil amendments, the Contractor will then commence with soil conditioning operations per section 3.01.

1.10 PLANT MATERIAL QUANTITY CONFORMANCE

A. After installation of plant materials, and coinciding with the pre-maintenance observation, the Landscape Architect, with the heretofore specified signed copies of the required certificates, trip slips and invoices for the plant materials and related items, will inventory such material, comparing the total area and/or the amounts specified. If the minimum amounts have not been furnished, the Landscape Architect may require the installation of additional materials to fulfill the minimum requirements specified or require that the Contractor provide credit(s) to the Owner.

PART 2 - PRODUCTS

2.01 SOIL AMENDMENT AND FERTILIZER:

A. Provide singly or in combination as required to meet specified requirements for topsoil. Soil conditioners shall be nontoxic to plants.

1. Composted Derivatives: Ground bark, nitrolized sawdust, humus, or other wood green waste material free of stones, sticks, and soil stabilized with nitrogen and having the following properties:

2. Particle Size: Minimum percent by weight passing:

a.	No. 4 mesh screen	95
b.	No. 8 mesh screen	80

3. Nitrogen Content: Minimum percent based on dry weight:

a.	Fir Sawdust	0.7
b.	Fir or Pine Bark	1.0

B. Gypsum shall be a commercially processed and packaged gypsum (CaSo, 2H 0) with minimum 80% grade containing 14% minimum combined sulfur.

C. Iron Sulphate: Ferric or ferrous sulphate in pelleted or granular form containing not less then 18 percent metallic iron. Material shall conform to the Agricultural Code of the State of California.

D. Pre-plant fertilizer for incorporation with rototilling or plant pit backfill mix shall be of a uniform 'beaded' homogeneous granular composition suitable for application with approved equipment and shall contain the following minimum available percentages by weight of plant food:

Nitrogen	5% minimum
Phosphoric acid	3% minimum
Potash	1% minimum
Iron	1%
Manganese	.05%
Zinc	.05%
Humic Acids (derived from compost)	15%
Soil Penetrant (alkyl naphthalene sodium sulfonate)	15%

E. Post-planting Fertilizer for Maintenance Period Fertilization: Organic base, long lasting, nonburning, controlled slow release, free flowing, uniform in composition, suitable for application with approved equipment, and shall contain the following minimum available percentages of weight of plant food :

Nitrogen	12% minimum
Phosphoric acid	8% minimum
Potash	8% minimum
Sulphur	7%
Iron	2%
Manganese	.05%
Zinc	.05%
Humic Acids (derived from compost)	5%

WARNING: Some fertilizers contain chelated iron which has caused staining of concrete surfaces in other projects. Contractor shall be responsible for removing all iron stains from concrete by sandblasting, or as directed by architect, at no additional cost to the Owner.

F. Planting Tablets: Tightly compressed chip type commercial grade planting tablets of varying weighted sizes with the following available percentages by weight of plant food:

Nitrogen	20% minimum
Phosphoric acid	10% minimum
Potash	5% minimum

G. Post-planting Fertilizer for Palms: Organic base, long lasting, nonburning, controlled slow release, free flowing, uniform in composition, suitable for application with approved equipment, and shall contain the following minimum available percentages of weight of plant food :

Nitrogen	3% minimum
Phosphoric acid	1% minimum
Potash	3% minimum

A micro-nutrient foliar spray for palm fronds is recommended to avoid micro-nutrient deficiencies.

2.02 PLANTING BACKFILL:

A. Planting backfill shall be a thoroughly blended mixture of topsoil amendments at the following mixture:

Soil Conditioner	1 part
Stock-piled on site soil	3 parts
Iron sulphate	2 lbs/per cu. yd. of mix
Gypsum	10 lbs/per cu. yd. of mix
Pre-plant fertilizer	4 lbs/per cu. yd. of mix

Soil to be used as planting medium for the project shall be fertile, well-drained, of uniform quality, free of stones over 1 inch diameter, sticks, oils, chemicals, plaster, concrete and other deleterious materials. On-site soil may be stockpiled for re-use provided it meets all requirements.

B. Planting Backfill for Date Palms:

Pure, washed plaster sand only. Do not incorporate fertilizer into backfill mix. Apply post-planting fertilizer only.

2.03 PLANT MATERIALS:

A. Nomenclature: The scientific and common names of plants herein specified conform with the approved names given in "Sunset Western Garden Book ", published by Lane Publishing Company, Menlo Park, California, latest edition. See list of plant material on drawings.

B. Quality and size of all plants shall be No. 1, of Pinto Tag stock. They shall be vigorous, of normal growth, free from disease, insects, insect eggs, and/or exceed the measurements specified or the American standards for nursery stock. Pinto Tags shall be submitted to the landscape architect.

D. Container stock (1 gal., 5 gal., and 15 gal.) shall have grown in containers for at least six months, but not over two years. No container plants that have cracked or broken balls of earth, when taken from the container, shall be planted, except upon special approval. No trees with damaged roots or broken balls shall be planted and no shrubs, vines or groundcovers shall be planted that are "pot-bound" or that have damaged roots.

E. Pruning shall not be done, prior to delivery, except by written approval.

F. Observation of Plant Materials, required by County authorities, shall be a responsibility of the contractor, and where necessary, the contractor shall have secured permits or certificates prior to delivery of plants to site.

G. Plants shall be subject to observation and approval or rejection, at the project site at any time before or during progress of work, for size, variety, condition, latent defects and injuries. Rejected plants shall be removed from the project site immediately.

H. Substitutions will not be permitted except that if proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size, variety and cost.

I. Quantities shall be furnished as needed to complete work as shown on drawings.

J. The landscape architect reserves the right to observe root condition of any species, particularly those grown from seed, and if found defective, to reject the plants represented by the defective sample.

K. Identify plant species or varieties correctly on legible, weather-proof labels attached securely at the job site. There shall be a minimum of one labeled plant for each 5 plants in a lot.

L. Groundcover plants shall be healthy vigorous rooted cuttings grown in flats until transplanting.

2.04 HERBICIDE:

A. Weed Contact Spray, post emergent, systemic product with no soil residual activity formulated as a water soluble liquid containing 50% glyphosate and 14.5% surfactant with surflan additive.

2.05 RODENT REPELLENT:

A. Rodent Repellent: Repellent X or approved equal.

2.06 HYDROSEED:

A. See drawings for hydroseed schedules.

2.07 MULCHING MATERIAL:

A. Mulching material shall be 3/8" - 1/2" dia. screened fir bark or approved equal, approved in writing, by the landscape architect.

2.08 STAKING MATERIALS FOR TREES:

A. Double Staking (Triple Staking for High Wind Areas) for Trees from up to 36" Box Size:

1. Stakes shall be of lodgepole pine. These shall be straight shafts, shaved and cut clean and bare of branches and stubs, of uniform thickness with a minimum diameter of 2 inches (3 inches in high wind exposure areas), free of loose knots, splits or bends. Stakes shall be no less than eight (8) feet in length.

B. Tree Tie Materials shall be one of the following:

1. Hose wires used for stabilizing trees with stakes, shall be 12 gauge galvanized wire with ultra-violet resistant precut hoses to 10 ½" and wire precut to 27" or 36" the length necessary per details.

2. Twist Braces shall be used in areas with high wind exposure, utilizing twist brace stability bars with the following criteria:

4 ½" loop diameter by 24" length for 24" box trees
4 ½" loop diameter by 36" length for 36" box trees

2.09 GUYING MATERIALS FOR TREES 48" BOX SIZE AND GREATER:

A. Guy wires shall be of pliable, zinc-coated steel of No. 12 gauge.

B. Anchors (deadman) for holding guy wires shall be of 4 inch by 4 inch (4" x 4") solid lumber, 1'-6" in length, or "duckbill" style anchor materials as shown on the details on the drawings.

C. Hose for covering wire shall be of 2-ply reinforced rubber, used or new, garden hose type of at least 1/2 inch in diameter.

D. Warning indicators, to be attached to guys, shall be of 1/2" PVC pipe and four feet long.

E. Tree ties shall be as stated in section 2.08 above.

2.10 TRIM GUARDS FOR TREES:

A. Trim Guards shall be made from quality polyethylene with ultra violet inhibitors and ratcheting latching device.

2.11 ROOT BARRIERS FOR TREES:

A. #UB-24-2 root barriers as manufactured by Deep Root Corp. or approved equal.

PART 3 - EXECUTION

3.01 LEACHING, SOIL CONDITIONING, ROTOTILLING AND FERTILIZING:

A. Deep Water Leaching:

1. After complete installation and testing of the irrigation system, all areas shall be deep water leached and compacted and settled by continuous application of irrigation water until the soil has received a minimum of 12" of water.

2. After leaching operation, soil samples shall be taken by contractor per landscape architect's direction and given to the Owner's soil laboratory for testing. Soil test shall meet the following requirements:

ECe	- Maximum 3.0
pH	- Maximum 7.50
	- Minimum 6.00

3. Deep water leaching shall be done prior to the application of the commercial fertilizer.

4. Care shall be taken that the rate of application of water does not cause erosion or sluffing of soils. Do not undertake leaching operations in expansive soils.

5. All depressions, voids, erosion scars and settled trenches generated by the deep watering shall be filled with conditioned topsoil and brought to finish grade prior to digging planting pits.

B. After leaching operations and after the areas have been graded, follow the Soil Preparation Conformance procedures per section 1.09. After approval by the Landscape Architect of the requirements in section 1.09, the soil conditioning and amendment materials shall be evenly spread over all planting areas and shall be thoroughly scarified to an average depth of six (6) inches by rototilling a minimum of two (2) alternating passes:

The following materials and quantities are to be used as a basis for bidding, and may be modified based on soil analysis results.

Soil conditioner:	4 cu. yd. per 1,000 sq. ft.
Soil sulphur:	20 lbs/per 1,000 sq. ft.
Iron sulphate:	20 lbs/per 1,000 sq. ft.
Gypsum:	100 lbs/per 1,000 sq. ft.
Pre-plant fertilizer:	20 lbs/per 1,000 sq. ft.

1. Fertilizer shall be incorporated into the top six (6) inches of finish grade. Fertilizer shall be applied after leaching operation.

2. The thoroughness and completeness of the rototilling and incorporation of the soil conditioners/amendments shall be accepted by the landscape architect in writing, prior to digging planting pits. For slopes 2:1 and steeper, or as per the drawings, omit soil conditioner application and rototilling.

3.02 FINISH GRADING:

A. Finish grades shall be as indicated on landscape and civil drawings. Contractor shall notify landscape architect for a decision should any discrepancies exist between the drawings and site conditions.

B. Finish grades shall be measured as the final water compacted and settled surface grades and shall be within $\pm$ 0.1 foot of the spot elevations and grade lines indicated. Grades adjacent to hardscape shall be within +/- .01 feet of the grades indicated on the drawings.

C. Molding and rounding of the grades shall be provided at all changes in slope.

D. All undulations and irregularities in the planting surfaces resulting from tillage, rototilling and all other operations shall be leveled and floated out before planting operations are initiated.

E. Take every precaution to protect and avoid damage to erosion control materials, sprinkler heads, irrigation lines, and other underground utilities during grading and conditioning operations.

F. Final finish grades shall insure positive drainage of the site with all surface drainage away from buildings, walls, and toward roadways, drains and catch basins.

G. Final grades shall be accepted by the landscape architect/Owner's representative in writing on company letterhead prior to digging planting pits and/or before planting operations will be allowed to begin.

H. Planting surfaces shall be graded with no less than 2 percent surface slope for positive drainage.

3.03 PLANTING:

A. The layout of locations for plants and outlines of groundcover beds to be planted shall be accepted by the landscape architect in writing prior to digging plant pits for planting. All such locations shall be checked by the contractor for possible interference with existing underground piping prior to excavation of holes. If underground construction or utility lines are encountered in the excavation of planting areas, other locations for the planting may be selected by the landscape architect at no additional cost to the owner. Damage to existing utilities shall be the responsibility of the contractor.

B. Planting Trees, Shrubs and Vines:

1. All excavated holes shall have vertical sides with roughened surfaces and shall be of the minimum sizes indicated on drawings. Holes shall be, in all cases, large enough to permit handling and planting without injury or breakage of root balls or roots.

2. Excavation shall include the stripping and stacking of all acceptable soil encountered within the areas to be excavated for plant pits and planting beds. Protect all areas that are to be trucked over and upon which soil is to be temporarily stacked pending its re-use for the filling of holes, pits and beds.

3. Excess soil, generated from the planting holes shall be spread evenly on the site within the tolerances indicated in section 3.02, or as directed by the landscape architect.

4. The plants shall be planted at approved locations with the heretofore specified plant pit fertilizer and soil planting backfill. Place plant pit fertilizer after two thirds of backfill material is installed at the rates specified by the manufacturer and soils report.

5. The plants shall be placed in the planting pits, which have been hand-tamped, and water settled to the rootball base levels prior to the placement of the plants. After setting the plants, the remaining backfill material shall be carefully tamped and settled around each rootball to fill all voids.

6. Each tree and shrub shall be placed in the center of the hole and shall be set plumb and held rigidly in position until the planting backfill has been tamped around each rootball.

7. All plants shall be set at such a level that after settling they bear the same relationship to the surrounding finish grade as they bore to the soil line grade in the container, unless otherwise noted.

8. No plant will be accepted if the rootball is broken or cracked, either before, during, or after the process of installation.

9. Plants shall be thoroughly watered into the full depth of each planting hole immediately after planting.

10. Install shrubs and vines as shown on the drawings.

11. For 1 gallon trees, utilize pre-installed nursery stakes if stakes are in good condition as described above. Broken, cracked and/or unsecured nursery stakes will not be allowed. If new stakes are required, install stakes with materials as specified as shown on the drawings.

12. For trees up to 36" Box size, install tree stakes with materials specified and as shown on the drawings. The stakes shall be driven in plumb and secure. Special care shall be taken that the driving in of the stake does not damage the tree roots or rootball. Tree ties shall be fastened to each stake by tacking the wire tie to the stake. Protective hoses shall be in contact with all tree trunk or branch areas per the details on the drawings.

13. For trees 48" Box size and greater guy all trees with the materials specified and as shown on the drawings.

14. The staking and guying shall be accomplished in such a manner as to insure the proper and healthy growth and the safety of the plants, property, and the public.

15. The contractor shall be responsible for all surface and subsurface drainage required which may affect his guarantee of the trees, shrubs, and vines.

16. Pruning after planting shall be required on all trees, shrubs, and vines when necessary to provide the specified or approved standard shapes, form and/or sizes characteristic to each plant. Pruning may include thinning, and/or cutting and shall be under the direction of the landscape architect or certified arborist.

17. Install tree guards on all trees within turf areas.

C. Planting Groundcovers:

1. Groundcovers shall be planted in the areas indicated on the drawings. The groundcover plants shall be rooted cuttings grown in flats and shall remain in those flats until transplanting.

2. All groundcover plants shall be planted with soil around roots in staggered row, evenly spaced at the intervals called out on the drawings.

3. The groundcover plants shall be planted sufficiently deep to cover all roots.

4. The groundcover planting area shall be hand smoothed after planting to provide an even, smooth final finish grade.

3.04 HYDROSEEDING:

A. Hydroseeding shall be applied in the areas indicated on the drawings in accordance with the mix specified on the drawings.

B. Hydroseeding Equipment: Hydraulic equipment used for the application of fertilizer, seed, and slurry of prepared wood pulp or fiber with tackifiers as specified on the drawings. This equipment shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend, and homogeneously mix a slurry containing 1,200 pounds of mulch and seed. The slurry distribution lines

shall be large enough to prevent stoppage and shall provide even distribution of the slurry. The slurry tank shall have a minimum capacity of 1,350 gallons and shall be mounted on a traveling unit, which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be sprayed so as to provide uniform distribution without waste.

C. Application Method: Using the wood pulp as a guide, spray the soil with a uniform visible coat of slurry. The slurry shall be applied in a sweeping motion, in an arched stream, so as to fall like rain allowing the wood fibers and tackifiers to build upon each other, until a complete, even coverage coat is achieved.

D. Hydroseeded areas shall be kept moist at all times 20-24 days after planting or until the new growth of the plants are sufficiently well established.

E. Hydroseeded areas shall be protected against foot traffic and other use immediately after hydroseeding is completed by placing warning signs and temporary twine and flagging around the areas.

F. Re-hydroseeding of bare areas shall be done 30 days after initial application at no additional cost to the owner.

3.05 HERBICIDE APPLICATION:

A. Herbicide or pesticide applications shall be performed only by personnel licensed for such work by the State of California.

3.06 RODENT REPELLENT:

A. Once plants have been planted and watered in, apply rodent repellent for plants indicated on plant legends on the drawings around the entire perimeter of the planting area at application rates and with methods as specified by the manufacturer.

3.07 MULCHING:

A. Landscape areas other than those hydroseeded or planted with turf shall be covered with the specified mulching material to the minimum depth indicated on the drawings.

3.08 CLEAN-UP:

A. As the project progresses on a daily basis, the contractor shall maintain all areas in a neat manner and remove unsightly debris as necessary, remove all debris and containers used in accomplishing work and sweep and clean all sidewalks, asphalt, and concrete areas adjacent to plantings.

3.09 SITE OBSERVATION & WALK-THROUGHS FOR SUBSTANTIAL COMPLETION:

A. General Observation: The landscape architect will visit the construction site at interim times during the construction process to access construction progress regarding installation of landscape material to be in compliance with the

drawings, details, specifications and site conditions. The landscape architect will prepare a site report after each visit noting progress of installation, verbal communication with the contractor and identifying any field adjustments necessary that require modifications to the designed landscape. A copy of this site report will be delivered to both the owner and the contractor. The contractor is responsible to immediately address each item on the site report before proceeding with further construction.

B. Walk Through For Substantial Completion (Punch List #1):

1. Before requesting a walk through for substantial completion the following requirements must be entirely satisfied:

   a. The entire planting area is completely installed, and when letters of acceptance as described above have been obtained from the landscape architect and/or owner's representative. If the contractor failed to notify the landscape architect for any of the above items as listed above than the contractor assumes full responsibility for any design modifications directed by the landscape architect during the walk through for substantial completion any of these issues at no additional cost to the owner.

   b. All invoices, pinto tags and receipts have been delivered to the landscape architect and/or owner's representative.

2. Once the above requirements have been met a walk through for substantial completion may be requested. The following procedures will be used during the walk through:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

   b. A visual walk through of the entire site will take place consisting of an examination of planting areas as compared to the drawings, and installation procedures as shown on the details and specifications. A punch list will be established of deficiencies in the construction and workmanship of the landscaped area as compared to the construction drawings, details, and specifications.

3. Once the Walk Through for Substantial Completion has been completed the landscape architect will provide a copy of all punch list items to the owner for review and distribution to the contractor. It is the contractor's responsibility to repair, replace, and adjust all items on the punch prior to requesting a final walk through.

C. Final Walk Through:

1. Before commencement of a final walk through is requested, each item on the walk through for substantial completion (punch list #1) must be thoroughly satisfied, addressed, and resolved by the contractor.

2. Once the above requirement has been met a final walk through may be requested. The following procedures will be used:

   a. Contractor must have (2) two personnel available with radio communication for the entire length of the walk through.

   b. Unless new issues arise between walk throughs, only those items as indicated on the walk through for substantial completion punch list will be addressed. This visual walk through will consist of walking through the punch list items created at the time of the walk through for substantial completion, and examining outstanding items. Any remaining deficiencies in the construction and workmanship of the landscape as compared to the punch list generated at the time of the walk through for substantial completion, construction drawings, details and specifications will be noted.

3. Once the Final Walk Through is completed and all items created on the final punch list have been addressed, the Maintenance Period may begin. Any additional walk throughs required due to contractors' inability to address all issues on the punch lists described above will be provided at the contractor's expense.

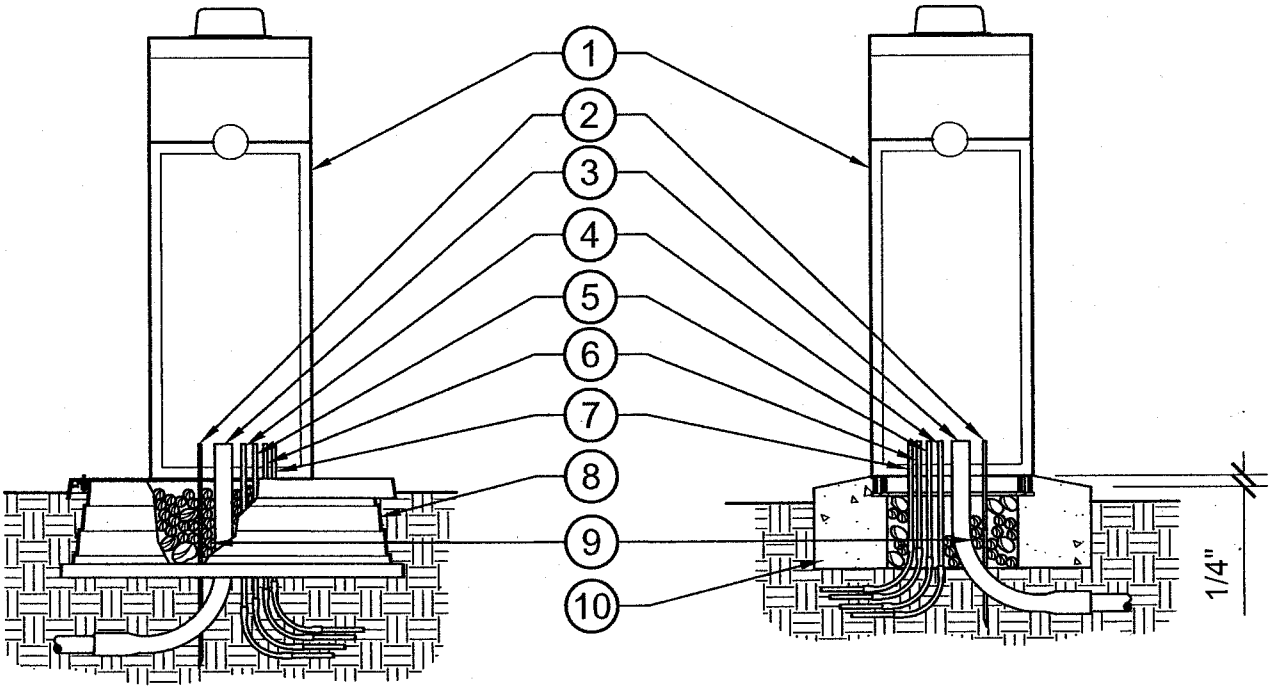
3.10 MAINTENANCE PERIOD:

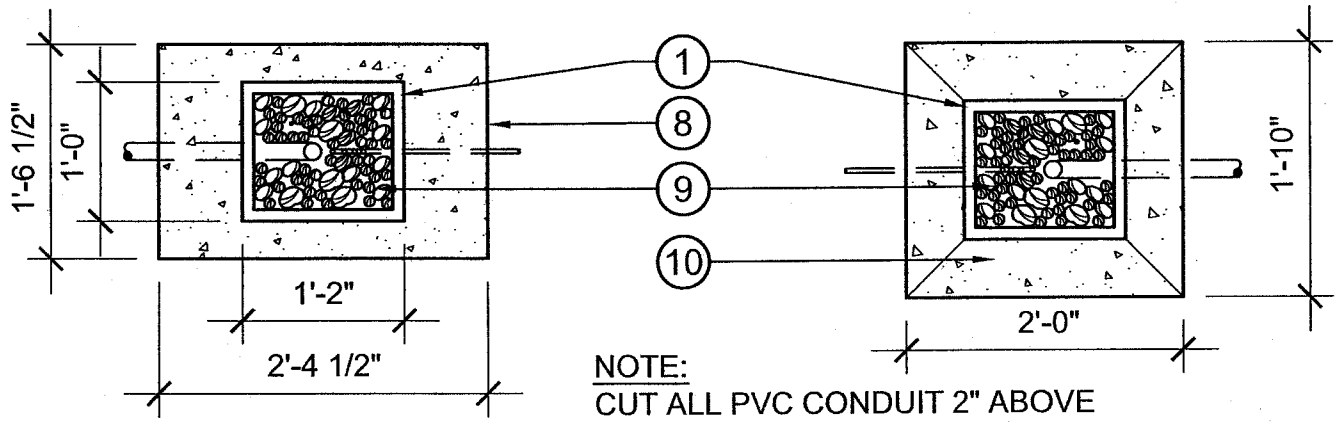
A. The Maintenance Period shall last for ninety (90) days after notification from the landscape architect of a successful final walk through and will begin once all items on the final walk through punch list have been satisfactorily addressed by a written statement indicating such from the landscape architect to the owner.

   1. The contractor is responsible for obtaining and following any maintenance manuals created specifically for the project from the owner at the beginning of the maintenance period.

   2. Once the contractor has fulfilled all maintenance agreement obligations the maintenance period will end see section 320533 Landscape Maintenance, for maintenance responsibilities.

END OF SECTION 329300



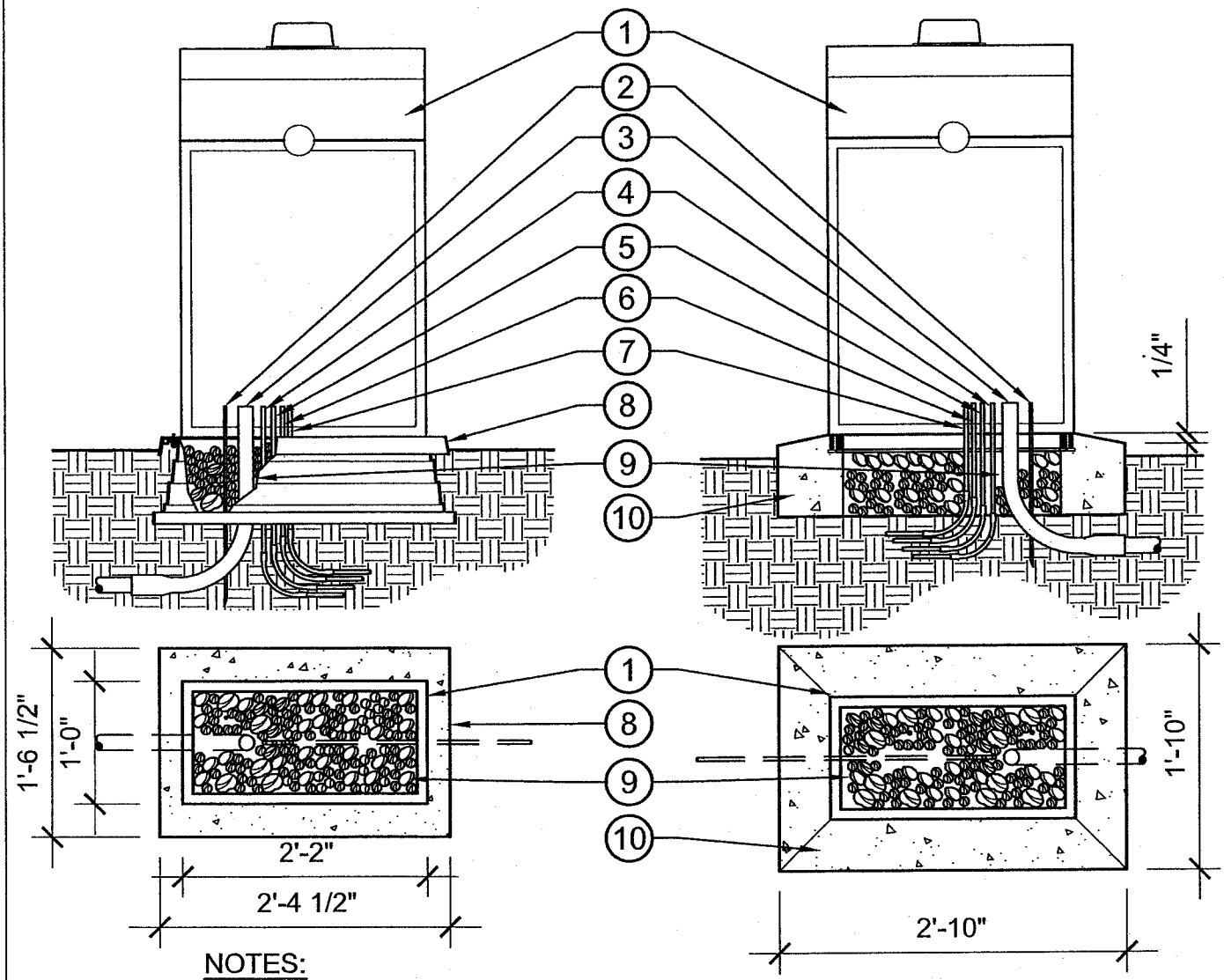


NOTE:
CUT ALL PVC CONDUIT 2" ABOVE CONCRETE PAD / QUICK PAD

1. CONTROLLER WITH STAINLESS STEEL ENCLOSURE (SEE SPECIFICATIONS)
2. GROUNDING ROD (INSTALL PER MANUFACTURER'S SPECIFICATIONS)
3. 2" WIRE CONDUIT AND SWEEP FOR CONTROL AND COMMON WIRE
4. 3/4" PVC SCH40 CONDUIT AND SWEEP FROM MASTER VALVE TO CONTROLLER
5. 3/4" PVC SCH40 CONDUIT AND SWEEP FROM FLOW SENSOR TO CONTROLLER
6. 3/4" PVC SCH 40 CONDUIT AND SWEEP FROM WEATHER STATION OR ET GAGE TO CONTROLLER
7. 3/4" PVC SCH40 SPARE CONDUIT AND SWEEP FOR FUTURE USE
8. QUICK PAD
9. 3/4" GRAVEL SUMP 18" DEEP FOR INSTALLATION OF CONDUIT
10. 8" THICK CONCRETE BASE, INSTALL 2" ABOVE FINISH GRADE

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	SINGLE CONTROLLER IN STAINLESS STEEL ENCLOSURE		
	ON QUICK PAD OR CONCRETE PAD	APPROVED BY: MPH	
STD. G-002	3/4"=1'-0"	REV:	

FILE: G-002_SINGLE CONTROLLER.DWG



NOTES:

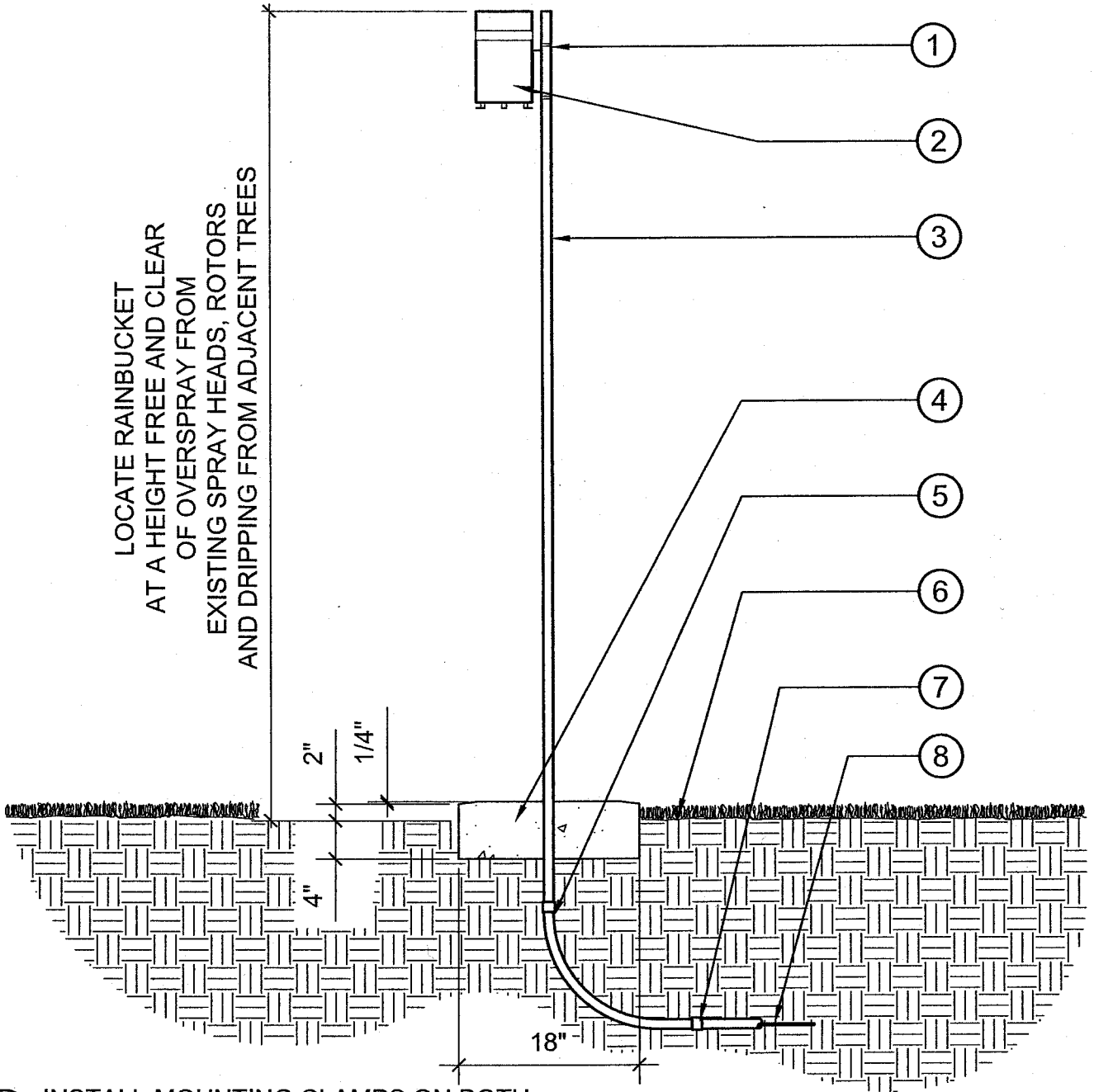
A DOUBLE WIDE ENCLOSURE SHALL BE SPECIFIED IF TWO CONTROLLERS ARE SPECIFIED IN ONE LOCATION.

CUT ALL PVC CONDUIT 2" ABOVE CONCRETE PAD / QUICK PAD

1. CONTROLLERS WITH STAINLESS STEEL ENCLOSURE (SEE SPECIFICATIONS)
2. GROUNDING ROD (INSTALL PER MANUFACTURER'S SPECIFICATIONS)
3. CONDUIT AND SWEEP FOR CONTROL AND COMMON WIRES (2" OR LARGER AS NEEDED)
4. 3/4" PVC SCH40 CONDUIT AND SWEEP FROM MASTER VALVE TO CONTROLLER
5. 3/4" PVC SCH40 CONDUIT AND SWEEP FROM FLOW SENSOR TO CONTROLLER
6. 3/4" PVC SCH 40 CONDUIT AND SWEEP FROM WEATHER STATION OR ET GAGE TO CONTROLLER
7. 3/4" PVC SCH40 SPARE CONDUIT AND SWEEP FOR FUTURE USE
8. QUICK PAD
9. 3/4" GRAVEL SUMP 18" DEEP FOR INSTALLATION OF CONDUIT
10. 8" THICK CONCRETE BASE, INSTALL 2" ABOVE FINISH GRADE

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	TWO CONTROLLERS IN DOUBLE WIDE STAINLESS ENCLOSURE		
	ON CONCRETE PAD OR QUICK PAD	APPROVED BY: MPH	
STD. G-003	3/4"=1'-0"	REV:	

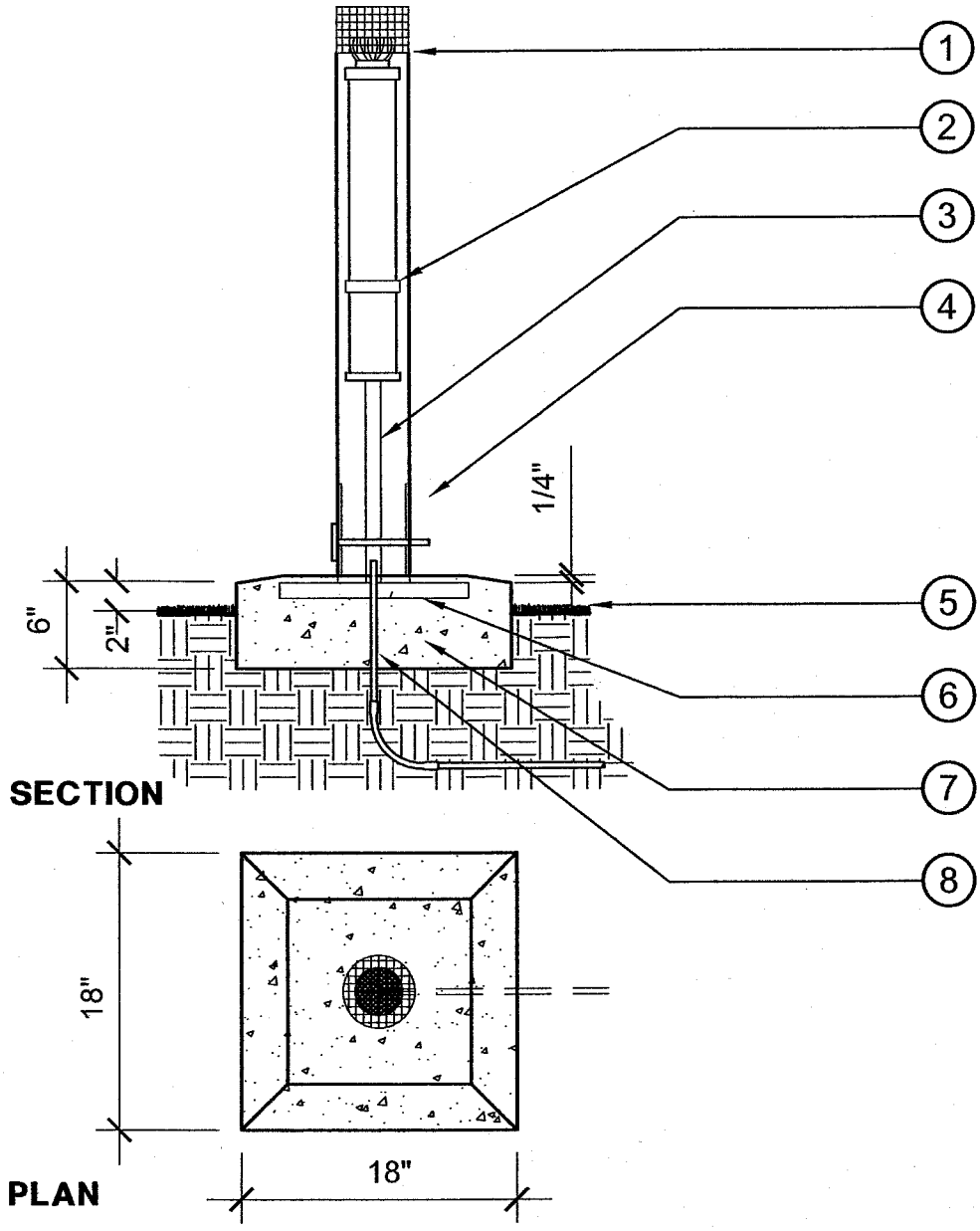
FILE: G-003_TWO CONTROLLERS.DWG



1. INSTALL MOUNTING CLAMPS ON BOTH SIDES OF MOUNTING BRACKET SECURE TO POST
2. RAINBUCKET
3. 2" GALVANIZED RIGID STEEL PIPE MOUNTING POST
4. 18" X 18" (6" THICK) CONCRETE BASE (INSTALL 2" ABOVE FINISH GRADE)
5. 2" T x T GALVANIZED COUPLER AND 2" RIGID GALVANIZED PIPE SWEEP
6. FINISH GRADE
7. REDUCTION OF CONDUIT SIZE TO 1" SCH 40 AT END OF SWEEP
8. 2-CONDUCTER CABLE (MAXIMUM LENGTH 200')

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	RAINBUCKET		
	POST MOUNTED	APPROVED BY: MPH	
STD. G-011	3/4"=1'-0"	REV:	

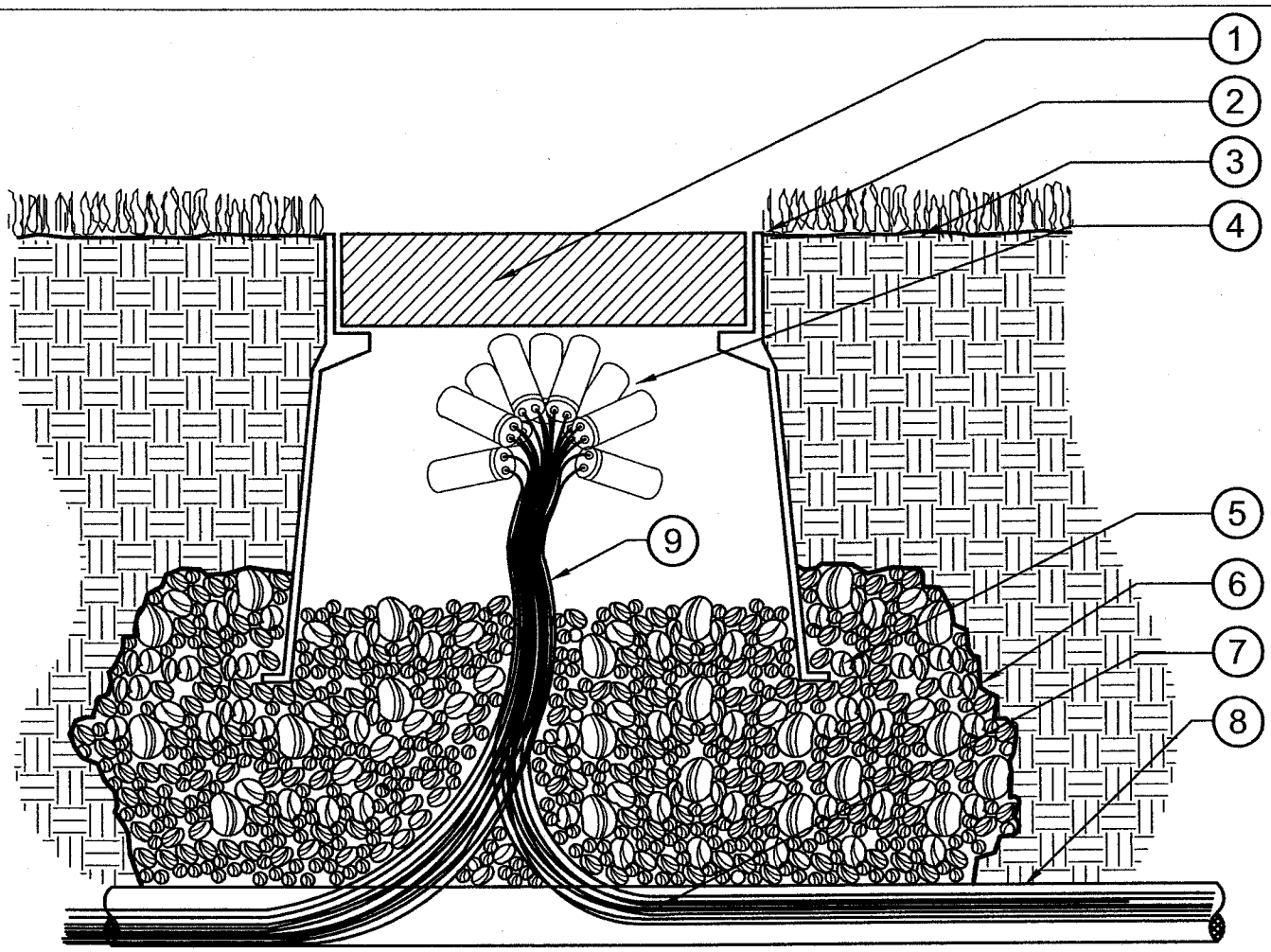
FILE: G-011_RAINBUCKET.DWG



1. STAINLESS STEEL ENCLOSURE (SEE SPECIFICATIONS)
2. ET GAGE (SEE SPECIFICATIONS)
3. ET GAGE MOUNTING BRACKET
4. T-PINS WITH DRILLED HOLES FOR PADLOCKS
5. FINISH GRADE
6. METAL BASE PLATE (POUR CONCRETE 1" ABOVE)
7. CONCRETE BASE
8. 1/2" PVC SCH 40 CONDUIT AND SWEEP FOR PAIGE P-7171-D CABLE (TO CONTROLLER)

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	ET GAGE		
	IN STAINLESS STEEL ENCLOSURE	APPROVED BY: MPH	
STD. G-012	1"=1'-0"	REV:	

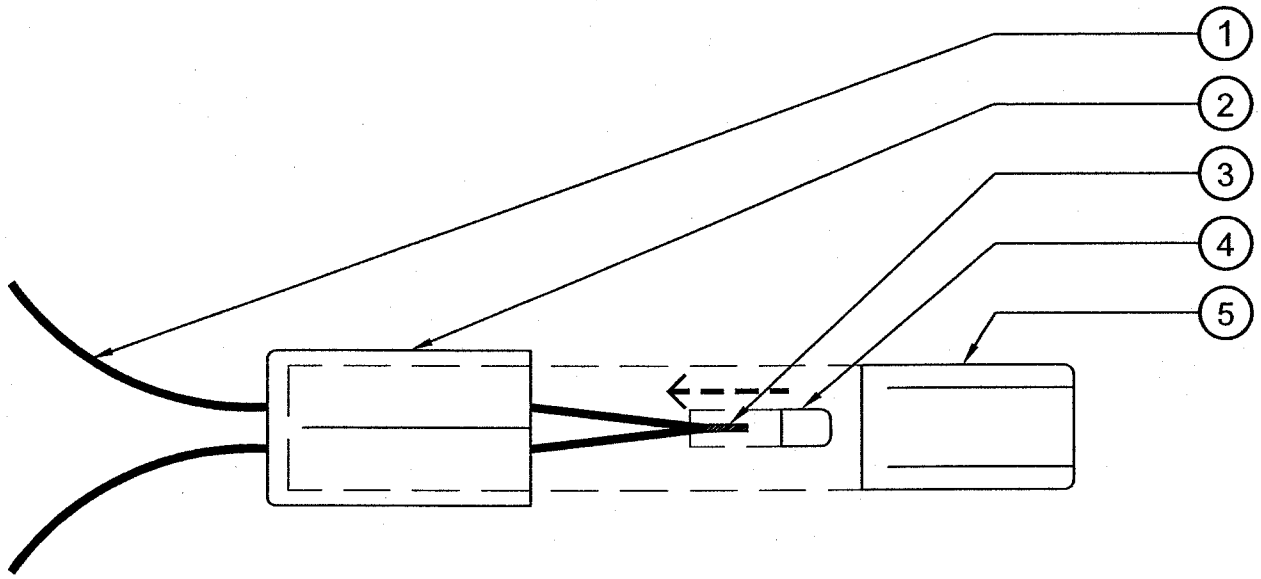
FILE: G-012_ET GAGE.DWG



1. STANDARD RECTANGULAR BOX W/ LOCKING LID (DO NOT CUT ADDITIONAL HOLES IN BOX)
2. FLUSH IN LAWN AREAS, 2" IN SHRUB AREAS
3. FINISH GRADE
4. WIRE CONNECTORS (ONE FOR EACH SPLICE) LABEL ALL WIRE ENDS WITHIN 1" OF CONNECTOR.
5. 3/4" GRAVEL SUMP IN, UNDER, AND AROUND VALVE BOX. FILL TO TOP OF VALVE BOX HOLES.
6. INSTALL FILTER FABRIC AROUND GRAVEL SUMP.
7. ELECTRIC CONTROL WIRES AND COMMON WIRE
8. PRESSURE SUPPLY LINE
9. 24" MIN. LENGTH TO EACH LEG OF WIRE IN SPLICE BOX, DO NOT COIL.

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	LOW VOLTAGE SPLICE CONNECTION		
		APPROVED BY: MPH	
STD. G-020	3"=1'-0"	REV:	

FILE: G-020_SPLICE CONNECTION.DWG



(1) LOW VOLTAGE WIRES, 3 MAXIMUM

(2) OUTER CASE OF CONNECTOR

(3) STRIP AND TWIST WIRES FOR PROPER CONNECTION

(4) COPPER SLEEVE CRIMP INSTALLED WITH RECOMMENDED TOOL

(5) INNER CASE OF CONNECTOR

NOTE:

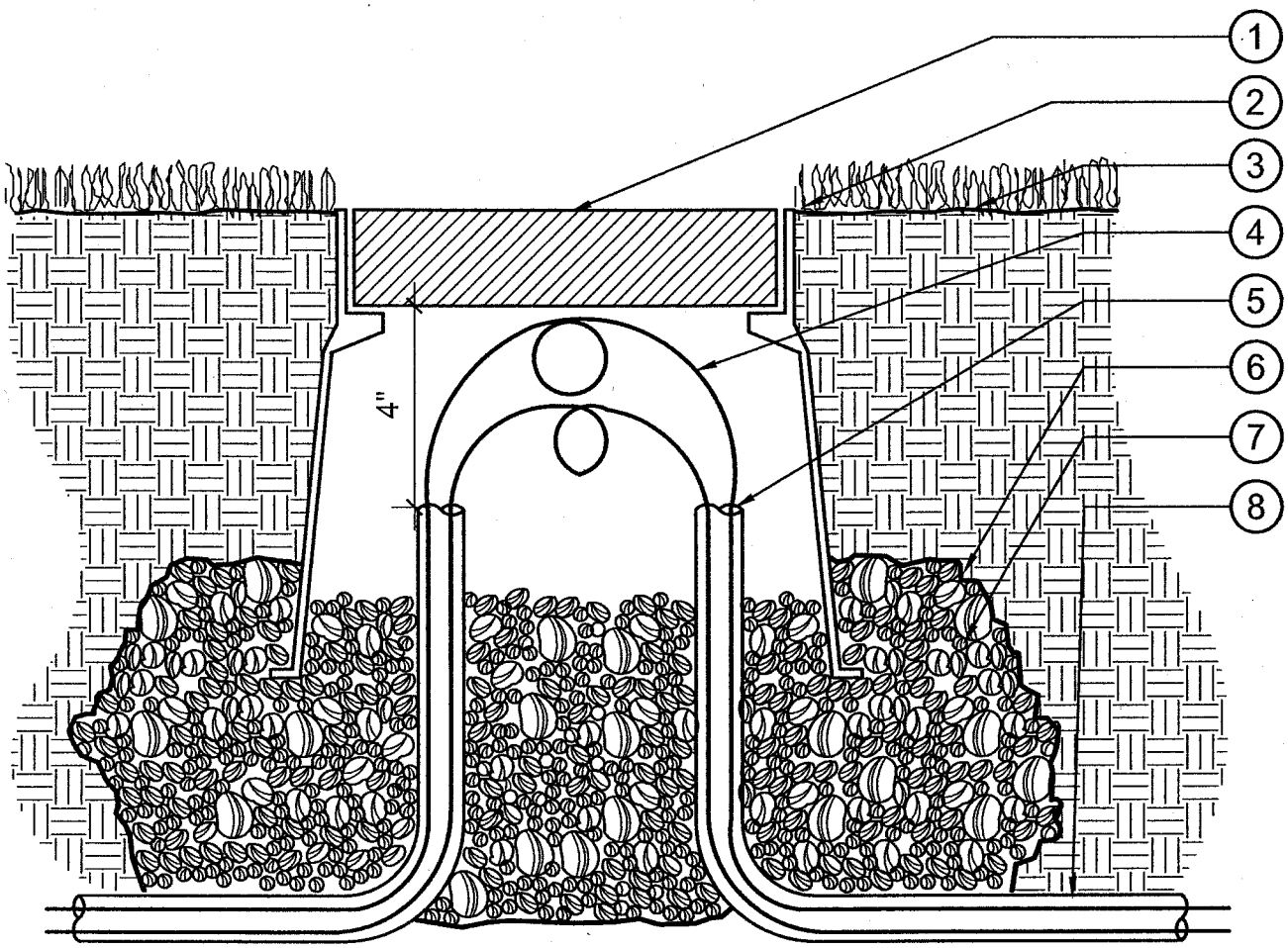
-FILL INNER CASE FILLED WITH SEALER PRIOR TO FINAL ASSEMBLY

-ALL WIRE ROUTED BETWEEN CONTROLLER AND REMOTE CONTROL VALVES SHALL BE A CONTINUOUS RUN WITH NO WIRE SPLICES

-WIRE SPLICES SHALL ONLY OCCUR AT THE REMOTE CONTROL VALVE.

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	LOW VOLTAGE WIRE CONNECTOR		
		APPROVED BY: MPH	
STD. G-021	N.T.S.	REV:	

FILE: G-021_WIRE CONNECTOR.DWG

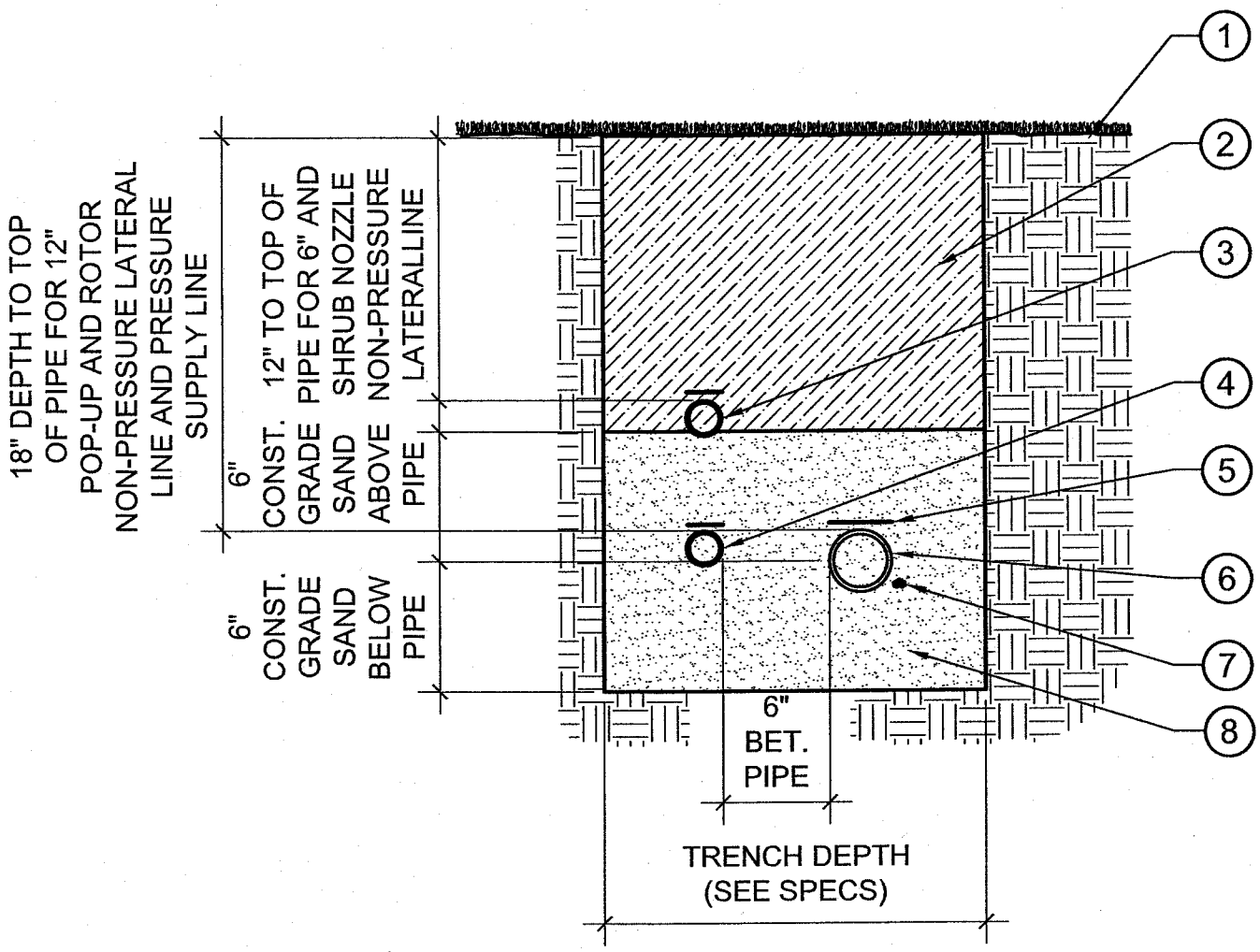


1. 10" PLASTIC BOX W/ LOCKING LID
2. FLUSH IN LAWN AREAS, 2" IN SHRUB AREAS
3. FINISH GRADE
4. FLOW SENSOR AND / OR MASTER VALVE CABLE
5. ADD FOAM TO CONDUIT ONCE WIRE PULL IS COMPLETE (SEE SPECIFICATIONS)
6. INSTALL FILTER FABRIC AROUND GRAVEL SUMP
7. 3/4" GRAVEL SUMP IN, UNDER, AND AROUND VALVE BOX. FILL TO TOP OF VALVE BOX HOLES
8. 1 1/4" COMMUNICATION CONDUIT

NOTE: DO NOT CUT / SPLICE WIRES

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	FLOW SENSOR AND MASTER VALVE CABLE PULL BOX		
	EVERY 100'	APPROVED BY: MPH	
STD. G-022	3"=1'-0"	REV:	

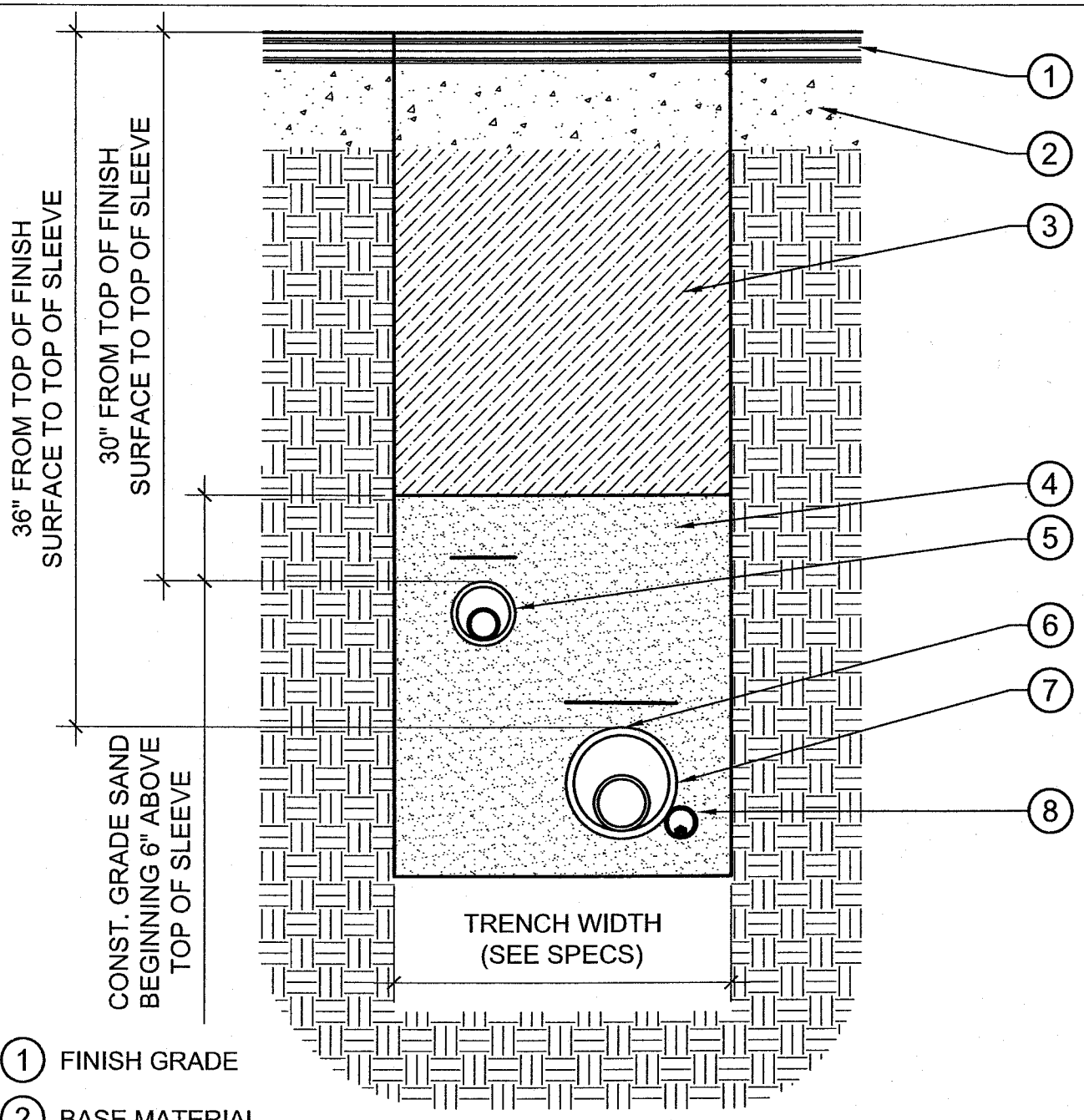
FILE: G-022_PULL BOX.DWG



1. FINISH GRADE
2. BACKFILL (FREE OF DEBRIS AND ROCK GREATER THAN 1", SEE SPECIFICATIONS)
3. NON-PRESSURE LATERAL LINE FROM SIX INCH POP-UP OR HEADS ON RISER
4. NON-PRESSURE LATERAL LINE FROM ROTORS OR 12 INCH POP-UPS
5. DETECTOR WATER METALIC TAPE
6. PRESSURE SUPPLY LINE (SEE PLAN FOR SIZE)
7. CONTROL WIRES DIRECT BURIED ADJACENT TO AND TO THE SIDE OF PRESSURE SUPPLY LINE
8. CONSTRUCTION GRADE SAND ABOVE AND BELOW PRESSURE SUPPLY LINE

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	TRENCH IN LANDSCAPE		
		APPROVED BY: MPH	
STD. G-040	3"=1'-0"	REV:	

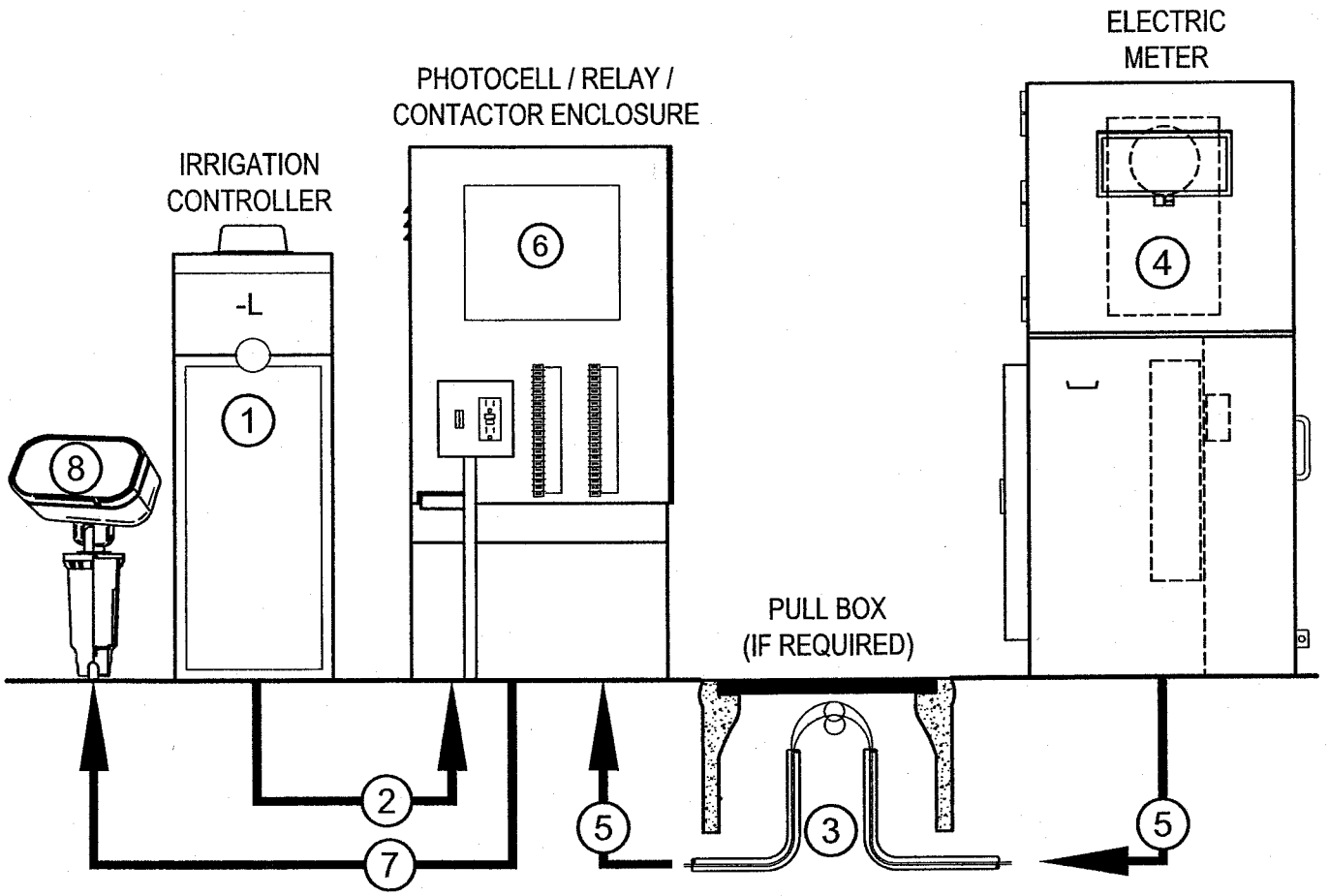
FILE: G-040_TRENCH IN LANDSCAPE.DWG



1. FINISH GRADE
2. BASE MATERIAL
3. BACKFILL MATERIAL (FREE OF DEBRIS AND ROCKS GREATER THAN 1")
4. CONSTRUCTION GRADE SAND BEGINNING 6" ABOVE TOP OF NON-PRESSURE LATERAL SLEEVE
5. NON- PRESSURE LATERAL LINE SLEEVE(SEE SPECIFICATION)
6. DETECTOR WATER METALIC TAPE (SEE SPECIFICATIONS)
7. PRESSURE SUPPLY LINE SLEEVES (SEE SPECIFICATIONS)
8. CONDUIT FOR WIRE (SEE SPECIFICATIONS)

	RIVERSIDE COUNTY TLMA: PLANNING AND TRANSPORTATION DEPARTMENTS		DATE: 02-05-13
	TRENCH IN HARDSCAPE		
	OR AT STREET CROSSING	APPROVED BY: MPH	
STD. G-041	3"=1'-0"	REV:	

FILE: G-041_TRENCH IN HARDSCAPE.dwg



SCHEMATIC VIEW

NOTE: ONLY RUNS OVER 500' MAY BE SPLICED FOR LIGHTING

1. CALSENSE ET2000e CONTROLLER WITH "-L" OPTION (PROVIDES 24VAC TO RELAY)
2. 24 VAC CONNECTION FROM CONTROLLER TO RELAY SWITCH USING:
   (1) #12 SOLID COPPER YELLOW WIRE
   (1) #12 SOLID COPPER WHITE WIRE
   INSTALL PER PLANS IN 3/4" OR 1" PVC SCH. 40 CONDUIT AT 24" DEPTH
3. ELECTRICAL PULL BOX (INSTALL ONLY IF RUN EXCEEDS 200')
4. ELECTRICAL SOURCE / METERED ENCLOSURE WITH 120 / 240 VAC SERVICE
5. CONNECTION FROM ELECTRICAL SOURCE TO ENCLOSURE (USE SEPARATE CIRCUIT)
6. FREESTANDING ENCLOSURE WITH INTERNAL FLUSH MOUNT PHOTOCELL AND LIGHTING RELAY (SEE LANDSCAPE / ELECTRICAL PLANS)
7. CONNECTION FROM RELAY / PHOTO CELL TO LANDSCAPE LIGHTING (SEE LANDSCAPE / ELECTRICAL PLANS)
8. LANDSCAPE LIGHTING (VARIES, SEE LANDSCAPE / ELECTRICAL PLANS)

LMD	COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT		COUNTY OF RIVERSIDE TRANSPORTATION DEPARTMENT
	LIGHTING CIRCUIT		
	CONTROLLED BY CALSENSE	APPROVED BY:	
STD. E-XXX	N.T.S.	REV:	DATE: 02-05-13

FILE: E-XXX_LIGHTING CIRCUIT - CALSENSE.DWG

Appendix I

Environmental Commitments Record

ENVIRONMENTAL COMMITMENT RECORD

Current Date:	5/29/2013
ECR Started:	
CCA Date:	
Working Days:	

EA: 08-925188 Route: Magnolia Avenue
Federal Project Number: CML-5956(193) County: Riverside

Project Description: The County of Riverside, in cooperation with the Department, is proposing to grade separate the existing Magnolia Avenue/ BNSF at-grade railroad crossing in Riverside County, California.

ECR Last Revised: April 2011

ECR Phase		
	PA&ED 95/100%	
	Construction	
	CEC	
	Post-Construction Monitoring	

Environmental Liaison: Marcia Frances Rose (951) 955 1505
Russell Williams (951) 955-2016
Riverside County Transportation Department (RCTD)

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
Traffic and Transportation						
TRAF-1	Prepare and implement a construction staging plan and Traffic Management Plan (TMP). The TMP will be provided to emergency service providers and school officials with construction plans prior to commencement of construction. The following shall be included in the TMP or carried out in coordination with the TMP: a. Implement a construction management program that maintains access to and from the project area community through signage, detours, flagmen, etc.	County	Prior to any grading or construction (prepare) / During any grading or construction (implement)			a. The project plans include Stage Construction and Traffic Handling plans which maintain access through the project area. Section 12-4 of the project specifications provides

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	b. Coordinate with emergency services providers to ensure that alternative response routes to and from the project area community are in place during construction of the proposed project. c. Provide access to all fire hydrants along all access routes and provide and maintain fire department vehicle access roads along project site. d. Consult with local school officials to identify safe vehicular routes and pedestrian crossing for students traveling to and from schools in the project area community during construction of the proposed project. e. Coordinate with the utility providers for relocation of utility lines and inform the utility users in advance about the date and timings of service disruptions. f. Prepare temporary detour plans during the Plans, Specifications, and Estimates (PS&E) phase. g. Provide notification to be sent to emergency service providers, local school officials, and any residents that may be substantially affected by any street closures (including partial and/or full closures) or traffic diversions at least two weeks in advance of the planned closure or diversion.					specifications for maintaining traffic through the workzones. b. Access through the project area will remain open during construction. The county will provide a public outreach campaign (Dennis Green) during construction that will coordinate with local emergency services providers to ensure alternative response routes are available. c. Access through the project area will remain open during construction. The county will provide a public outreach campaign (Dennis Green) during construction that will coordinate with local fire departments to ensure temporary fire hydrant locations are properly identified. d. The county will provide a public outreach campaign (Dennis Green) during construction that will coordinate with local school districts to inform students, parents and faculty of alternative vehicular routes and safe pedestrian crossings. e. Utility coordination is ongoing, plans will be provided to each utility owner at the 95% level to further establish limits of conflict and relocations. Section 5-1.36D of the specifications includes a listing of utility facilities requiring coordination and time periods the contractor must provide the utility company to relocation the facility f. The project plans include Stage Construction and Traffic Handling plans which maintain access through the project area. Detour plans are

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
						not needed. g. The county will provide a public outreach campaign (Dennis Green) during construction that will prepare notifications to appropriate entities as required.

Visual/Aesthetics

VIS-1	A landscape treatment plan will be prepared for the proposed project. The plan will be consistent with both Magnolia Avenue's classification as a "parkway" street in the City of Riverside General Plan (Circulation Element Figure CCM-4) and the identification of the Buchanan Street/ Magnolia Avenue intersection as a western "gateway" into the City of Riverside (Magnolia Avenue Specific Plan 2009).	County and City (during final design)/ Resident Engineer and Contractor (during construction)	Prior to any grading or construction (prepare) / During any grading or construction (implement)			Landscape and Irrigation plans have been included in the project plans. Coordination with both the County and City of Riverside has occurred.

Cultural Resources

CR-1	Further investigations may be needed if unanticipated cultural sites are encountered that cannot be avoided by the proposed project. If buried cultural materials are encountered during construction, it is Department policy that work stop in that area until a qualified archaeologist can evaluate the nature and significance of the find. The archaeologist, Resident Engineer and/or appropriate personnel shall contact the appropriate Native American group(s) (including the Pechanga Tribe) and/or individuals, and assess the significance of such resources, and shall also meet and confer regarding the mitigation for such resources, as appropriate. An additional archaeological survey would be required if changes are made to the proposed project to include areas not previously surveyed.	Archaeologist, Resident Engineer and/or County Personnel as Appropriate	During all ground-disturbing and construction activities			Section 14-2.02 of the project specifications details that work shall be stopped and the Engineer must be notified if archeological resources are discovered on the project site.
CR-2	If human remains are discovered, State	Resident	During all ground-			Section 14-2.02 of the project

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	Health and Safety Code Section 7050.5 states that further disturbances shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to Public Resources code Section 5097.98, remains shall be left in place and free from disturbance until a final decision as to the treatment and disposition has been made; if the remains are thought to be native American, the coroner will notify the Native American Heritage Commission (NAHC) who will then notify the Most Likely Descendant (MLD) within 24 hours. The most likely descendant shall then make recommendations within 48 hours, and engage in consultations concerning the treatment of the remains. At this time, the person who discovered the remains will contact the Department District 8 Environmental Division, Cultural Studies Branch, so that they may work with the MLD on the respectful treatment and disposition of the remains. Further provisions of PRC 5097.98 are to be followed as applicable.	Engineer and Contractor	disturbing and construction activities			specifications details that work shall be stopped and the Engineer must be notified if archeological resources are discovered on the project site.

Water Quality and Stormwater

WR-1	The County will file a Notice of Intent with the State Water Resources Control Board for coverage under the state NPDES for construction-related discharges. The County will prepare a SWPPP that sets forth the Best Management Practices (BMPs) that will be implemented on site. The BMPs will be implemented to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges so as not to cause or contribute to an exceedance of any applicable water quality standard contained in a Statewide Water Quality	County (during final design)/ Resident Engineer and Contractor (during construction)	Prior to construction/ Incorporate BMPs into project during final design and implement BMPs prior to and during all grading and construction activities			Water Pollution Control plans have been prepared during the PS&E phase which will assist the contractor in preparing a SWPPP. The proper permits will be secured prior to construction.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	Control Plan and/or the applicable Santa Ana Regional Water Quality Control Board's (RWQCB) Basin Plan.					
WR-2	Implement Design Pollution Prevention BMPs and post-construction Site Design, Source Control, and Treatment Control BMPs, in compliance with current and anticipated NPDES permit requirements.	County (during final design and post-construction maintenance)/ Resident Engineer and Contractor (during construction)	Incorporate BMPs into project during final design/ Implement and maintain during construction and post-construction			A Water Quality Management Plan has been prepared during the PS&E phase which documents the use of design pollution prevention BMPs.
WR-3	Develop a maintenance schedule for all post-construction BMPs designed to reduce or eliminate pollutants.	County (during final design and post-construction maintenance)/ Resident Engineer and Contractor (during construction)	Incorporate water quality treatment measures into project during final design/ Implement and maintain during construction and post-construction			Coordination of a maintenance schedule for the proposed water quality basin is ongoing with the County of Riverside.
WR-4	In anticipation of new Santa Ana Region NPDES requirements prior to construction of the project, a Water Quality Management Plan (WQMP) or functionally equivalent document will be prepared, and water quality treatment measures identified in the plan, implemented.	County (during final design and post-construction maintenance)/ Resident Engineer and Contractor (during construction)	Incorporate water quality treatment measures into project during final design/ Implement and maintain during construction and post-construction			A Water Quality Management Plan has been prepared during the PS&E phase.

Hazardous Waste/Materials

HAZ-1	Soil proposed for disturbance during construction will be tested for aerially deposited lead (ADL).	County, Resident Engineer, and Contractor	Prior to initiating any onsite construction activities			ADL is not anticipated on this project due to the relatively recent improvements to Magnolia Ave medians. No grading within the railroad right of way is anticipated.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
HAZ-2	Yellow thermoplastic paint materials on the pavement will be tested for lead-based paint (LBP) in accordance with Department guidelines prior to removal.	County, Resident Engineer, and Contractor	Prior to removal of existing pavement			Section 14-11.07 of the project specifications details how to handle yellow thermoplastic paint materials.
HAZ-3	Soil sampling for hazardous materials from the use of weed control, including herbicide and arsenic, will be conducted in the event construction earthwork will involve soil removal from the railroad right-of-way, and for health and safety concerns during earthwork dust control.	County, Resident Engineer, and Contractor	Prior to any grading or construction (prepare) / During any grading or construction (implement)			No grading within the railroad right of way is anticipated. Work within the railroad right of way will be limited to existing pavement and crossing removals.
HAZ-4	Railroad ties designated for reuse or disposal (including previously salvaged railroad ties in the project right-of-way) will be managed or disposed as treated wood waste (TWW) in accordance with Alternative Management Standards provided in Title 22 Section 67386.	County, Resident Engineer, and Contractor	During grading or construction			Work within the railroad right of way will be limited to existing pavement and crossing removals. No railroad ties are anticipated to be removed. Section 14-11.2A of the project specifications details how to handle unanticipated discovery of hazardous substances.
HAZ-5	Structures proposed for acquisition will be evaluated for suspect asbestos-containing materials (ACM) and LBP.	County, Resident Engineer, and Contractor	Prior to removal of any structures			No structures containing asbestos materials are anticipated to be removed. Section 14-11.2A of the project specifications details how to handle unanticipated discovery of hazardous substances.

Air Quality

AQ-1	The proposed project would conform to Department construction requirements, as specified in the Department's Standard Specifications Section 7-1.01F (Air Pollution Control), which states: "The Contractor will comply will all air pollution control ordinances and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances and statutes, specified in Section 11017 of the Government Code."	Resident Engineer and Contractor	During any grading and construction activities			Section 14-9.02 of the project specifications details the Air Pollution Control compliance with Section 11017 of the Government Code.
AQ-2	SCAQMD Rule 403 (Fugitive Dust) requires	Resident	During any			Section 14-9.03 of the project

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	that fugitive dust control measures be applied to all construction projects in the SCAB and SSAB, unless the project is specifically exempted by the rule. Construction projects that are classified as "large operations" (i.e., 20 hectares [50 acres] or larger) are required to submit a fully executed Large Operation Notification Form (Form 403 N) to the Executive Office of the SCAQMD within seven days of qualifying as a large operation and to maintain daily records to document the specific control actions taken. The control measures incorporated in the Rule are available in a Rule 403 Implementation Handbook. The proposed project, although not a large operation under the Rule's definition, would be required to implement mitigation measures for each source of PM10 emissions, as specified in the Rule.	Engineer and Contractor	grading and construction activities			specifications details the Dust Control measures for the project.

Noise

NOI-1	As directed by the Department, the contractor will implement appropriate additional noise mitigation measures, including changing the location of stationary construction equipment, turning off idling equipment, rescheduling construction activity, notifying adjacent residents in advance of construction work, and installing acoustic barriers around stationary construction noise sources. Standard Special Provisions (SSPs) will be edited specifically for this project during the PS&E phase. The content of SSP (S5-310) is provided at the following link: http://pd.dot.ca.gov/env/noise/html/noisesp.htm	Resident Engineer and Contractor	During any grading and construction activities			Section 14-8.02 of the project specifications conforms to the standard specifications referenced.
NOI-2	To minimize this impact, sound control	Resident	During any			Section 14-8.02 of the project

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	should conform to the provisions in Standard Specification "Noise Control" section 14-8.02 and SSP S5-310.	Engineer and Contractor	grading and construction activities			specifications conforms to the standard specifications referenced.
NOI-3	Do not exceed 86dBa at 50 feet from the job site activities from 9 p.m. to 6 a.m. Use an alternative warning method instead of a sound signal unless required by safety laws. Equip an internal combustion engine with the manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.	Resident Engineer and Contractor	During any grading and construction activities			Section 14-8.02 of the project specifications includes these restrictions.
NOI-4	Do not operate construction equipment or run the equipment engines from 7:00 p.m.to 7:00 a.m. or on Sundays except you may operate equipment within the project limits during these hours to: Service traffic control facilities Service construction equipment	Resident Engineer and Contractor	During any grading and construction activities			Section 14-8.02 of the project specifications includes these restrictions.
NOI-5	**Noise Monitoring** Provide one Type 1 sound level meter and 1 acoustic calibrator to be used by the Department until Contract acceptance. Provide training by a person trained in noise monitoring to 1 Department employee designated by the Engineer. The sound level meter must be calibrated and certified by the manufacturer or other independent acoustical laboratory before delivery to the Department. Provide annual recalibration by the manufacturer or other independent acoustical laboratory. The sound level meter must be capable of taking measurements using the A-weighting network and the slow response settings. The measurement microphone must be fitted with a windscreen. The Department returns the equipment to you at Contract acceptance.	Resident Engineer and Contractor	During any grading and construction activities			Section 14-8.02 of the project specifications includes these requirements.
NOI-6	The contract lump sum price paid for noise monitoring includes the full compensation for furnishing all labor, materials, tools, equipment and incidentals and for doing all	Resident Engineer and Contractor	During any grading and construction activities			A lump sum pay item has been included in the project estimate. Item 148005.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	work involved in noise monitoring.					

Biological Environment

BIO-1	**Preconstruction Nesting Bird Survey.** If Project-related site disturbances are scheduled to occur during the core bird nesting period (February 15 through August 31), a qualified biologist will perform a preconstruction nesting bird survey. Such disturbance includes clearing, grubbing, vegetation removal or trimming, grading, or sustained use of loud equipment. The survey may be conducted in phases to match construction but all potentially relevant portions of the limits of disturbance and a 200-foot buffer as accessible, will be completely surveyed within seven days prior to initial project-related disturbance for the surveyed location. If any native birds are actively nesting on or within 200 feet (as determined by available legal access) of the limits of disturbance, a 200-foot buffer will be marked (e.g., flagged around the nest), and no project activities within the buffer will occur until it has been determined that the nest is no longer active. Active nesting includes nest construction, the presence of nests determined to most likely contain eggs or young, and nest-site dependent young. Evidence need not be direct and the biologist shall not cause substantial risk of nest failure as part of the survey effort. The survey biologist will maintain an active and complete survey log of conditions, actions, conclusions, limitations, and results, including detected bird nesting (date, location, species, and evidence).	County	Within 7 days prior to the commencement of construction			Section 14-6.03 of the project specifications includes requirements regarding bird protection. The new Caltrans specs specify a 100' radius.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	Within 45 days of the end of the survey work the biologist will provide a summary memorandum and complete copy of the log to the Department, CDFG, and USFWS.					
BIO-2	**Avoid and Minimize Introduction and Spread of Invasive Species.** Landscaping and erosion control and any other use of plants included in the project will not use species listed as noxious weeds in either the state noxious weed list or the current list(s) from the California Invasive Plant Council (Cal-IPC 2006, 2007 at this time).	County and City (during final design and post-construction maintenance)/ Resident Engineer and Contractor (post-construction installation)	Incorporate recommendations during final design (confirm) / Following construction (implement and maintain)			Landscape and Irrigation plans have been included in the project plans. Coordination with both the County and City of Riverside has occurred regarding the plant palette.
BIO-3	**Standard Best Management Practices.** Applicable Best Management Practices from the Western Riverside County MSHCP Volume I, Appendix C (Section 7.2) will be implemented. These include, but are not necessarily limited to: • Water pollution and erosion control plans shall be developed and implemented in accordance with Regional Water Quality Control Board (RWQCB) requirements. • The area of disturbance shall be minimized to the maximum extent feasible. Access to sites shall be via pre-existing access routes to the greatest extent possible. • Equipment storage, fueling, and staging areas shall be located on upland sites with minimal risks of direct drainage into riparian areas or other sensitive habitats. These designated areas shall be located in such a manner as to prevent any runoff	County, Resident Engineer and Contractor	Prior to ground disturbance / throughout construction			Water Pollution Control plans and a Water Quality Management Plan have been prepared during the PS&E phase which will assist the contractor in preparing a SWPPP. These documents are all consistent with the current BMP guidelines for the County.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	from entering sensitive habitat. Necessary precautions shall be taken to prevent the release of cement or other toxic substances into surface waters. Project related spills of hazardous materials shall be reported to appropriate entities including but not limited to applicable jurisdictional city, USFWS, CDFG, and/or RWQCB and shall be cleaned up immediately and contaminated soils removed to approved disposal areas. • Exotic species that prey upon or displace target species of concern should be permanently removed from the site to the extent feasible. • To avoid attracting wildlife to the project site, the construction site shall be kept as clean of debris as possible. All food related trash items shall be enclosed in sealed containers and regularly removed. • Construction employees shall strictly limit their activities, vehicles, equipment, and construction materials to the proposed project footprint and designated staging areas and routes of travel. The construction area(s) shall be the minimal area necessary to complete the project and shall be specified in the construction plans. Employees shall be instructed that their activities are restricted to the construction areas.					
BIO-4	**Avoid and Minimize Impacts Specifically to Water Features.** Temporary placement of fill (e.g., construction equipment and construction falsework) into jurisdictional water features, specifically Arlington Channel and La Sierra Channel, is anticipated. The following measures will be	County, Resident Engineer and Contractor	Prior to ground disturbance / throughout construction and post-construction			Section 13 of the project specifications and the permit issued by the RWQCB and RCFC&WCD will place restrictions on the contractors' ability to work within the Arlington and La Sierra Channels.

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	implemented: • Education: All site personnel will be required to discard no solid or liquid materials into jurisdictional water features, no matter how small in extent or seemingly harmless. Only solid or liquid materials, including equipment, tools, supplies, fuel, or falsework, shall be placed into water features as necessary for the project and then only in a manner that is safe and legal, to remove such materials as soon as feasible, to inspect all such materials before and after placement to ensure no leakage or loss, and to inspect the site each workday at the start and end to ensure no leakage or changed condition has occurred and that no unnecessary materials have been left within or where they may readily enter jurisdictional waters. If any leakage or equipment loss occurs that cannot be quickly and completely removed or retrieved, every site worker is responsible to ensure that the event is fully addressed and reported to relevant authorities quickly and as needed. • Temporary placement of materials and personnel in jurisdictional waters shall be done in a manner for, and due consideration of, safety and minimization of impacts regarding time of year and potential for loss due to water flows or windy conditions. For example, materials will not be left loose in channels but removed as quickly and completely as feasible or secured so that unexpected flows or winds cannot carry them away from the site or cause them to leak or burst.					

NO.	DESCRIPTION OF COMMITMENT	RESPONSIBLE PARTY/MONITOR	TIMING/PHASE	TASK COMPLETED (Sign and Date)	COMMITMENT SOURCE	COMMENTS
	• Project personnel shall ensure that conditions subsequent to work in Arlington Channel shall be at least equivalent to those prior to the work with respect to project effects. The project will result in no net, adverse effect to hydrology (including occurrence, duration, volumes, flow rates and temporal patterns), water quality (including chemistry, pollutants, temperatures, and shading), or biological functions (including habitat value, water source function, and connective functions). This will be assured through adequate documentation of prior and post-project conditions and, when potentially needed, proactive consultation with relevant resource agencies and/or qualified resource professionals prior to commitment to actions and effects at issue. • It is anticipated that permits will be required for impacts to jurisdictional water features. All project work must comply with relevant permit requirements and associated laws and regulations affording protections to water features and their functions and values.					

PERMITS AND AGREEMENTS

AGENCY	Type	Issue Date	Expiration Date
California Regional Water Quality Control Board – Santa Ana Region	Clean Water Act Section 401 and Porter-Cologne Water Quality Control Act — Water Quality certification Prior to construction, the County will submit application for 401 water quality certification to the RWQCB. Project will comply with NPDES Permit and Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the incorporated cites of Riverside County within the Santa Ana Region (Order No. R8-2010-0033, NPDES No. CAS618033).		
State Water Resources Control Board	Clean Water Act Section 402—National Pollutant Discharge Elimination System (NPDES) Prior to issuance of any grading permits, the County will prepare a Stormwater Pollution Prevention Plan (SWPPP) and provide proof that a Notice of Construction was filed with the State Water Resources Control Board (SWRCB) for coverage under the state NPDES for construction-related discharges. This evidence will consist of a Waste Discharge Identification Number (WDID) issued by the SWRCB. Project will comply with NPDES General Permit, Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activities (Order No. 2009-0009-DWQ, NPDES No. CAS000002) and NPDES Permit and Waste Discharge Requirements for the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the incorporated cites of Riverside County within the Santa Ana Region (Order No. R8-2010-0033, NPDES No. CAS618033).		
U.S. Army Corps of Engineers	Clean Water Act Section 404— Nationwide Permit 14 concurrence Prior to construction, the County will submit a preconstruction notification package to ACOE for NWP 14 concurrence.		
California Department of Fish and Game	Fish and Game Code Section 1602—Streambed Alteration Agreement Prior to construction, the County will provide Notification of Lake or Streambed Alteration to CDFG for approval.		
Riverside County Flood Control and Water Conservation District	Encroachment Permit Prior to construction, the County will submit Encroachment Permit information to the Flood Control District for approval.		

Appendix J

County of Riverside

Electrical Systems Specifications

Table of Contents

86 ELECTRICAL SYSTEMS

Add following to Section 86-1 General

SIGNAL AND HIGHWAY LIGHTING SYSTEM

A. General

Furnishing and installing traffic signal and highway lighting systems, and payment shall conform to the provisions in Section 86, "Electrical Systems", of the latest edition Standard Specifications, amendments to the Standard Specifications, and these Special Provisions.

B. Start of Work

Location where signalization and highway lighting work is to be performed:

	Location	Area
1.	Magnolia Ave at Lincoln St Intersection	County of Riverside
2.	Magnolia Ave	County of Riverside
3.	Frontage Road	County of Riverside
4.		

C. Equipment Orders

The Contractor shall furnish all equipments and materials specified in the plans and these special provisions that are not furnished by the County. All equipment shall be new and purchased by the Contractor for this project only.

The Contractor shall furnish the Engineer written statements from vendors stating that they have accepted the order for the said equipment within twenty-one (21) calendar days of the date that the County of Riverside Board of Supervisors awarded this contract. Delay in equipment delivering shall not be considered as justification for the suspension of the construction contract.

Liquidated Damages:

In addition to the liquidated damages set forth elsewhere in these contract documents, the Contractor shall pay to the County of Riverside the sum of $800 same as project LD per day for each and every calendar day delay in receiving all of the below listed equipment, onto the job site or the contractors storage facility, and available for installation, within one hundred (100) calendar days of the contract award:

1. Traffic Signal Controller Assemblies
2. Service Equipment Enclosures
3. Traffic Signal and Pedestrian Signal heads
4. LED Modules
5. Edge Lit LED Internally Illuminated Street Name Signs and mounting brackets

D. Equipment List and Drawings

Equipment list and drawings shall conform to the provisions in Section 86-1.04, "Equipment List and Drawings", of the Standard Specifications and these Special Provisions.

The Contractor shall furnish four complete cabinet wiring diagrams for each furnished controller assembly, battery backup system, video detection system, and emergency vehicle preemption system. The cabinet wiring diagram shall include an approximately 6 inches x 8 inches or larger schematic drawing of the project intersection on a separate 8 ½" x 11" sheet of paper, which shall include the following information, at a minimum:

1. North arrow
2. Street names
3. Pavement delineation and markings
4. Signal poles
5. Traffic signal heads with phase designations
6. Pedestrian signal heads with phase designations
7. Loop detectors with input file designations

E. Warranties, Guaranties, Instruction Sheets, and Manuals

Warranties, guaranties and instruction sheets shall conform to these Special Provisions.

1. LED modules shall have five (5) years of manufacturer warranty.

2. Battery Backup System (BBS) shall have five (5) years of manufacturer warranty. The first three (3) years shall be termed the "Advanced Replacement Program". Under this program, the manufacturer will send out a replacement within two business days of the call notifying them of an issue. The replacement unit may be either a new unit or a re-manufactured unit that is up to the latest revision. The last two years of the warranty will be factory-repair warranty for parts and labor on the BBS.

3. Video Detection System shall have three (3) years of manufacturer warranty. During the warranty period, technical support from factory-certified personnel or factory-certified installers shall be available via telephone within four (4) hours of the time when a service call is made.

4. Edge Lit LED internally illuminated street name sign shall have two (2) year of manufacturer warranty.

5. All other equipment and systems shall have at least one (1) year of manufacturer warranty.

Furnish the manufacturer's standard written warranty pertaining to defects in materials and workmanship for all equipment, and two (2) sets of user, operation, and maintenance manuals, written in English, on all equipments and components for the traffic signal and highway lighting system to the Engineer.

F. Maintaining Existing and Temporary Electrical Systems

Maintaining existing and temporary electrical systems shall conform to the provisions in Section 86-1.06 "Maintaining Existing and Temporary Electrical Systems", of the Standard Specifications and these Special Provisions.

Authorization and coordination from the Engineer is required for each traffic signal system shutdown. Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 A.M. and 3:00 P.M.

The Contractor may request authorization from the Engineer to use temporary overhead conductors for temporary traffic signal operation.

Equip existing flashing beacons with portable flashing beacons during flashing beacon shutdown. Portable flashing beacons shall conform to the provisions in Section 12-3.05, "Portable Flashing Beacons" of the Standard Specifications or as directed by the Engineer.

If directed by the Engineer, a generator shall be furnished, connected, and maintained to keep traffic signal or flashing beacon system running in normal operation. All matters pertaining to the operation of existing traffic signal equipment shall be coordinated and cooperated with Riverside County's traffic signal operation division.

Temporary "Stop" signs furnished and installed shall be 48 inches in size.

Temporary "Stop Ahead" signs furnished and installed shall be equipped with portable flashing beacons. The traffic signal maintenance staff are:

Delaney Davezan or Brent Trimmer
Riverside County Transportation Department
Telephone (951) 955-6894

G. Remove, Reinstalling or Salvaging Electrical Equipment

Removing, reinstalling or salvaging shall conform to provisions in Section 86-7 "Removing, Reinstalling or Salvaging Electrical Equipment", of the Standard Specifications. Contractor shall remove and salvage County's installed Queue-Cutter Traffic Signal and equipment as directed by Engineer. Salvaged Traffic Signal and Equipment shall be delivered to Traffic Signal shop located at Washington Street, Riverside.

H. Foundations

Foundations shall conform to the provisions in Section 51, "Concrete Structures", and Section 86-2.03, "Foundations", of the Standard Specifications and these Special Provisions. Contractor shall remove and salvage County's installed Queue-Cutter traffic signal and equipments as directed by Engineer. Salvaged traffic signal and equipments shall be delivered to traffic signal shops located at Washington Street in Riverside.

Portland cement concrete shall conform to Section 90-2, "Minor Concrete", of the Standard Specifications and shall be Class 3 except pole foundations shall be Class 2.

Construct Type 332 controller cabinet foundation per Standard Plans ES-3C.

Vibrate all foundation concrete to eliminate air pockets.

I. Standards, Poles, Steel Pedestals and Posts

Standards, poles, steel pedestals, and posts shall conform to the provisions in Section 86-2.04, "Standards, Poles, Steel Pedestals and Posts", of the Standard Specifications and these Special Provisions.

Type 1A pole material shall be spun aluminum unless otherwise specified.

Poles installed at the near-right approach of each intersection shall be banded conforming to the strap and saddle method per Standard Plans RS4 for the emergency installation of stop signs.

Signal mast arms shall be installed in accordance with the "Signal Arm Connection Details" of the Standard Plans unless otherwise specified.

Internally Illuminated Street Name Sign (IISNS) mast arm shall be 10-foot long galvanized steel pole in accordance with County Standard No. 1200. The IISNS mast arm shall be constructed to prevent deformation or failure when subjected to 100 mph wind loads while carrying a 10' long and 2' height Edge-Lit LED IISNS.

If required by the serving electric utility, and confirmed by the Engineer, State Certified Electric Workers shall be utilized for the installation of standards, steel pedestals, and posts in accordance with State of California High Voltage Safety Orders.

J. Conduits

Conduit shall conform to the provisions in Section 86-2.05, "Conduit", of the Standard Specifications and these Special Provisions.

Conduits shall be Type 3, Schedule 80 Polyvinyl Chloride (PVC) conforming to UL Publication 651 requirements for Rigid Non-Metallic Conduit, for underground installation only.

Conduit depth shall not exceed 60 inches below finish grade.

Conduit size shall be 2 inches minimum unless otherwise specified. New conduit shall not pass through foundations or standards.

Conduit bends shall be factory bends. Bend radius for signal interconnect conduits shall be 3 feet minimum.

A pull rope and a bare #12 AWG wire shall be installed in conduits intended for future use.

Bell bushings are required for all conduit ends. The ends of conduits terminating in pull boxes and controller cabinets shall be sealed with sealing compound approved by the Engineer after conductors have been installed.

Conduits shall be installed via jacking or drilling method per Section86-2.05C, "Installation", of the Standard Specifications.

Trenching Installation

The Engineer shall approve trenching installation on a case-by-case basis where conduit cannot be installed by jacking or drilling. Jacking or Drilling shall be attempted a minimum of three times prior to requesting trenching installation.

If ordered by the Engineer, all pavements shall be cut to a depth of 3 inches with an abrasive type saw or with a rock cutting excavator specifically designed for this purpose. Cuts shall be neat and true with no shatter surface outside the removal area.

Trench shall be 2 inches wider than the outside diameter of the conduit being installed however not exceeding 6 inches in total width. The conduit shall be placed in the bottom of the trench. Conduit

depth shall be at a minimum of 30 inches below finished grade, with a minimum of 26 inches cover over the conduit.

The trench shall be backfilled with two-sack slurry to the finish grade before final paving. Prior to final paving, grind pavement centered along the length of the trench a minimum width of 3 feet and depth of 0.10 feet, and excavate backfilled to a depth of 0.30 feet below the final pavement surface. Final paving with commercial Type A ½" PG64-10 asphalt concrete.

If directed by the Engineer, the two-sack slurry backfill can be installed to a depth of 0.30 feet below the final pavement surface and cured for a minimum of two days prior to final paving if the trench area is not open to traffic.

K. Pull Boxes

Pull boxes shall conform to the provisions in Section 86-2.06, "Pull Boxes", of the Standard Specifications and these Special Provisions.

Traffic pull boxes shall conform to the provisions in Section 86-2.06, "Traffic Pull Boxes", of the Standard Specifications and these Special Provisions.

Pull boxes shall have a "Fibrelyte" or equivalent cover and bolt down design. Cover shall have a non-skid surface.

Pull box covers shall be marked in accordance with Standard Plans ES-8 without the word "CALTRANS" unless the project is on State of California right of way.

Pull boxes shall be placed with their tops flush with surrounding finish grade or as directed by the Engineer.

Pull boxes shall be installed behind the curb or as shown on the plans and shall be spaced at no more than 500 feet intervals. The Engineer shall determine the exact locations.

Pull boxes installed in unimproved areas, locations not protected by concrete curb and gutter, shall be traffic pull box and marked with Type L markers.

L. Conductors, Cables and Wiring

Conductors and Cables shall conform to the provisions in Section 86-2.08, "Conductors and Cables", of the Standard Specifications and these Special Provisions.

Wiring shall conform to the provisions in Section 86-2.09, "Wiring", of the Standard Specifications and these Special Provisions.

Specific cabling and wiring requirements for various systems or components shall be in accordance with the Special Provisions entitled to each herein.

Signal cable shall be installed continuously without splicing from the controller cabinet to each traffic signal pole. Traffic signal conductors, multiple circuit conductors, and signal cable conductors shall not be spliced unless otherwise shown

All outer cable jacket for 12 conductor cable shall be removed from the traffic signal standard hand hole to the terminal block located at the side mount traffic signal head.

Where splice is required, Type C or Type T splice shall be used and insulated as shown in the Standard Plans, ES-13A.

Where splice is required, "Liquid Electrical Tape" or equivalent in black color shall be used to provide a watertight electrical insulating coating with "Method B" as shown in the Standard Plans, ES-13A.

Minimum luminaire wiring shall be No. 10 AWG, including wiring within poles and mast arms.

M. Signal Interconnect Cable

Signal Interconnect Cable shall conform to the provisions in Section 86-2.08E, "Signal Interconnect Cable (SIC)" of the Standard Specifications and these special provisions.

SIC shall be 6-pair, No. 20 AWG cable unless specified otherwise.

Submit a sample of the proposed SIC to the Engineer for approval prior to installation.

SIC shall be pulled without splices in between traffic signal controller cabinets. Provide 6 feet of slack in each pull box, 20 feet of slack inside the pull box adjacent to the controller cabinet, and 3 feet of slack inside the controller cabinet.

Solder each end of SIC conductor to a terminal lug using the hot iron method and connect them to the terminal block inside the controller cabinet in the following order:

Terminal Block Number	SIC Conductor Color Coding (County)		SIC Conductor Color Coding (Caltrans)	
1	White	(White / Blue pair)	White	(Black / White pair)
2	Blue	(White / Blue pair)	Black	(Black / White pair)
3	White	(White / Orange pair)	Red	(Black / Red pair)
4	Orange	(White / Orange pair)	Black	(Black / Red pair)
5	White	(White / Green pair)	Brown	(Black / Brown pair)
6	Green	(White / Green pair)	Black	(Black / Brown pair)
7	White	(White / Brown pair)	Blue	(Black / Blue pair)
8	Brown	(White / Brown pair)	Black	(Black / Blue pair)
9	White	(White / Slate pair)	Green	(Black / Green pair)
10	Slate	(White / Slate pair)	Black	(Black / Green pair)
11	Red	(Red / Blue pair)	Yellow	(Black / Yellow pair)
12	Blue	(Red / Blue pair)	Black	(Black / Yellow pair)

N. Bonding and Grounding

Bonding and grounding shall conform to the provisions in Section 86-2.10, "Bonding and Grounding", of the Standard Specifications and these Special Provisions.