Santa Maria Reservoir Siphon & Canal System Rehabilitation

RIO GRANDE BASIN ROUNDTABLE

Water Supply Reserve Account

Grant Application

January 8, 2013

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

SANTA MARIA RESERVOIR SIPHON & CANAL SYSTEM REHABILITATION

Name of Water Activity/Project

SANTA MARIA RESERVOIR COMPANY

Name of Applicant

RIO GRANDE BASIN ROUNDTABLE

Approving Basin Roundtable(s)
(If multiple basins specify amounts in parentheses.)

Amount from Statewide Account:	$440,750.00
Amount from Basin Account(s):	23,000.00
Total WSRA Funds Requested:	463,750.00

Application Content

Required Exhibits

A. Statement of Work, Budget, and Schedule
B. Technical Specifications – Canal and Siphon Stabilization - Maps
C. Photos – Letters of Recommendation

Appendices – Reference Material

1. Program Information
2. Insurance Requirements
3. WSRA Standard Contract Information (Required for Projects Over $100,000)
4. W-9 Form (Required for All Projects Prior to Contracting)

Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable **AND** the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf

The application, statement of work, budget, and schedule **must be submitted in electronic format** (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

If you have questions or need additional assistance, please contact Greg Johnson at: 303-866-3441 x3249 or gregory.johnson@state.co.us.

Water Supply Reserve Account – Application Form
Revised December 2011

Part I. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): **Santa Maria Reservoir Company**

Mailing address: P.O. Box 288
Monte Vista, CO 81144

Taxpayer ID#: 84-0418055

Primary Contact: Jay Yeager Position/Title: Manager

Email: rgcjey@gmail.com

Phone Numbers: Cell: 719-850-1111 Office: 719-852-3556

Alternate Contact: Connie Pleasant Position/Title: Admin. Assistant/Sec.

Email: pleasant@gojade.org

Phone Numbers: Cell: Office: 719-852-3556

2. Eligible entities for WSRA funds include the following. What type of entity is the Applicant?

[ ] Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.

[x] Public (Districts) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and water activity enterprises.

[ ] Private Incorporated – mutual ditch companies, homeowners associations, corporations.

[ ] Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.

[ ] Non-governmental organizations – broadly defined as any organization that is not part of the government.

3. Provide a brief description of your organization

Santa Maria Reservoir Company (SMRC) is an eligible applicant under Senate Bill 06-179. It was incorporated in 1931, "to safeguard and protect the rights of all water users and consumers of water in what is commonly known as The Continental Reservoir (Continental), located in Hinsdale County, Colorado, and storing water for use in connection with The Rio Grande Canal and the Monte Vista Canal, supplying water for irrigation in the Counties of Rio Grande, Saguache, Conejos and Alamosa, in the State of Colorado, all in Water District numbers 20, 21,22, 26, and 27 in Irrigation Division No. 3 of the State of Colorado;" and "For the purpose of acquiring title, holding, maintaining and operating the Santa Maria Reservoir, the storage of water therein, the distribution of water therefrom, together with all extensions thereof or thereto, the inlet works, outlet works, settling ponds and maintaining the same…"

Santa Maria Reservoir (Santa Maria) is located in the crater of an old volcano. The reservoir was constructed in 1910 and is operated in conjunction with Continental. Santa Maria receives regulated discharges from Continental Reservoir through a century-old conveyance system (the System) of a pipeline, a siphon and an open ditch (See Attachment A).

Ninety percent of the water managed by SMR goes through the Rio Grande Canal, serving some of the best water rights in the San Luis Valley. The remaining 10% goes through the Monte Vista Canal.

SMR has 5,400 shares of outstanding stock, mostly split in groups of 10 shares, with 225 stockholders. A total of 70,000 acres are irrigated by this two-reservoir system.

4. If the Contracting Entity is different then the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.

5. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A link to this standard contract is included in Appendix 3. Please review this contract and check the appropriate box.

[X] The Applicant will be able to contract with the CWCB using the Standard Contract

[ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

6. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant. **None apply**

Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

	Nonconsumptive (Environmental or Recreational)
X	Agricultural
	Municipal/Industrial
	Needs Assessment
	Education
	Other Explain:

2. If you feel this project addresses multiple purposes please explain.

- **Implementing 1st phase of a multi-phase project by upgrading the conveyance system, with ultimate objective to remove State-imposed storage restrictions on Continental Reservoir**
- **Restoring full operating efficiency to the conveyance system between Continental and Santa Maria reservoirs, thereby managing irrigation water more effectively**
- **Improving control of current and future Rio Grande Compact water**
- **Preventing further deterioration of water-control assets and reducing maintenance needs**
- **Improving flood control capability and providing flexibility in responding to drought**
- **Upgrading conveyance system to handle increased storage of depletion water**
- **Maximizing total capacity of ditch and pipeline when water is available for storage**
- **Increasing options to serve third party water storage needs**
- **Maintaining favorable wildlife habitat conditions.**
- **Continue to provide public and private recreational opportunities.**

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

	Study	X	Implementation

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed, Consumptive or Nonconsumptive (acre-feet)
	Existing Storage Preserved or Enhanced (acre-feet)
	Length of Stream Restored or Protected (linear feet)
690' pipe 7,200'canal	Length of Pipe/Canal Built or Improved (linear feet)
	Efficiency Savings (acre-feet/year OR dollars/year – **circle one**)
	Area of Restored or Preserved Habitat (acres)
	Other -- Explain:

4. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude: 37,845139 Longitude: 107,147641

5. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

(next page)

The objective of the Santa Maria Reservoir Siphon & Canal System Rehabilitation Project (this Project) is to improve the capability of SMRC to continue providing irrigation water to shareholders. This will be accomplished by rehabilitating and making critical repairs to the Santa Maria Siphon and the Santa Maria Canal, which constitute the main structural elements of the conveyance system between Continental Reservoir and Santa Maria Reservoir. The goals of this Project are to mitigate current water-management inefficiencies, reduce high maintenance, and prevent continued deterioration and potential failure of this delivery system.

This Project constitutes the first phase of SMRC's multi-phase Santa Maria Rehabilitation Initiative (referred to here as the SMRC Rehab Initiative), implementing recommendations made in recently completed studies by URS Corporation (URS). This Project and all future phases of the SMRC Rehab Initiative have the eventual objective of lifting the State-imposed storage limitation at Continental Reservoir and mitigating or eliminating the many problems created by the deterioration of a century-old system which will otherwise soon reach the end of its useful life.

WSRA grant funding requested represents 25% of total project cost, with the remaining costs funded through a CWCB Water Projects Loan and matching funds from SMRC. All funds will be used to rehabilitate and reinforce the existing supports of the siphon and to improve the flow hydraulics of the conveyance system by upgrading and improving the canal. The preferred alternative for the canal requires removing the existing drop structures and upgrading and adding to the canal's concrete lining, thus enabling the system to convey additional flow when available.

This Project, the first phase of the SMRC Rehab Initiative, will improve and increase the capacity of the conveyance system between Continental Reservoir and Santa Maria Reservoir and put in place the critical elements required to proceed with future improvements at Continental Reservoir. By implementing the preferred alternatives in the URS Studies, this Project will accomplish multiple consumptive and nonconsumptive purposes; greatly improve SMR's ability to meet the agricultural needs of irrigators in 70,000 acres of the San Luis Valley; and improve the efficient management of Colorado's Rio Grande Compact water.

Part III. – Threshold and Evaluation Criteria

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

   a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

This water activity is consistent with Section 37-75-102 because it implements the recommendations of previous studies relating to the deterioration of existing structural elements in the conveyance system between two existing reservoirs. This project does not supersede, abrogate, or otherwise impair Colorado's current system of allocating water, nor does it in any way pertain to or affect Colorado's water rights adjudication system, nor does it restrict the ability of any holder of a water right to use or dispose of that water right in any manner permitted under Colorado law. This project in no way diminishes, impairs, or causes injury to any property or contractual right and it actually protects and enhances the value of water rights held by stockholders of the Santa Maria Reservoir Company by improving and preserving the physical structures which are critical elements of their water storage and distribution system.

   b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

This is affirmed in the cover letter from the Chairman of the Rio Grande Basin Roundtable.

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments.

This water activity meets the provisions of Section 37-75-104(2) because it directly addresses issues of sustainability, which are of the highest priority to the Rio Grande Basin Roundtable. As the first Phase of the SMRC Rehab Initiative, this Project supports an important goal of the Statewide Water Supply Initiative (SWSI) which is to increase the ability for this basin to meet current and future consumptive and nonconsumptive needs. This Project is the first step to eventually removing the State-imposed storage limits of Continental reservoir. By upgrading the conveyance system between Continental and Santa Maria reservoirs, this Project helps to meet the Rio Grande Basin's increasing demands for water currently and for decades into the future.

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

d) Matching Requirement: For requests from the **Statewide Fund**, the applicants is required to demonstrate a **20 percent** (or greater) match of the request from the Statewide Account. Statewide requests must also include a minimum match of **5 percent** of the total grant amount from Basin Funds. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the application was submitted to the CWCB. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in **Exhibit A** of this application)

Total Project Cost	$1,855,000	
WSRA Request (Total)	$ 463,750	25% of the overall project
WSRA (basin)	$ 23,000	5% basin match to statewide request
WSRA (statewide)	$ 440,750	
CWCB Loan Request	$1,391,250	75% of the total project cost
CWCB Loan w/ 1% service fee	$1,405,163	

SMRC MATCHING AMOUNT **$139,125**

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

Evaluation Criteria – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the Statewide Account. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

Tier 1: Promoting Collaboration/Cooperation and Meeting Water Management Goals and Identified Water Needs

a. The water activity addresses multiple needs or issues, including consumptive and/or non-consumptive needs, or the needs and issues of multiple interests or multiple basins. This can be demonstrated by obtaining letters of support from other basin roundtables (in addition to an approval letter from the sponsoring basin).

Consumptive & Nonconsumptive Needs: As the Rio Grande Basin's confined and unconfined aquifers fall to the lowest levels on record, and as drought conditions worsen, this Project takes the first step in restoring full capacity to the conveyance system between two major reservoirs. By implementing the recommendations of previous studies, this Project promotes the sustainability priorities of the Rio Grande Basin Roundtable, supports the storage needs of subdivisions as they come online, and extends the useful life of SMRC's conveyance system from the Diversion Gate through the Open Ditch to Santa Maria Reservoir -- for perhaps another century.

Multiple Interests: This Phase I implementation project is of high value to many stakeholders vested in the continued reliable delivery of water through the Rio Grande Canal and the Monte Vista Canal. This includes irrigators in a 70,000-acre agricultural area as well as local governments in three counties. Letters of support demonstrate the high level of consumptive and nonconsumptive value of this project and the importance of its successful completion.

Many diverse interests of the Rio Grande Basin and of Colorado are served by the Continental and Santa Maria reservoirs. This Project's purpose is to upgrade and make critical repairs to the conveyance system connecting these two reservoirs. Continental Reservoir has been used primarily to store irrigation water for agricultural producers spread throughout five counties of the San Luis Valley of Colorado. Continental also stores CDOW water, Rio Grande Compact water, San Luis Valley Water Conservancy District water, and water for Subdistrict #1.

Continental also provides storage for other entities as needed. For example, CDOW is currently using the Rio Grande Reservoir to assist in reaching its water use goals and objectives. Through this Project, SMRC will enhance its ability to further assist the CDOW in achieving these goals. The CDOW has water rights to 3 Transmountain diversions. As the SMRC Rehab Initiative continues, the CDOW, by mutual agreement, will be able to store enough water in Santa Maria to allow for an effective and well-thought-out plan for the most beneficial use to wildlife, increasing habitat in critical winter range lands. This will allow for a productive fishery; sustain and increase riparian habitat; irrigate lands for wildlife nesting, shelter and forage; and provide increased storage for well augmentation.

Fixing and upgrading the siphon and canal provide SMRC renewed levels of operational flexibility and cost effectiveness, reducing maintenance and allowing more resources to be devoted to recreation. As an example, CDOW may be able to fully utilize the ability to store more water by offering it as potential payment for projects to private landowners in return for walk-in access on their lands for hunting and or fishing.

Multiple Basins / Statewide Interests: This Project's Phase I upgrades to the siphon and the canal are essential in order for SMRC to proceed with work at Continental Reservoir and the eventual lifting of the State-imposed storage restriction at Continental. With this restored capacity, CDOW will be in a better position to answer water demands in the face of uncontrollable circumstances, such as now face this Basin due to drought. Restored storage capacity provides flexibility in how and when water is distributed to different areas, depending on needs and available resources.

b. The number and types of entities represented in the application and the degree to which the activity will promote cooperation and collaboration among traditional consumptive water interests and/or non-consumptive interests, and if applicable, the degree to which the water activity is effective in addressing intrabasin or interbasin needs or issues.

Cooperation and Collaboration: Some examples of inter-agency collaboration are described in (a) above. Multiple benefits of this Project include providing water for irrigation and for wildlife, maintaining flood control, providing flexibility in addressing drought conditions, and offering spectacular opportunities for high altitude recreational fishing and boating.

If the century-old delivery system is not rehabilitated it will continue to deteriorate, potentially putting Santa Maria Reservoir out of commission and presenting huge problems to SMRC in storing and delivering water.

As the Rio Grande Basin develops subdistricts, the availability of storage for well augmentation and stream depletions becomes a priority. In addition to agricultural water management this is of concern to many of the CDOW state wildlife areas (SWA), which rely on wells in order to maintain wildlife habitat. CDOW currently has surface water rights and wells with a variety of use adjudications on SWA's.

The establishment of groundwater conservation sub-districts within the SLV may have an effect on the amount of water pumped by any individual well on a SWA, regardless of CDOW's active participation in the district. Should a SWA fall within areas which are not regulated by a sub-district, the State Engineer may dictate a set of rules and regulations. Therefore, Transmountain water which is collected and stored in these reservoirs may serve to augment wells which cannot be re-adjudicated for the beneficial use of wildlife or which may be reduced in flow as a result of a sub-district or to comply with State Engineer rules and regulations.

c. The water activity helps implement projects and processes identified as helping meet Colorado's future water needs, and/or addresses the gap areas between available water supply and future need as identified in SWSI or a roundtable's basin-wide water needs assessment.

This Project supports the Rio Grande Basin's work to improve the management of surface and ground water supplies by ameliorating or curing problems created by the deterioration and potential failure of SMRC's conveyance system linking Continental and Santa Maria reservoirs.

This water activity greatly improves water management efficiency; promotes increased future storage and distribution capabilities of two reservoirs; and provides SMRC greater flexibility to provide additional storage to third parties. This Project is critically important, helping in many ways to meet the water supply challenges of the Rio Grande Basin, which is totally over-appropriated.

As the first step in restoring the designed storage capacity at Continental, this Project suggests another major benefit to Colorado. Lifting the storage limitation at Continental will enable SMRC to release Transmountain water throughout the year, thus maintaining a 'low flow' in the Rio Grande and its tributaries. This flow would promote the maintenance of fish populations and recreational activities, assisting in the efficient delivery of water. Currently, the CDOW is researching the amount of water needed to maintain a low flow in the Rio Grande. In all these ways, this Project effectively addresses the Statewide Water Supply Initiative's Management Objectives and the Rio Grande Basin Roundtable's concerns regarding sustainability, and improved management of surface and ground water resources. This Project restores the conveyance system between Santa Maria and Continental Reservoirs, returning these assets to optimal operational reliability, and, in the process, complying with all applicable laws and regulations of the State of Colorado.

A fully functioning conveyance system is essential to lifting the State-imposed storage restriction on Continental Reservoir. It restores full operating efficiency of the conveyance system and greatly enhances SMRC's ability to hold and control additional project water, transmountain water, augmentation water, and Rio Grande Compact water. This Project anticipates future consumptive and nonconsumptive needs of the San Luis Valley by upgrading and preserving SMRC's ability to respond to drought, providing storage for subdistrict replacement water, maximizing the total capacity of the ditch and the pipeline when water is available for storage, and improving SMRC's ability to respond to changeable and unpredictable circumstances over the coming decades.

Tier 2: Facilitating Water Activity Implementation

d. Funding from this Account will reduce the uncertainty that the water activity will be implemented. For this criterion the applicant should discuss how receiving funding from the Account will make a significant difference in the implementation of the water activity (i.e., how will receiving funding enable the water activity to move forward or the inability obtaining funding elsewhere).

Receiving grant funds from the WSRA Account is critical for this water activity to be implemented. SMRC has negotiated with CWCB to obtain a ratio of grant funds to loan funds of 25% to 75%. This represents a sizeable commitment from the Board and Stockholders of SMRC. That loan cannot be obtained without first being awarded the grant funds requested in this proposal.

The Loan Feasibility Document, prepared by the Project's design engineer, Mr. Ed Toms of URS Corporation, describes this grant/loan strategy as follows:

"Total capital expenses for the recommended project alternative, including construction and construction contingency, construction engineering, SMRC's administration and legal support, and environmental permitting support is $1,855,000. SMRC is anticipating receiving 25% funding support from the Basin and Statewide grants from the Water Supply Reserve Account (WSRA). This support would reduce the project cost to $1,391,250. SMRC is applying for 90% of the construction cost through the CWCB Small Project Loan Program and will finance the remaining 10% of the construction cost through member participation. SMRC's loan request, with the CWCB 1% Service Fee, is for the amount of $1,252,125. The annual payment will be $55,543.88, assuming a 30-year loan at an interest rate of 1.75%. Table ES-1 presents a summary of the requested project loan."

* Also see loan feasibility study

Table ES.1
Project Loan Summary *

Total Project Cost (Rounded)	$1,855,000
Total Project Amount after Anticipated Grant (25%)	$1,391,250
Total Amount Eligible for CWCB Funding (~~90%~~ 100%)	~~$1,252,125~~ $1,391,250
1% CWCB Loan Service Fee	~~$12,521.25~~ $13,913
CWCB Loan (Including 1% Service Fee)	~~$1,264,646.25~~ $1,405,163
CWCB Annual Loan Payment	~~$54,543.88~~ $60,604
Number of Shares	5,400
Annual Cost Per Share for Loan	~~$10.10~~ $12
Current Assessment per Share	$28.00
New Assessment per Share	~~$38.10~~

Edited to be consistent w/ loan request. acm 2/28/13

e. The amount of matching funds provided by the applicant via direct contributions, demonstrable in-kind contributions, and/or other sources demonstrates a significant & appropriate commitment to the project.

As explained in 1(3)d above, applicant is providing matching funds of $139,125, in addition to taking on the above loan. This represents a significant and appropriate commitment to the project by shareholders.

Tier 3: The Water Activity Addresses Other Issues of Statewide Value and Maximizes Benefits

f. The water activity helps sustain agriculture & open space, or meets environmental or recreational needs.

This Project directly improves the ability of SMRC to irrigate 70,000 acres of farm and ranch land in the San Luis Valley. Full discussion and details are above, in Tier 1a and Tier 1b.

g. The water activity assists in the administration of compact-entitled waters or addresses problems related to compact entitled waters and compact compliance and the degree to which the activity promotes maximum utilization of state waters.

This Project greatly increases SMRC's ability to store, release, and manage Rio Grande Compact entitled waters by upgrading and making critical repairs to the conveyance system's siphon and canal, enabling future phases of the SMRC Rehab Initiative to move forward. Details and a full discussion of this element of the Project are above, in Tier 1a and Tier 1b.

h. The water activity assists in the recovery of threatened and endangered wildlife species or Colorado State species of concern.

i. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.

Findings from the URS Hydrology studies have provided a more thorough understanding of the complexities involved in restoring full capacity to Continental and Santa Maria reservoirs. Recognizing this, SMRC increased its financial commitment by expanding those studies (2011 WSRA grant), and its stockholders have recently approved the 25% / 75% grant/loan strategy. This sustained re-commitment of funds by SMRC, plus the funds requested here, provides a high level of benefit to Colorado in relation to the grant funds requested, for all the reasons listed above, but primarily by improving Colorado's ability to meet its commitments to the Rio Grande Compact. This application requests funds for the first of several steps in restoring full capacity to Continental and Santa Maria reservoirs. That represents a very good deal for Colorado.

j. The water activity is complimentary to or assists in the implementation of other CWCB programs.

CWCB has twice funded the studies by URS Corporation which were required in order for SMRC to proceed with this implementation project. Other CWCB programs to upgrade or improve reservoirs in the Rio Grande Basin have provided WSRA funding for the Rio Grande Reservoir, Terrace Reservoir Spillway Replacement, Sanchez Reservoir, and several grants for Platoro Reservoir. This Project is in keeping with CWCB's objective to upgrade deteriorated and aging reservoirs in the San Luis Valley.

Part IV. – Required Supporting Material

1. **Water Rights, Availability, and Sustainability** – This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by, the water activity. This should include a description of applicable water rights, and water rights issues, and the name/location of water bodies affected by the water activity.

Santa Maria stores irrigation water and also stores Subdistrict #1 water, Rio Grande Compact water, San Luis Valley Water Conservancy District water, Colorado Division of Wildlife (CDOW) water, and Trans-Mountain water. Santa Maria also provides flood control. Continental, with a

designed capacity of 27,000 acre feet, and Santa Maria, with designed capacity 43,500 acre feet, irrigate a vast 5-county area of the San Luis Valley. For the past twenty years, however, Continental has been limited to storing only 15,000 AF due to the deteriorating condition and the leaks, seeps and losses in the dam and the deteriorated condition of the conveyance system between Continental and Santa Maria reservoirs.

Ninety percent of the water managed by SMR goes through the Rio Grande Canal. The remaining 10% of SMRC water goes through the Monte Vista Canal. SMR has 5,400 shares of outstanding stock, mostly split in groups of 10 shares, with 225 stockholders. A total of 70,000 acres are irrigated by this two-reservoir system.

This project will not broaden SMRC's service area and will not provide for irrigation of any new lands. The present lands irrigated are 70,000 acres, as mentioned above. No new downstream stream depletions will occur due to the proposed Project elements. No additional water supplies will be developed in connection with this Project. No new or increased diversions will be made and no additional storage capacity will be created at the reservoir in this Project, although removal of the State-imposed limitation on storage at Continental is an overall objective of the SMRC Rehab Initiative, of which this Project is the first phase.

SMRC has the water rights in place for this Project, with no new rights required. As set forth in the Loan Feasibility Study, Table 3.1, excerpted below, is a summary of SMRC's storage water rights and Table 3.2 presents their diversion rights from North Clear Creek, Bennett Creek, and Boulder Creek, all of which are stored by the Santa Maria Reservoir.

(next page)

Table 3.1 - Summary of Storage Water Rights			
Appropriation No.	**Adjudication Date**	**Appropriation Date**	**Amount (ac-ft)**
Santa Maria Reservoir			
1916-81A 1916-2 (Reservoir)	September 13, 1916[1]	August 11, 1986	15,871.21
1916-81A 1916-4 (Reservoir	September 13, 1916[1]	September 22, 1902	21,643.79[2]
Total Storage Right Santa Maria Reservoir			37,515.00
Continental Reservoir			
1934-1	December 15, 1934	June 1, 1901	8,832
1934-3	December 15, 1934	May 4, 1907	2,557
1934-4	December 15, 1934	May 4, 1907	15,327[3]
Total Storage Right Continental Reservoir			26,716
Total System Storage Right			**64,231**

[1] - Original decree amended on remitter June 26, 1924.
[2] - Originally 27,945.85 ac-ft; 6,302.06 ac-ft conditional not made absolute.
[3] - Originally 19,361 ac-ft; 4,034 ac-ft conditional not made absolute.

Table 3.2 - Summary of Diversion Water Rights	
Diversion Point	**Amount (cfs)**
Santa Maria Supply Ditch – North Clear Creek	150
Santa Maria Supply Ditch – Bennett Creek	25
Santa Maria Supply Ditch – Boulder Creek	100
Total	**275**

2. Please provide a brief narrative of any related studies or permitting issues.

- **A Loan Feasibility Study has been prepared in parallel with this proposal by URS Corporation, in conformance with CWCB's grant/loan requirements. The Loan Feasibility study examines the feasibility of several non-structural and structural alternatives considered by URS and sets forth the Recommended Alternative. That study establishes the technical, financial, environmental, and institutional feasibility of rehabilitating the siphon and canal system.**

- **Two recently completed studies by URS Corporation (which are referred to here as the Conveyance System Studies) contain the design and engineering recommendations for this Project, as follows:**

- **The technical specifications for the <u>Santa Maria Siphon Support System Stabilization Project</u> and the <u>Santa Maria Canal Improvements Project</u>, are included with this proposal in Exhibit B. Additional data is available from SMRC including engineering drawings, additional specifications, and maps.**

- **Based on the results of URS field surveys and engineering and design analyses, the two Conveyance System Studies set forth the Scope of Work and construction requirements to stabilize the siphon support system and to upgrade the canal of the conveyance system. They describe alternative approaches considered by URS to resolving problems identified in the siphon and canal and set forth URS' Recommended Alternative in each case. The Recommended Alternative for each element are as follows:**

  <u>Siphon Preferred Alternative : Rehabilitating and reinforcing the existing supports in place</u>. ***"This alternative will repair the existing supports with reinforced concrete in place. This alternative will include selective demolition of the thrust blocks and intermediate supports and then using reinforcement overlays for the blocks and supports to reestablish their structural integrity. The steel bearing plates that support the siphon pipe on the intermediate supports will be [re]placed with new plates. This alternative was selected as the preferred alternative based on technical and cost merits. The pipe has been in place since [...] 1934. It was decided that the replacement of an existing support system would last the same time period with minimal risk of failure."***

  <u>Canal Preferred Alternative: Improve the flow hydraulics through canal improvements.</u> ***"This alternative includes removing the existing drop structures and [improving and adding to]the concrete lining [of] the canal to improve the flow hydraulics so the canal [will have the capacity] to convey additional flow. A hydraulic model was used to evaluate the appropriate cross section for the canal. It was decided that it was important to remain within the same footprint of the existing canal to minimize the potential of extensive environmental and special use permitting issues. This alternative was selected as the preferred alternative based on technical and cost merits."***

- **In 2011 URS Corporation performed a topographic survey as well as preliminary and final hydraulic and structural design analyses for the siphon and the canal projects, and the results of these were used to develop the designs of the project components of this Project.**

- **The Continental Reservoir Studies have been finalized by URS Corporation and have been reviewed by the State Engineer's Office (SEO), with approval expected prior to CWCB contract.**

- **The engineering and design work of URS to complete this Project, along with the CWCB grant/loan strategy, were unanimously approved by SMRC stockholders at their annual meeting on December 4, 2012. With the SMRC Board and Stockholders committed to this**

Project, this proposal seeks the required grant funds to proceed with implementation. SMRC is working with URS to develop the bid documents prior to soliciting bids.

Background Studies

- **In 2011, with WSRA funds, URS Corporation performed a hydrologic study of Continental Reservoir to determine its required spillway size. This study assessed the hydrologic and hydraulic adequacy of the Continental spillway, according to State's regulations, so as to determine the measures required to lift the current storage restriction.**

- **Completed in 2012, URS Corporation also performed an analysis and identified the shortcomings of the entire SMRC reservoir storage and water delivery system. This Project and all subsequent studies by URS are the result of that analysis. Future phases of the SMRC Rehab Initiative will be based upon those findings.**

- **Since the beginning of planning in 2007, SMRC has conducted numerous site visits and held many meetings with URS Corporation, stockholders, SMRC's Attorney William Paddock, and also with CWCB's grant and loan program staff. Chairman of the Rio Grande Basin Roundtable, Mike Gibson, has advised the project many times over the years, with assistance from the Rio Grande Basin Roundtable's Technical Assistance Subcommittee.**

- **Site visits included inspections of Continental Dam and Santa Maria Dam to assess dam safety issues, including the Continental spillway and seepage along the left dam abutment at Continental. Further field investigations focused on the conveyance system, consisting of portions of Clear Creek, the pipeline, the siphon, and the open ditch.**

- **URS developed the 24-hour, 100-year precipitation using NOAA Atlas II; and local and general storm probable maximum precipitation (PMP) using EPAT and HMR-55A methods. URS developed the flood hydrology using the United States Army Corp of Engineers (USACE) HEC-HMS computer model, using available project data and routing the floods through the existing spillway to determine if the critical storm event meets SEO Rules. These analyses will inform future phases of the SMRC Rehab Initiative and determine the required spillway configuration and other reservoir and dam requirements at Continental Reservoir.**

Permitting Issues: Included in Exhibit C are copies of several early special use permits issued in and around 1908, together with correspondence from SMRC's attorney, describing the very minimal extent to which this Project will need additional permits. To address SMRC's concern with regard to the wetland area above Continental, the following preliminary study was conducted:

- **In November, 2012, SMRC contracted with Charles O. Spielman, consulting geological engineer, to perform a preliminary assessment as to the likelihood that a fen, or fens, might be present in the area immediately upstream of the present Continental Reservoir high water line. Since this is an area that would be flooded by an increase in the maximum allowed capacity of the reservoir, this information would be needed in future phases of the SMRC Rehab Initiative. This study examined the subject area from a geological perspective, briefly reviewed selected literature regarding the definition of a fen, and assessed the geologic, topographic, and moisture conditions relative to the formation of fens. This study concluded that it is very unlikely that a fen, or fens, exist in the subject area. The brief preliminary study is included in its entirety.**

3. Statement of Work, Detailed Budget, and Project Schedule

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and budget, and in return, the State of Colorado is receiving the deliverables/products specified. **Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

Please provide a detailed statement of work using the template in Exhibit A. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 5 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. All products, data and information developed as a result of this grant must be provided to

the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and help promote the development of a common technical platform.

The above statements are true to the best of my knowledge:

Signature of Applicant:

Print Applicant's Name:

Project Title:

Return an electronic version (hardcopy may also be submitted) of this application to:

Greg Johnson – WSRA Application
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
gregory.johnson@state.co.us

Exhibit A

Budget

Scope of Work

Schedule

B U D G E T

TASK NO.	TASK DESCRIPTION	ESTIMATED QUANTITY	UNITS	UNIT PRICE	TOTAL PRICE
SUPPORT SYSTEM STABILIZATION					
1	Mobilization, Demobilization & Preparatory work	1	LS	14,500	$14,500.00
2	Erosion & Sediment Control	1	LS	2,000	$2,000.00
3	Clearning & Grubbing	1	LS	5,000	$5,000.00
4	Selective Demolition - Thrust Blocks	1	LS	20,000	$20,000.00
5	Selective Demolition - Intermediate Supports	1	LS	20,000	$20,000.00
6	Reinforced Concrete Overlays - Thrust Blocks	13	CY	1,500	$19,500.00
7	Reinforced Concrete Overlays - Intermediate Blocks	26	CY	1,500	$39,000.00
8	Fabrication & Installation - Steel Bearing Plates	10	EA	500	$5,000.00
9	Removal of Loose Rock & Boulders	60	CY	250	$15,000.00
	CONSTRUCTION SUBTOTAL				$140,000.00
10	Allowance for Changes After Contract (12%)				$16,800.00
	CONSTRUCTION TOTAL				$156,800.00
11	Engineering during construction (10%)				$15,680.00
	Total Siphon Support costs				**$172,480.00**
CANAL IMPROVEMENTS					
12	Mobilization, Demobilization & Preparatory work	1	LS	119,510	$119,510.00
13	Erosion & Sediment Control	1	LS	10,000	$10,000.00
14	Dewatering & Diversion	1	LS	10,000	$10,000.00
15	Clearning & Grubbing	3	AC	6,000	$18,000.00
16	Stripping & Stockpiling Topsoil	1200	CY	5	$6,000.00
17	Selective Demolition	1	LS	40,000	$40,000.00
18	42" Bypass Pipe	2410	LF	120	$289,200.00
19	Concrete Encasement	1170	CY	350	$409,500.00
20	Unclassified Excavation	1460	CY	9	$13,140.00
21	Rock Excavation	170	CY	60	$10,200.00
22	Fill	200	CY	30	$6,000.00
23	Concrete Canal Liner	7110	SY	50	$355,500.00
24	Riprap & Bedding	230	CY	65	$14,950.00
25	Concrete Check Structure	4	CY	800	$3,200.00
26	Reclamation of Disturbed Areas	1.2	AC	4,000	$4,800.00
	CONSTRUCTION SUBTOTAL				$1,310,000.00
27	Allowance for changes after contract (12%)				$157,200.00
	CONSTRUCTION TOTAL				$1,467,200.00
28	Engineering during construction (10%)				$146,720.00
	TOTAL CANAL PROJECT COSTS				**$1,613,920.00**
OTHER PROJECT COSTS					
29	Admin. And Legal				$17,864.00
30	Enviromental Permitting				$50,000.00
Total Convayance System Project Costs					**$1,854,264.00**
Total Convayance System Project Costs(Rounded)					**$1,855,000.00**

S C O P E O F W O R K

The Scope of Work for this Phase I Project will follow the technical specifications provided by URS Corporation for the Canal Improvement Project and the Support System Stabilization Project. These specifications are included in their entirety in **Exhibit B**. The following Tasks are involved.

SUPPORT SYSTEM STABILIZATION **Task**	
1	Mobilization, Demobilization & Preparatory work
2	Erosion & Sediment Control
3	Clearing & Grubbing
4	Selective Demolition - Thrust Blocks
5	Selective Demolition - Intermediate Supports
6	Reinforced Concrete Overlays - Thrust Blocks
7	Reinforced Concrete Overlays – Intermediate Blocks
8	Fabrication & Installation - Steel Bearing Plates
9	Removal of Loose Rock & Boulders
10	Allowance for Changes After Contract (12%)
11	Engineering during construction (10%)
CANAL IMPROVEMENTS	
12	Mobilization, Demobilization & Preparatory work
13	Erosion & Sediment Control
14	Dewatering & Diversion
15	Clearing & Grubbing
16	Stripping & Stockpiling Topsoil
17	Selective Demolition
18	42" Bypass Pipe
19	Concrete Encasement
20	Unclassified Excavation
21	Rock Excavation
22	Fill
23	Concrete Canal Liner
24	Riprap & Bedding
25	Concrete Check Structure
26	Reclamation of Disturbed Areas
27	Allowance for changes after contract (12%)
28	Engineering during construction (10%)
29	Admin. And Legal
30	Environmental Permitting

S C H E D U L E

TASK NO.	TASK DESCRIPTION	MONTHS - 2013								
		MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
	BID PROCESS	X	X	X						
	NOTICE TO PROCEED			X						
SUPPORT SYSTEM STABILIZATION										
1	Mobilization, Demobilization & Preparatory work				X					
2	Erosion & Sediment Control				X					
3	Clearning & Grubbing				X					
4	Selective Demolition - Thrust Blocks				X					
5	Selective Demolition - Intermediate Supports				X					
6	Reinforced Concrete Overlays - Thrust Blocks					X	X	X		
7	Reinforced Concrete Overlays - Intermediate Blocks					X	X	X		
8	Fabrication & Installation - Steel Bearing Plates				X	X	X	X		
9	Removal of Loose Rock & Boulders				X	X	X	X		
10	Allowance for Changes After Contract (12%)				X	X	X	X	X	X
11	Engineering during construction (10%)				X	X	X	X	X	X
CANAL IMPROVEMENTS										
12	Mobilization, Demobilization & Preparatory work				X	X				
13	Erosion & Sediment Control				X	X	X	X	X	X
14	Dewatering & Diversion				X	X				
15	Clearning & Grubbing				X	X	X	X	X	X
16	Stripping & Stockpiling Topsoil				X	X	X	X	X	
17	Selective Demolition				X	X	X			
18	42" Bypass Pipe						X	X	X	X
19	Concrete Encasement						X	X	X	X
20	Unclassified Excavation				X	X	X	X	X	X
21	Rock Excavation				X	X	X	X	X	X
22	Fill				X	X	X	X	X	X
23	Concrete Canal Liner						X	X	X	X
24	Riprap & Bedding							X	X	X
25	Concrete Check Structure							X	X	X
26	Reclamation of Disturbed Areas								X	X
27	Allowance for changes after contract (12%)				X	X	X	X	X	X
28	Engineering during construction (10%)				X	X	X	X	X	X
29	Administration & Legal	X	X	X	X	X	X	X	X	X
30	Enviromental Permitting	X	X	X						
FINAL REPORT										X

Exhibit B

Technical Specifications Santa Maria Canal

Technical specifications Santa Maria Siphon Support System Stabilization

Initial Watershed Study

Project Maps

TECHNICAL SPECIFICATIONS

SANTA MARIA CANAL IMPROVEMENTS PROJECT

MINERAL COUNTY, COLORADO

Prepared for

Santa Maria Reservoir Company
PO Box 288
Monte Vista, CO 81144

May 2012

URS
8181 East Tufts Avenue
Denver, Colorado 80237

Santa Maria Canal Improvements Project
TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 - SITE WORK

DIVISION 3 - CONCRETE

TECHNICAL SPECIFICATIONS
DEFINITIONS

Addenda	Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.
Agreement	The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.
Application for Payment	The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
Asbestos	Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
Bid	The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
Bidding Documents	The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
Bidding Requirements	The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.
Bonds	Performance and payment bonds and other instruments of security.
Change Order	A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
Claim	A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
Contract	The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Documents	The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.
Contract Price	The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).
Contract Times	The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.
CONTRACTOR	The individual or entity with whom OWNER has entered into the Agreement.
Cost of the Work	See paragraph 11.01.A for definition.
Drawings	That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.
Effective Date of the Agreement	The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
ENGINEER	The individual or entity named as such in the Agreement.

ENGINEER's Consultant	An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.
Field Order	A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
General Requirements	Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
Hazardous Environmental Condition	The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
Hazardous Waste	The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
Laws and Regulations; Laws or Regulations	Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
Liens	Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
Milestone	A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
Notice of Award	The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.
Notice to Proceed	A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.
OWNER	The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

Partial Utilization	Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
PCBs	Polychlorinated biphenyls.
Petroleum	Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
Project	The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.
Project Manual	The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
Radioactive Material	Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
Resident Project Representative	The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.
Samples	Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
Shop Drawings	All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.
Site	Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.
Specifications	That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor	An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.
Substantial Completion	The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
Supplementary Conditions	That part of the Contract Documents which amends or supplements these General Conditions.
Supplier	A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.
Underground Facilities	All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
Unit Price Work	Work to be paid for on the basis of unit prices.
Work	The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
Work Change Directive	A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change

	Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.
Written Amendment	A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project description, work summary, and work by Owner.

1.2 BACKGROUND

A. The Santa Maria Canal is located in Mineral County in southwest Colorado. The canal is located approximately 10 miles west of the town of Creede, Colorado. The canal is primarily fed by 7-ft diameter siphon which is supplied by Continental Reservoir and direct runoff. The canal discharges into Lakeman Lakes. There are no turnouts (offtakes from the irrigation canal) from the Santa Maria Canal. The canal is owned and operated by the Santa Maria Reservoir Company.

B. The canal was constructed as a benched channel, with a cut-slope on the left side (looking downstream) and maintenance road and fill slope on the right side (looking downstream). The existing maintenance road is approximately 10 to 12 ft wide. The canal is approximately 7,200 feet long and between 3 and 8 feet deep.

C. Generally, the canal consists of an earthen canal with a concrete lined right bank through the majority of the canal. Approximately 470 ft segment of the canal is fully concrete lined.

D. The canal has a 4'x5' (inside dimensions) cast-in-place box culvert buried within the canal. A portion of the box culvert was rehabilitated with a 4' diameter corrugated metal pipe placed inside the existing box culvert and encased in concrete.

1.3 PROJECT DESCRIPTION

A. Major work items associated with the Santa Maria Canal Improvements include:

1. Mobilization and preparatory work
2. Erosion and sediment controls
3. Dewatering and diversion
4. Clearing and grubbing
5. Stripping and stockpiling topsoil
6. Demolishing selected canal control structures and selected portion of top slab of the box culvert
7. Furnish and place new HDPE pipe within the existing box culvert
8. Placing new concrete encasement surrounding the HDPE pipe
9. Earthworks to prepare canal for new concrete liner
10. Construction of new reinforced concrete canal check structures
11. Placing new concrete canal liner
12. Place new riprap and riprap bedding
13. Reclamation
14. Demobilization

1.4 OWNER OCCUPANCY

A. The Owner may occupy the premises during the period of construction to conduct normal operations.

B. Cooperate with Owner to minimize conflicts, and to facilitate Owner operations.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01120
CONTRACTOR WORK PLAN

PART 1 GENERAL

1.1 SUMMARY

A. This section covers the Contractor Work Plan.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Prepare and submit a project-specific Work Plan to the Engineer for approval within 14 days after Award. Include the following topics in the Work Plan:

1. Construction implementation plan to include work approach, equipment to be used for each item of construction, methods, and management.
2. Key personnel names and qualifications, list of subcontractors, including an organizational chart and project directory with contact information.
3. Health and Safety Plan. See Section 01145: Health and Safety.
4. Environmental Protection. See Section 01350: Environmental Protection.
5. Waste Handling and Disposal Procedures. See Section 01575: Disposal of Waste Materials.
6. Spill prevention and control procedures. See Section 01350: Environmental Protection.
7. Fire prevention and protection. See Section 01350: Environmental Protection.
8. Dust control. See Section 01350: Environmental Protection. (BMPs to be used).
9. Construction sequence and schedule. See Section 01320: Construction Progress Schedule.
10. Construction Quality Control Plan (CQCP). See Section 01450: Quality Control.
11. Other applicable items to describe work approach.

1.3 WORK PLAN REQUIREMENTS

A. The Work Plan shall be carefully thought out, prepared in accordance with all applicable Federal, state, and local laws and regulations, these specifications, and good engineering and construction practices. The Work Plan shall include a complete discussion of conformance with applicable laws, regulations, guidelines, and other applicable procedures, and shall be approved by the Engineer before beginning field activities.

B. A statement in the Work Plan that "all applicable laws will be followed" is not sufficient detail for the Work Plan submittal. Repetition of specification wording and requirements shall only be used to present the elements of the work plan, not as a substitute for the detail that is expected to present the Contractor's work approach.

C. The Work Plan shall be developed in accordance with the requirement of the individual specifications indicated and other requirements in this specification.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01145
HEALTH AND SAFETY

PART 1 GENERAL

1.1 REFERENCES

A. Williams - Steiger Occupation Safety and Health Act of 1970 (OSHA).

B. All other applicable Federal, State, and Local Safety and Health requirements.

1.2 CONTRACTOR'S RESPONSIBILITY

A. Provide and implement a Health and Safety Plan (HSP) that conforms to all applicable regulations.

B. The HSP shall include the possibility of encountering hazardous or controlled waste at the site, worker protection, actions to be taken, and responsible parties for managing such waste streams.

1.3 OWNER AND ENGINEER'S RESPONSIBILITY

A. Owner and Engineer will have no responsibility for enforcing the Contractor's Health and Safety program.

1.4 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Prepare and submit the Contractor's Project Health and Safety Plan in accordance with the General Conditions. The plan is for informational purposes only.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01200
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Measurement and payment criteria applicable to work performed under a unit price payment method.

B. Measurement and payment criteria applicable to work performed under a lump sum payment method.

C. List of unit price and lump sum pay items.

D. Schedule of value requirements for lump sum pay items.

E. Defect assessment and non-payment for rejected work.

1.2 AUTHORITY

A. Measurement methods delineated in the individual Specification Sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Specification Section shall govern.

B. Take all measurements and compute quantities for unit price pay items. The Engineer will verify measurements and quantities of work performed by the Contractor for payment purposes.

C. Assist the Engineer in the taking of measurements by providing necessary equipment, workers, and survey personnel as required.

1.3 QUANTITIES OF UNIT PRICE PAY ITEMS

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Actual quantities and measurements supplied or placed in the work and verified by the Engineer shall determine payment.

1.4 MEASUREMENT OF QUANTITIES FOR UNIT PRICE PAY ITEMS

A. Measurement Devices:

1. Weigh scales: inspected, tested, and certified by the appropriate Colorado Weights and Measures Division within the past year.
2. Platform scales: of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering devices: inspected, tested, and certified by the appropriate Colorado Weights and Measures Division within the past year.

B. Measurement by volume: Measured by cubic dimension using mean length, width, and height or thickness.

C. Excavation quantities will be based on the calculated volume between the baseline survey, as defined in Section 01720: Layout of Work and Surveying and the excavation limits shown on the Drawings or described in these Specifications, or to the most

practicable lines, grades and dimensions as prescribed by the Engineer, and will include only material that is actually removed within the prescribed pay lines.

D. Fill quantities will be based on the calculated volume between the approved excavation limits or the approved base surface and the fill limits shown on the Drawings or described in these Specifications, or to the most practicable lines, grades and dimensions as prescribed by the Engineer, and will include only material that is actually placed within the described pay lines.

E. Compute excavation and fill quantities in accordance with the requirements of Section 01720: Layout of Work and Surveying.

F. Where concrete for structures is to be placed directly upon or against the excavations and the character of the material cut into is such that the material cannot be trimmed efficiently to accurate dimensions by ordinary excavation finishing methods, as determined by the Engineer, measurement for payment thereof will be made to the prescribed average dimension lines. The prescribed average dimension lines shall be considered as 6 inches outside the neat lines of the concrete for the purposes of measurement, for payment.

G. Measurement, for payment, of excavations upon or against which concrete is not required to be placed will be limited to the neat lines shown on the Drawings, to the most practicable lines, grades, and dimensions as established by the Engineer.

H. Measurement by area: Measured by square dimension using mean length and width or radius. Items which are measured by the acre, such as revegetation, shall be measured horizontally.

I. Linear measurement: Measured by linear dimension, at the item centerline or mean chord. Items which are measured by the lineal foot, such as pipes, culverts, underdrains, fence, etc., shall be measured parallel to the base or foundations upon which the items are placed, unless otherwise specified or shown on the Drawings.

J. Stipulated sum/price measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed items or units of the Work.

K. Lump sum items will not be measured for payment. However, measurements may be made to monitor work progress.

1.5 PAYMENT

A. Payment includes: Full compensation for furnishing all required labor, materials, products, tools, equipment, plant, transportation, services, incidentals; erection, application or installation of an item of the work, and all other costs of whatsoever nature for the items of work complete, will be included in the various bid items; overhead and profit.

B. Contractor shall submit a Schedule of Values for all lump sum bid items listed in the Bid Schedule within 30 days of the Notice to Proceed. The Schedule of Values will be used to help assess the intermediate value of work completed for the purpose of making progress payments

C. Payment for unit price items will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price.

D. Payment for lump sum price items will be made on the basis of the contract lump sum prices in the Bid Form. If the Contractor requests progress payments for lump sum items, such progress payments will be made in accordance with a detailed program of payment apportioning in the schedule of values, prepared by the Contractor and submitted to the Engineer for approval.

1.6 DEFINITION OF BID ITEMS

A. Bid Items:

1. Mobilization, Demobilization, and Preparatory Work and (Lump Sum Item)

a. This item includes the mobilization of personnel, equipment and temporary construction facilities to the project site and their subsequent removal; providing temporary utilities; safety fence; traffic control signage and barricades; and other miscellaneous items required to begin construction and closeout the Contract. The cost of all work specified in Division 1 - General Requirements, unless specifically covered in other bid items, will not be paid separately, but shall be included in the lump sum price bid in the Schedule for Mobilization and Preparatory Work.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.
d. Mobilization, Preparatory Work and Demobilization is limited to maximum of ten percent (10%) of the total Bid Price.

2. Erosion and Sediment Control (Lump Sum Item)

a. Erosion and Sediment Control includes installation, maintenance, and removal of all sediment control devices required for the Work, including hay bales, silt fence, sedimentation ponds, and associated compliance work required by Federal, State, and County permits in accordance with Section 01570.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.

3. Dewatering and Diversion (Lump Sum Item)

a. This item includes dewatering and diversion of all construction areas including installing, maintaining and removing all pumps, piping, drains, well points, wells, and other facilities required to effectively control, collect, and dispose of groundwater or surface water to permit safe and proper construction of all contract work in accordance with Section 02240. This item also includes removing the dewatering facilities at the end of construction.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.

4. Clearing and Grubbing (Unit Price Item)

a. This item includes clearing and grubbing within the limits of site disturbance for required excavations, staging and stockpile areas, and

borrow areas. Includes removal, cutting, grubbing, mowing, etc in accordance with Section 02230.

b. Measurement: Measurement will be based on the acres cleared and grubbed within the disturbed areas, measured to the nearest 0.1 acre.

c. Payment will be made at the Contract Unit Price per acre.

5. Stripping and Stockpiling Topsoil (Unit Price Item)

a. This item includes stripping all topsoil as defined in the Specifications to the depths approved by the Engineer and within the limits of the disturbed areas approved by the Engineer. Item includes hauling the stripped topsoil to the stockpile area and stockpiling the topsoil in accordance with Section 02235. Re-location of the stockpiled topsoil to a new stockpile location is considered incidental and will not be paid for separately.

b. Measurement: Measurement shall be in cubic yards of topsoil in the stockpile.

c. Payment will be made at the Contract Unit Price per cubic yard.

6. Selective Demolition (Lump Sum Item)

a. This item includes all work associated with the demolition, salvage, and disposal of items designated on the Drawings as salvage, demolish, remove, or similar terms in accordance with Section 02220.

b. Measurement: Measurement will be based on the approved Schedule of Values.

c. Payment: Payment will be made at the Contract Lump Sum Price.

7. HDPE Pipe (Unit Price Item)

a. This item includes furnishing materials, transportation, temporary stockpiling/storage, submittals, installation, examination and repair, testing, labor equipment, securing the pipe and fittings, warranty and any and all related costs required for the HDPE pipe work in accordance with Section 02620.

b. Measurement for payment will be made in lineal feet of pipe based on surveys made by the Contractor and approved by the Engineer. No additional payment will be made for loss of materials due to defective materials, repairs, quality control samples, temporary stockpiling, or mishandling or misshaping of materials.

c. Payment will be made at the Contract Unit Price per lineal feet of pipe.

8. Concrete Encasement (Unit Price Item)

a. This item includes procuring, batching, transporting, forming, placing, vibrating, finishing, and curing the reinforced concrete for HDPE pipe encasement. Also includes procuring transporting, and installing reinforcing steel, accessories, and joint preparation in accordance with Sections 03100 to 03300.

b. Measurement: Concrete encasement will be measured in place by volume (cubic yards) to the limits approved by the Engineer.

c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

9. Unclassified Excavation (Unit Price Item)

   a. This item includes excavation of unclassified materials as defined in Section 02315: Excavation required for construction within the existing canal extents in the area shown on the Drawings and hauling the material to stockpiles or placement areas.
   b. Measurement: Measurement will be by volume (cubic yards) of unclassified excavation, measured from the existing ground surface to the neat excavation lines and grades shown on the Drawings.
   c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

10. Rock Excavation (Unit Price Item)

   a. This item includes excavation of rock materials as defined in Section 02315: Excavation, required for construction in the areas shown on the Drawings.
   b. Measurement: Measurement will be by volume (cubic yards) of rock excavation to the neat lines and grades on the Drawings.
   c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

11. Fill (Unit Price Item)

   a. This item includes processing materials obtained from offsite sources, and transporting, placing, spreading, grading, moisture conditioning, and compacting fill in accordance with Section 2330: Earthwork, at the locations shown on the Drawings.
   b. Measurement: Measurement for payment will be made by volume (cubic yards) of select fill placed to the neat lines and grades shown on the Drawings.
   c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

12. Concrete Canal Liner (Unit Price Item)

   a. This item includes procuring, batching, transporting, forming, placing, vibrating, finishing, and curing the concrete canal liner. Also includes procuring transporting, and installing reinforcing steel, fiber reinforcement and accessories, and joint preparation in accordance with Sections 03100 to 03300.
   b. Measurement: Concrete canal liner will be measured in place by area (square yards) to the limits approved by the Engineer.
   c. Payment: Payment will be made at the Contract Unit Price per square yard.

13. Riprap (Unit Price Item)

   a. This item includes material procurement from offsite sources, transporting, placing, spreading, moisture conditioning, and grading riprap to the lines and grades shown on the Drawings in accordance with Section 02375.

b. Measurement: Measurement for payment will be made by volume (cubic yards) of riprap material placed to the neat lines and grades shown on the Drawings.
c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

14. Concrete Check Structures (Unit Price Item)

a. This item includes procuring, batching, transporting, forming, placing, vibrating, finishing, and curing the reinforced concrete for the concrete check structures. Also includes procuring transporting, and installing reinforcing steel, accessories, and joint preparation in accordance with Sections 03100 to 03300.
b. Measurement: Concrete encasement will be measured in place by volume (cubic yards) to the limits approved by the Engineer.
c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

15. Reclamation of Disturbed Areas (Unit Price Item)

a. This item includes loading and hauling topsoil from stockpiles, spreading, and grading topsoil evenly over the areas to be reclaimed; procuring, transporting, and placing materials required for reclamation in disturbed areas, including seeding, and hydraulically applied tackified mulch in accordance with Sections 02920 where shown on the Drawings or as specified.
b. Measurement: Measurement will be by area (acres) of areas seeded, measured to the nearest hundredth of an acre.
c. Payment: Payment shall be made at the Contract Unit Price per square acre.

1.7 SCHEDULE OF VALUES

A. The Contractor shall submit Schedule of Values for lump sum items listed in this Section within 15 days after date of Notice to Proceed.

B. The Schedule of Values will be used to assess the intermediate value of Work for pay applications.

1.8 DEFECT ASSESSMENT

A. The Contractor shall replace the work, or portions of the work, not conforming to the Drawings or the Specifications.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the work that does not conform to the Drawings or the Specifications, the Owner will direct one of the following remedies:

1. The defective work will remain, but the corresponding unit or lump sum price of the work will be adjusted to a new unit or lump sum price at the discretion of the Owner.
2. The defective Work will be partially repaired at the instruction of the Owner, and the corresponding unit or lump sum price of the work will be adjusted to a new unit or lump sum price at the discretion of the Owner.

3. The individual Specification Sections may modify the options specified in this Section or may identify a specific formula or percentage unit or lump sum price reduction. In the event of conflict, the requirements of the individual Specification Section shall govern.
4. The authority of the Owner to assess the defect and identify payment adjustment is final.

1.9 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment shall not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and grades of the required Work.
5. Products remaining on hand of the Contractor after completion of the Work.
6. Loading, hauling, and disposing of rejected products.
7. Rejected materials including, but not limited to, overly wet or frozen earth material.
8. Excavation or fill made for the convenience of the Contractor for any purpose or reason.
9. Overexcavation and replacement materials.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01310
PROJECT COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 WORK INCLUDED IN THIS SECTION

A. The work of this section includes, but is not limited to: coordination; preconstruction meeting; progress meetings; and task start-up meetings.

1.2 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate all work with progress meetings to explain unique features of the work to the work forces. The Engineer will attend such meetings. Meet daily with the Engineer to explain work progress, quality control, and any issues affecting successful completion of the work.

C. Coordinate completion and clean up of work of separate sections in preparation for Substantial Completion.

D. After the Owner occupancy of premises, coordinate access to site for correction of defective work and the work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

A. Within ten days after Notice to Proceed and prior to starting the Work except mobilization, the Contractor, accompanied by a representative from each principal subcontractor, shall meet with the Owner and the Engineer for a Preconstruction Meeting. The Preconstruction Meeting will be scheduled by the Owner. The principal features of work will be reviewed and any questions regarding the Contract and work site will be addressed.

B. Attendance Required: the Owner, the Engineer, and the Contractor Superintendent, the Contractor Safety and Health Officer, principal subcontractors, and other key personnel as requested by the Contractor or Owner.

C. Unless previously submitted to the Owner, the Contractor shall bring to the conference a schedule for each of the following:

1. Preliminary Progress Schedule.
2. Procurement schedule.
3. Shop Drawings and other submittals schedule.
4. Schedule of Values

D. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

1. Distribution of Contract Documents, including Contractor executed bond, certificate of insurance, and Contract.
2. Submission of list of Subcontractors, list of Products, schedule of values, and preliminary progress schedule.
3. Designation of personnel representing the parties in the Contract, and the Engineer.
4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
5. Contractor schedules.
6. Critical Work sequencing.
7. Processing Applications for Payment.
8. Field decisions and Change Orders.
9. Use of premises by the Owner, the Engineer and the Contractor.
10. Owner's requirements.
11. Construction facilities and controls provided by the Owner.
12. Use of premises, office and storage areas, security, housekeeping, and Owner needs.
13. Survey and layout.
14. Security and housekeeping procedures.
15. Contractor assignments for safety and first aid.
16. Quality Control and Inspection Program.
17. Procedures for maintaining record documents.
18. Major equipment deliveries and priorities.
19. Requirements for start-up of equipment.
20. Inspection and acceptance of equipment put into service during construction period.
21. Record drawings.

E. The Engineer will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

1.4 PROGRESS MEETINGS

A. The Engineer will schedule and hold regular progress meetings at least weekly and at other times as requested by the Owner or required by progress of the Work. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

B. Additional meetings may be called by the Owner, the Engineer, or the Contractor during any stage of the project when it is deemed necessary to raise any significant questions, establish new guidelines, introduce a new aspect to the project, or any other items that will affect the progress of work.

C. Meetings may take place at the project site or some other location that is satisfactory to the Owner, the Engineer and the Contractor.

D. The Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

E. Attendance Required: The Contractor and all Subcontractors active on the site shall be represented. The Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

F. All expenses associated with attending the meetings that are incurred by other than the Owner and the Engineer shall be born by the Contractor.

G. Proposed Agenda:

1. Review and approval of minutes of previous meetings.
2. Review of Work progress of minutes of previous meeting.
3. Field observations, problems, conflicts, and decisions.
4. Identification of problems which impede the schedule and proposed corrective actions.
5. Review of submittals schedule and status of submittals; expedite as required.
6. Requests for information status.
7. Review of off-site fabrication and delivery schedules.
8. Revisions to project schedule.
9. Maintenance of progress schedule.
10. Corrective measures and procedures to regain projected schedules.
11. Planned progress during succeeding Work period.
12. Coordination of project schedules and projected progress. Review of three week look-ahead schedule provided by Contractor to ensure proper coordination with Owner, Engineer, and subcontractors.
13. Maintenance of quality, and Safety and Work standards.
14. Pending changes and substitutions.
15. Effect of proposed changes on progress schedule and coordination, and effect on other contracts of the project.
16. Other business relating to Work.

H. The Engineer shall record minutes; include significant proceedings and decisions and distribute copies after meeting to participants and those affected by decisions made.

1.5 TASK START-UP MEETING

A. Before the start of any significant site activity, as determined by the Engineer, conduct a start-up meeting to discuss procedures, quality control, inspections, and related activities. Attendance at the meeting should include the Contractor project manager, site supervisor, representatives of key Subcontractors, and the Engineer and his designated representatives. Notify Engineer at least 72 hours in advance of meeting to allow the Engineer to invite necessary offsite personnel.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01320
CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SUMMARY

A. Construction Progress Schedules developed in accordance with this Section and the General Conditions.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. With each Progress Schedule submission provide the following:

1. Contractor certification that progress schedule submission is the actual schedule being utilized for execution of the Work and certification by all Subcontractors with 10 percent or more of Work that they concur with Contractor progress schedule submission.
2. Five legible copies of the progress schedule.

C. Preliminary Progress Schedule:

1. Within 10 days following the effective date of the Agreement, the Contractor shall prepare and submit a preliminary Critical Path Method (CPM) Gantt progress schedule covering all Work to be done on the Project. The schedule shall include the major construction activities and their durations and start/finish dates.
2. The Gantt schedule and subsequent revisions shall be submitted to the Owner and shall reflect the actual progress of the Project to within 5 days prior to submittal.
3. If the schedule or any subsequent revision is not acceptable to Owner, the schedule shall be revised and resubmitted as many times as necessary until the schedule is acceptable. Acceptance of the schedule will not be unreasonably withheld.
4. The initial progress schedule, when accepted by the Owner, will be the project baseline schedule.

D. Shop Drawings and Engineering Data Schedule.

1. At the time the preliminary Gantt progress schedule is submitted, a schedule shall be submitted of the items of materials, equipment, qualifications, plans, and data for which Shop Drawings and/or engineering data are required by the Specifications. For each required submittal item, the date shall be given for intended submission of the item to Engineer for review and the date required for its return to avoid delay in any activity beyond the scheduled start date. Sufficient time shall be allowed for initial review, correction and resubmission, and final review of all submittals.

E. Bi-weekly Progress Reports:

1. At the end of each two week period, the activities that have been completed, with their actual start and completion dates, and a list of the activities on which Work is currently in progress and the number of working days required to complete each, shall be submitted to Owner.

F. Submit adjusted schedule or confirm validity of current schedule with each monthly Application for Payment in accordance with this Section and the General Conditions, and at such other times as necessary to reflect the following:

1. Progress of Work to within 5 days prior to submission.
2. Changes in Work scope and activities modified since submission.
3. Delays in Submittals or resubmittals, deliveries, or Work.
4. Adjusted or modified sequences of Work.
5. Other identifiable changes.
6. Revised projections of progress and completion.

G. Narrative Progress Report: Submit with each monthly submission of progress schedule.

1.3 PROGRESS OF THE WORK

A. If Contractor fails to complete activity by its latest scheduled completion date and this failure may extend Contract Times (and/or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to the acceptable current progress schedule. Actions by Contractor to complete Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

B. Engineer may request a schedule recovery or mitigation plan if Contractor fails to: (i) complete a critical scheduled activity by its latest Milestone completion date, or (ii) satisfactorily execute Work as necessary to prevent delay to the overall completion of the Work.

C. Owner may require Contractor, at Contractor expense, to add to its plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule.

1.4 PRELIMINARY PROGRESS SCHEDULE

A. As a minimum, submit two computer generated CPM schedules as follows:

1. The Gantt schedule shall be sufficiently detailed to indicate such activities as shop drawing submittal and review, equipment manufacture and delivery, installation of equipment, earthwork, demolition activities, concrete placements, and subcontractor’s items of work. Construction activities of less than 1 day's duration or more than 5 days' duration shall be kept to a minimum. Each activity on the diagram shall be labeled with the following information: description, duration, start date, and finish date

B. Planned durations and start dates shall be indicated for each Work item subdivision. Work item durations for any activity shall not exceed thirty (30) working days. Each major component and subdivision component shall be accurately plotted on time scale

sheets 11 inches by 17 inches or 24 inches by 36 inches in size. Not more than four sheets shall be employed to represent this overview information.

1.5 PROGRESS SCHEDULE

A. General:

1. Schedule(s) shall reflect Work logic sequences, restraints, delivery windows, review times, Contract Times, and Milestones set forth in the Agreement, and shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. The schedule requirement herein is the minimum required. Contractor may prepare a more sophisticated schedule if such will aid Contractor in execution and timely completion of Work.
3. Submit assumptions for base schedule describing work week duration, numbers of shifts, hours per shift, holidays, assumed weather days, assumed productivity, crew size, etc.
4. Adjust or confirm schedules in accordance with this Section and the General Conditions on a monthly basis.
5. The update of the Project Schedule shall be an integral part of the estimate upon which progress payments will be made. If, in the judgment of the Owner, the Contractor fails or refuses to provide information required to accomplish a complete Project Schedule Update or revision as specified hereafter, the Contractor shall be deemed to have not provided the required estimate upon which progress payments may be made, and shall not be entitled to progress payments until it has furnished the information necessary for a complete schedule update to the satisfaction of the Owner.
6. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times.
7. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of Owner and Contractor.
8. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.
9. If Contractor provides an accepted schedule with an early completion date, The Owner reserves the right to reduce Contract Times to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

B. Format:

1. Computer generated baseline schedule, on maximum 11-inch by 17-inch or 24-inch by 36-inch sheet size to include at least:

    a. Identification and listing in chronological order of those activities reasonably required to complete Work, including, but not limited to, subcontract work, fabrication, and delivery dates including required lead times, move-in and other preliminary activities, Project closeout and cleanup, and specified Work sequences, constraints, and Milestones,

including Substantial Completion date(s). Listings to be identified by Specification section number.

b. Identify: (i) horizontal time frame by year, month, and week, (ii) duration, early-start, and completion for each activity and subactivity, and (iii) critical activities and Project float, (iv) assumed weather allowances, (v) planned holidays, (vi) production rates and (vii) assumed work hours per day and number of work days per week.

c. Subschedules to further define critical portions of the Work.

d. Monthly Schedule Submissions: Show overall percent complete, projected and actual, and completion progress by listed activity and subactivity.

1.6 NARRATIVE PROGRESS REPORT

A. Include, as a minimum:

1. Summary of Work completed during the past period between Narrative Progress Reports.
2. Work planned during the next period.
3. Explanation of differences between summary of Work completed and Work planned in previously submitted Narrative Progress Report.
4. Current and anticipated delaying factors and their estimated impact on other activities and completion Milestones.
5. Corrective action taken or proposed.

1.7 CLAIMS FOR ADJUSTMENT OF CONTRACT TIMES

A. Reference the General Conditions.

B. Where Engineer and Owner has not yet rendered formal decision on Contractor claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in progress schedule, Contractor shall reflect that amount of time adjustment in progress schedule as Engineer and Owner may accept as appropriate for the interim. It is understood and agreed that such interim acceptance by Engineer and Owner will not be binding and will be made only for purpose of continuing to schedule Work, until such time as formal decision as to an adjustment, if any, of the Contract Times acceptable to the Engineer and Owner has been rendered. Contractor shall revise progress schedule prepared thereafter in accordance with Engineer and Owner formal decision.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01330
SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal requirements. Submittals shall be in accordance with this Section and the General Conditions.

1.2 DEFINITIONS

A. Work-related submittals of this Section are categorized for convenience as follows:

1. Product Data: Product Data includes standard printed information on materials, products and systems not specifically prepared for the Work, other than designation of selections from among available choices printed therein.
2. Shop Drawings: Shop Drawings include specially prepared technical data for the Work, including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form for general application to other contracts.
3. Samples: Samples include both fabricated and unfabricated physical examples of materials, products and units of Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.
4. Miscellaneous Submittals: Miscellaneous Submittals related directly to the Work (non-administrative) include construction permits, Stormwater Pollution Prevention Plan (SWPPP) requirements, Spill Prevention Control and Countermeasures Plan (SPCC), Work Plan, Health and Safety Plan, warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical Work records, quality testing and certifying reports, copies of industry standards, records, drawings, field measurement data, operation and maintenance materials, overrun stock; and similar information, devices and materials applicable to the Work and not processed as Product Data, Shop Drawings or Samples.

1.3 QUALITY ASSURANCE

A. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. When an item consists of components from several sources, Contractor shall submit a complete initial submittal including all components.

1.4 SUBMITTAL SEQUENCING AND SCHEDULING

A. Coordinate preparation and processing of submittals with performance of the Work so that Work will not be delayed by submittal review process.

B. Coordinate and sequence different categories of submittals for the same Work, and for interfacing units of Work, so that one will not be delayed for coordination with another.

C. The Contractor shall make all submittals far enough in advance of scheduled installation dates to provide all time required for reviews, for possible revisions and resubmittals, and for placing orders and securing delivery. Submittals shall be received at least 21 calendar days prior to any scheduled work for the activity covered by the submittal unless otherwise noted in individual specification Sections or agreed to in writing by the Engineer.

D. Timing of submittals shall allow for review time by the Engineer.

E. Contractor scheduling shall include preparation of a submittal schedule to be coordinated with the Contractor construction sequencing and scheduling, including allowance for Engineer review time.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 SUBMITTAL PROCEDURES

A. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this Contract, Contractor name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data. The forms shall be sequentially numbered.

B. The Contractor shall certify by signing the submittal that review, verification of products required, field dimensions and coordination of information is in accordance with the Work as specified in the Contract Documents.

C. Process submittals in accordance with this section.

D. Identify specific variations from the Contract Documents and Product or system limitations which conflict or may be detrimental to successful performance of the completed Work.

E. Provide space for the Contractor and Engineer review stamps. Submittals shall contain Contractor's executed review and approval marking. Submittals which are received from sources other than through Contractor or do not contain the Contractor approval marking will be returned without action.

F. Revise and submit resubmittal as required and identify all changes made since the previous submittal. Submission of resubmittals shall be performed in a similar manner as that of the submittals described in Paragraph 3.1 of this section.

G. Distribution:

1. Six copies of each drawing and necessary data shall be submitted. Engineer will return two marked copies to Contractor. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
2. Distribute copies of reviewed submittals to all subcontractors whose work will interface with the subject of the submittal.
3. Provide additional distribution of submittals (not included in other copy submittal requirements specified in this Section) to subcontractors, suppliers, fabricators, installers, governing authorities and others as necessary for performance of the Work.
4. Include such additional copies in transmittal to Engineer where required for status before final distribution, and show such distribution on transmittal form.

H. The Engineer will review submittals only for general conformance with the Contract Documents. Such review by the Engineer shall not relieve the Contractor or any subcontractor of responsibility for full compliance with Contract requirements; for correctness of dimensions, clearances and material quantities; for proper designing of details; for proper fabrication and construction techniques; for proper coordination with other trades; and for providing all devices required for safe and satisfactory construction and operation.

I. Submittals reviewed by the Engineer and returned to the Contractor will be marked with one of the following designations:

1. No Exceptions Taken
2. Furnish As Noted
3. Revise and Resubmit

J. Processing of Revise and Resubmit Submittals

1. When the drawings and data are returned marked “Revise and Resubmit” Contractor shall not proceed with manufacture and the corrections shall be made as noted thereon and as instructed by Engineer and six corrected copies resubmitted.
2. Resubmissions will be handled in the same manner as first submissions. Direct specific attention, in writing or on the resubmittal, to revisions other than the corrections requested by the Engineer on previous submittals using the notation specified in this Section.

K. Processing of Furnish As Noted Submittals

1. When the drawings and data are returned marked "Furnish As Noted”, Contractor may proceed with manufacture at its own risk on the basis of incorporating all comments noted on the returned drawings and data, and six corrected copies submitted.
2. Resubmissions will be handled in the same manner as first submissions. Direct specific attention, in writing or on the resubmittal, to revisions other than the corrections requested by the Engineer on previous submittals using the notation specified in this Section.

L. Processing of No Exceptions Taken Submittals:

1. Each copy of the submittal so designated by the Engineer will be identified accordingly by being so stamped and dated.
2. Construction shall be carried out in accordance therewith and no further changes made therein except upon written instructions from the Engineer. Final drawings (paper, mylar, or electronic) and/or microfilms shall be submitted to the Engineer.

3.2 RESUBMITTAL OF DRAWINGS AND DATA

A. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal.

B. Promptly notify the Engineer, if any correction or notation indicated on submittals constitutes a change of the Contract requirements.

C. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.

D. Resubmittals shall be made within 7 days of the date of the letter returning the material to be modified or corrected.

E. Any need for more than one resubmission, or any other delay in obtaining Engineer review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of Engineer to review any submittal within the submittal review period specified herein and to return the submittal to Contractor.

3.3 PROPOSED PRODUCT LIST

A. Within 30 days from execution of the Agreement between Owner and Contractor, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product, and the lead time for procurement, fabrication and delivery of all products with a lead time of more than 30 days.

B. For products specified only by reference standards, give manufacturer, trade names, model or catalog number, and reference standard.

3.4 PRODUCT DATA, SHOP DRAWINGS, AND SAMPLES

A. Product Data:

1. Collect required data into one submittal for each unit of Work or system; and mark each copy to show which choices and options are applicable to the Work. Include manufacturer's standard printed recommendations for application of labels and seals, notation of field measurements which have been checked, and special coordination requirements.
2. Maintain one set of Product Data (for each submittal) at project site, available for reference by Engineer and others.

3. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide all information unique to this Project.
4. After review, distribute in accordance with paragraph 3.1 of this section.

B. Shop Drawings:

1. Reproduce and distribute in accordance with Paragraph 3.1 of this section and for Record documents described in Section 01770: Contract Closeout.

C. Samples:

1. Provide units identical with final condition of proposed materials or products for the Work.
2. Include "range" samples (not less than three units) where unavoidable variations must be expected, and describe or identify variations that must be expected, and describe or identify variations between units of each set.
3. Provide full set of optional samples where Owner selection is required. Prepare samples to match Owner sample where so indicated.
4. Include information with each sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture, and "kind" by Owner.
5. Engineer will not "test" samples (except as otherwise indicated) for compliance with other requirements. Conformance with the Contract Documents is the exclusive responsibility of the Contractor.

3.5 MISCELLANEOUS SUBMITTALS

A. Construction Permits:

1. Acquire, maintain, and submit copies of all construction permits that are required by agencies to execute the Work.

B. Manufacturers' Instructions:

1. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing in quantities specified herein.
2. Identify any conflicts between manufacturers' instructions and Specifications

C. Manufacturers' Certificates:

1. When specified in individual specification Sections, submit manufacturers' certificates to Engineer, in quantities specified herein.
2. Indicate that a material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
3. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer. If these are outdated and/or not acceptable to

Engineer, the Contractor shall submit to the Engineer the new certificates and test results on materials or product.

D. Tests and Test Reports:

1. Classify each as either "project related" or Product Data, depending upon whether report is uniquely prepared for project or a standard publication of workmanship control testing at point of production, and process accordingly.
2. All test equipment used shall be verified to be in calibration at the time of each test and test reports shall so indicate. No test shall be made without such verification.

E. Standards:

1. Where copy submittal is indicated, and except where specified integrally with Product Data submittal, submit a single copy for Engineer's use.
2. Where workmanship at project site and elsewhere is governed by standards, furnish additional copies to fabricators, installers and others involved in performance of the work.

END OF SECTION

SECTION 01350
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Landscape preservation; prevention of water pollution; abatement of air pollution; abatement of noise; and temporary drainage provisions.

1.2 LANDSCAPE PRESERVATION

A. Exercise care to preserve the existing landscape outside of specified limits of areas of site disturbance. Conduct construction operations to prevent any unnecessary destruction, scarring, or defacing of the natural or man-made surroundings in the vicinity of the work.

B. Shape irregularly the edges of clearings and cuts through trees, shrubbery, and vegetation to soften the undesirable visual impact of straight lines. Perform movement of crews and equipment within the right-of-way, within easements, and over routes provided for access to the work in a manner to prevent damage to vegetation and property.

C. Destruction, scarring, damage, or defacing of the landscape resulting from the Contractor's operations shall be repaired, replanted, reseeded, or otherwise corrected as directed by the Owner and at the Contractor's expense.

D. The locations, alignments, and grades of construction roads are subject to approval of the Owner. Site clearing shall be conducted in accordance with Section 02230: Clearing and Grubbing. When no longer required by the Contractor, areas of construction roads and staging, stockpiling/disposal and storage areas shall be restored to the original topographic contours except as otherwise specified for excess excavation materials. All areas disturbed by construction shall be reclaimed in accordance with Section 02920: Reclamation. All contouring and reclamation work completed in disturbed areas shall be conducted in such a manner as to provide for proper drainage and to prevent erosion.

E. Except where clearing is required for permanent works or excavation operations, all trees, shrubbery, vegetation, and wetlands shall be preserved and protected from damage by the Contractor's construction operations and equipment.

F. Exercise special care where trees or shrubs are exposed to injuries by construction equipment, excavating, dumping, chemical damage, or other operations. Adequately protect such trees by use of protective barriers or other methods approved by the Owner. Removal of trees and shrubs shall be permitted only after approval by the Owner.

G. The layout of the Contractor construction facilities such as shops, trailers, storage areas, and parking areas; location of access and haul routes; and operations in the stockpile areas shall be planned and conducted in such a manner that all trees and shrubbery not approved for removal by the Owner shall be preserved and adequately protected from either direct or indirect damage by the Contractor operations.

H. No equipment shall be allowed to operate within the dripline of any tree to be protected.

I. Trees shall not be used for anchorages.

J. The Contractor shall be responsible for injuries to trees and shrubs caused by their operations. The term injury shall include, without limitation, bruising, scarring, tearing, and breaking of roots, trunks, or branches. All injured trees and shrubs shall be repaired or treated without delay, at the Contractor's expense. If injury occurs, the Owner shall determine the repair method or treatment to be used for injured trees and shrubs as recommended by an experienced horticulturist or a licensed tree surgeon provided by and at the expense of the Contractor. All repairs or treatment of injured trees shall be performed under the direction of an experienced horticulturist or a licensed tree surgeon provided by and at the expense of the Contractor.

K. Injured trees or shrubs that, in the opinion of the Owner, are beyond saving shall be removed and replaced early in the next planting season. The replacements shall be the same species, or other approved species, and of the maximum size that is practicable to plant and sustain growth in the particular environment. Replacement trees and shrubs shall be guyed, watered, and maintained for a period of one month. Any replacement tree or shrub that dies shall be removed and replaced, as directed by the Owner, with such replacements being maintained for a period of one month from the replacement date. Replacement of injured trees and shrubs not required to be cleared or removed for construction shall be at the Contractor's expenses.

1.3 SPILL PREVENTION AND CONTROL

A. Prepare and provide spill prevention and control procedures in the Work Plan submittal, See Section 01120: Contractor Work Plan. Prepare and implement spill prevention and control procedures and appropriate containment and diversionary structures, materials, and equipment to prevent and control the maximum spillage of any specific item within the scope of work. This includes the materials and equipment used in connection with this project. The procedures shall ensure that sufficient inspections and tests are performed on a continuing basis. All qualified personnel, appropriate facilities, instruments, equipment, and testing devices necessary for quality spill prevention and control shall be furnished. The spill prevention and control procedures shall be carefully thought out and prepared in accordance with all applicable Federal, State, and local laws and regulations, and good engineering practices. The necessary resources for procedures, methods, and equipment operations shall also be addressed.

B. Provide spill prevention and control procedures in the Work Plan as appropriate for the material being handled and hauled by the Contractor. Design, construct, operate and maintain preparedness and prevention facilities to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air or surface water which could threaten human health or the environment.

C. Implement special measures to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides, insecticides, harmful materials, biological materials, and concrete materials from entering the air, waters of the State, utilities, and storage areas.

D. Laws and Regulations: Do not pollute any area with any manmade or natural harmful materials. It is the sole responsibility of the Contractor to investigate and comply with

all applicable Federal, State, county, and municipal laws and regulations concerning spill prevention and control procedures.

E. Communications: Provide internal communications or an alarm system to provide immediate emergency instruction to facility personnel if necessary. Provide a device, such as a telephone immediately available at the scene of operations, capable of summoning emergency assistance from local police departments, fire departments, State or local emergency response teams. A project telephone directory shall be included in the Work Plan.

F. Dispose of all materials off site in accordance with applicable Federal, State, and local laws and regulations. See Section 01575: Disposal of Waste Materials for additional requirements.

G. Required inspections and documentation shall be in accordance with written procedures developed by the Contractor. These written procedures shall be part of the Work Plan. A record of the inspections, signed by the appropriate supervisor or inspector, shall be maintained during the project and submitted to the Engineer for final close-out.

H. If materials are released provide a written description of the event, corrective action taken, and plans for preventing recurrence, as well as a written document of manpower, equipment, and materials required to expedite control and removal of any harmful quantity of materials released.

I. The Contractor is responsible for properly instructing Contractor personnel regarding applicable pollution control laws, rules, and regulations and in the operation and maintenance of equipment and BMPs to prevent the discharge of materials. Schedule and conduct spill prevention briefings for its operating personnel at intervals frequent enough to assure adequate understanding of spill prevention and control procedures for this project. Such briefings shall highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

J. Designate a person who is responsible for environmental protection to include but not limited to material spill prevention, BMPs maintenance, recordkeeping, permit condition compliance and who reports to management.

K. All facility communication systems and spill control equipment, shall be maintained by the Contractor as necessary to assure proper operation in time of emergency.

1.4 PREVENTION OF WATER POLLUTION

A. Comply with all project permit requirements, and all other applicable federal, state, and local laws, orders, regulations, permits, and water quality standards concerning the control and abatement of water pollution.

B. Perform construction activities by methods that shall prevent entrance or accidental spillage of solid matter, contaminants, debris, and other pollutants and wastes into streams, flowing or dry water courses, rivers, lakes, and underground water sources.

C. Such pollutants and wastes include, but are not restricted to, refuse, garbage, sediment from erosion of construction areas, concrete wash-out, sanitary waste, industrial waste,

radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

D. Do not allow wastewater from construction operations to enter streams, water courses, wetlands, or lakes without passing through suitable sedimentation ponds or treatment facilities approved by the Engineer.

E. Where the location of a construction site is such that oil or gas from an accidental spillage could reasonably be expected to enter into or upon the navigable waters of the United States or adjoining shorelines, and the aggregate storage of oil or gas at the site is over 1,320 gallons, or a single container has a capacity in excess of 660 gallons, prepare a Spill Prevention Control and Counter Measure Plan (SPCC) reviewed and certified by a registered professional engineer in accordance with 40 CFR, Par 112, as required by Public Law 92-500 as amended by Public Law 95-217 and Public Law 95-576.

F. Submit to the Engineer a certified statement that the SPCC, if required, was reviewed and certified by a professional engineer registered in the State of Colorado.

1.5 ABATEMENT OF AIR POLLUTION

A. Comply with applicable federal and state laws and County ordinances and regulations concerning the prevention and control of air pollution.

B. In conducting construction activities and operation of equipment, utilize such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.

C. The emission of dust into the atmosphere shall be minimized during handling and storage of construction materials, and use such methods and equipment as are necessary to minimize or prevent dust during these operations. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

D. Do not operate equipment and vehicles that are found to have emissions of exhaust gases or particulates that exceed applicable limits established by federal, state, or local laws or authorities until corrective repairs or adjustments are made. If required by the Engineer, the Contractor shall provide acceptable evidence that equipment and vehicles have been tested for exhaust emissions and have been found to be in compliance with applicable limits.

E. Carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from his operations under these Specifications.

1.6 ABATEMENT OF NOISE

A. Comply with applicable federal and state laws and County ordinances, orders, and regulations concerning the prevention, control, and abatement of excessive noise.

B. Take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All

construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

1.7 TEMPORARY DRAINAGE PROVISIONS

A. Provide for the drainage of storm water, and such water as may be applied or discharged on the site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the site, and adjacent property.

B. See also Section 01570: Sediment and Erosion Control.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01410
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Responsibilities for obtaining permits in accordance with federal, state, and local agencies.

1.2 GENERAL PERMIT REQUIREMENTS

A. Comply with the conditions and requirements of all permits required by federal, state, county, and local governing agencies in the performance of this Contract. If the Contractor fails to comply with the conditions and requirements of any permit and such failure to comply results in fines, penalties, and/or suspension of Work by a regulatory agency, all liability for such fines, penalties and delays are the sole responsibility of the Contractor.

B. The Contractor is responsible for obtaining all permits necessary to complete the Work. The Contractor is also responsible for all monitoring, testing, and corrective measures necessary to maintain the permits throughout the duration of the Project, including modification of or renewal of the permits as necessary. Applicable permits may include, but are not limited to, the following:

1. Colorado Department of Health and Environment (CDPHE), Water Quality Control Division (WQCD) Construction Stormwater General Permit (includes preparation of a Stormwater Management Plan [SWMP] and a Storm Water Pollution Prevention Plan [SWPPP].
2. CDPHE, WQCD Construction Stormwater Dewatering Permit.
3. CDPHE, Air Pollution Control Division (APCD), Construction Permit (regulates fugitive dust).
6. Haul permits.

1.3 OWNER OBTAINED PERMITS

A. The Owner is responsible for obtaining certain permits that pertain to the Work.

B. The Contractor shall be responsible for implementing and coordinating the terms and requirements of all environmental permits obtained by the Owner.

C. A copy of the permits obtained by the Owner will be provided with the Bid Documents

1.4 RESPONSIBILITY AND COORDINATION

A. Accept full responsibility for contacting all Federal, State, and local agencies to obtain permitting requirements for construction related activities on lands under jurisdiction by those agencies, and be fully responsible to research and become familiar with regulatory requirements that must be met for the performance of the Contract work.

B. Perform all coordination and documentation, and engineering to obtain the required permits including providing a registered professional engineer for engineering to obtain permits where required.

C. Be fully responsible and solely accountable for meeting the requirements of all permits.

D. Unless otherwise specified by an agency, the Contractor shall be the sole permittee for all contractor-obtained permits.

1.5 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Contractor-Obtained Permits: Copies of all permits obtained by the Contractor.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Contractor quality control requirements.

1.2 QUALITY ASSURANCE/CONTROL

A. Provide a quality control system to perform inspections, tests, and retesting in the event of failure of items of work, including that of subcontractors, to ensure compliance with the Contract provisions. Quality control will be established for all work.

B. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

C. Comply fully with manufacturers' instructions, including each step in sequence.

D. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform work by persons qualified to produce workmanship of specified quality.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. For Products or workmanship specified by association, trades, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

I. Obtain copies of standards when required by Contract Documents.

J. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

K. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3 INSPECTION PROCEDURES

A. Preparatory inspection shall be performed by the Contractor before beginning any work, and, in addition, before beginning each segment of work. Preparatory inspection shall include a review of the Contract requirements, the review of shop drawings and other submittal data, a check to ensure that required control testing will be provided, a physical examination to ensure that materials and equipment conform to approved shop drawings and submittal data, and a check to ensure that required preliminary work has been completed.

B. An initial inspection shall be performed as soon as a representative segment of the particular item of work has been accomplished. Initial inspection shall include performance of scheduled tests, examination of the quality of workmanship, a review for omissions or dimensional errors, and approval or rejection of the initial segment of the work.

C. Follow-up inspections shall be performed as necessary, and shall include continued testing and examinations to ensure continued compliance with the Contract requirements.

D. Test results provided shall cite the Contract requirements, the test or analysis procedures used, and the actual test results, and shall include a statement that the item tested or analyzed conforms or fails to conform to the specification requirements. Each report shall be conspicuously noted in large letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements as the case may be. Test reports shall be signed by a testing laboratory representative authorized to sign certified test reports. The Contractor shall arrange for immediate delivery of the signed original of all test reports, certifications, and other documentation to the Engineer.

1.4 INDEPENDENT INSPECTION AND TESTING LABORATORY SERVICES

A. Conduct quality control testing for each item of Work to confirm work is in accordance with the contract documents.

B. Retain an independent geotechnical inspection and testing firm to perform the Contractor's specified quality monitoring and testing. Submit the name of the independent testing firm and laboratory and a statement of its qualifications. The firm shall have at least 5 years of experience in soil, and concrete inspection and testing, and shall be equipped to perform all field and laboratory tests specified that are the Contractor’s responsibility.

C. Submit names and resumes of the laboratory's key personnel and field testing personnel. Field personnel shall have at least 3 years experience in soil and concrete testing, and cannot be changed without prior approval of the Engineer.

D. Make available written results of all completed tests and inspections performed by the Contractor’s independent testing firm to the Engineer by the end of the next working day following completion of the tests. Provide verbal results to the Engineer upon test completion. Results of all completed tests shall be submitted to the Engineer.

E. Reports will indicate observations and results of tests and indicate compliance or non-compliance with Contract Documents.

F. Retesting required because of non-conformance to specified requirements is the Contractor’s responsibility and shall be performed by the Contractor’s approved testing agency.

1.5 ENGINEER TESTING

A. Engineer may perform and pay for quality assurance inspection and testing at their discretion, independent of testing and inspections performed by Contractor.

B. Cooperate with Engineer; furnish samples of materials, equipment, tools, storage, access, and assistance as requested.

C. Notify Engineer 24 hours prior to QC testing or sampling.

D. Engineer may obtain samples of material for testing. Contractor shall provide Engineer access and assistance in obtaining samples.

E. Engineer may inspect Contractor off-site producers of materials and products. Contractor shall provide access to these off-site facilities to the Engineer at all times during the Work.

1.6 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Quality Control Plan. Prepare and submit a Construction Quality Control Plan (CQCP) within 30 calendar days after receipt of the Notice of Award. The CQCP shall identify personnel, procedures, controls, instructions, tests, records, reports and forms to be used. Describe quality control for each work element. Submit as part of the Work Plan specified in Section 01120: Contractor Work Plan. Unless specifically authorized by the Engineer in writing, construction shall not be started and no requests for payment will be processed until the CQCP is approved. This plan shall include, as a minimum:

1. Names and qualifications of personnel responsible for quality control on the Contract.
2. Area of responsibility and authority of each individual in the quality control system.
3. A description of the services the Contractor will have provided by outside organizations such as testing laboratories, manufacture representatives architects, and consulting engineers.
4. Procedures for reviewing shop drawings, samples, certificates, or other submittals for contract compliance, including the name of the person(s) authorized to sign the submittals for the Contractor, as complying with the Contract.
5. A test and inspection schedule, keyed to the construction schedule and following the order of the specification technical sections, indicating inspections and tests, the names of persons responsible for the inspection and testing for each segment of work, and the time schedule for each inspection and test.
6. The procedures for documenting quality control operation, inspection, and testing, with a copy of forms and reports to be used for this purpose. The Contractor shall also include a submittal status log listing submittals required by the specifications and drawings and stating the action required by the Contractor or the Engineer.

C. Independent Laboratory Qualifications. Name of the independent laboratory, a statement of qualifications (SOQ), the most recent certification by state/federal or other appropriate independent testing services, and names, resumes, and experience of the laboratory and field key personnel. Include a statement indicating the laboratory and field key personnel meet the requirements of this specification.

D. Daily Quality Control Reports.

E. Results of all completed testing.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heating ventilation and air conditioning (HVAC), telephone service, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, project signage, and water control.

C. Construction Facilities: Access roads, parking, field offices.

1.2 TEMPORARY ELECTRICITY

A. Provide all power for HVAC, lighting, operation of Contractor's plant or equipment, or for any other use by Contractor.

B. Provide and pay for power service from utility sources as required.

C. Provide temporary electric feeder and electrical service as required.

D. Provide separate metering for cost of energy used as required.

1.3 TEMPORARY LIGHTING

A. Provide and maintain lighting for construction operations.

1.4 TEMPORARY HEAT

A. Provide HVAC devices and heat or cool as required to maintain specified conditions for construction operations.

1.5 TEMPORARY TELEPHONE AND INTERNET SERVICE

A. Make all necessary arrangements and pay all installation and monthly service charges for telephone and internet connection lines in engineer’s field offices at the site and provide all telephone instruments and modems.

1.6 TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations.

1.7 TEMPORARY SANITARY FACILITIES

A. Furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each

20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

1.8 CONSTRUCTION AIDS

A. Furnish, install, maintain, and operate all construction aids required by Contractor and its Subcontractors in the performance of the Work. Such construction aids shall include, but not be limited to, the following:

1. Cranes and hoists
2. Temporary enclosures
3. Scaffolding
4. Temporary stairs
5. Drainage provisions

1.9 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

A. Protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, shall be restored to their original condition. All replacements shall be made with new materials.

B. Contractor is responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work or any part or site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the Owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

1.10 DAMAGE TO EXISTING PROPERTY

A. Contractor will be held responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, the Owner.

B. Protect all existing structures and property from damage. Provide bracing, shoring, or other work necessary for such protection.

1.11 BARRIERS AND FENCING

A. Provide barriers or fencing to protect adjacent properties from damage from construction operations and demolition.

B. Provide barriers around all excavations or obstructions to prevent accidents and protect Work, apparatus, equipment, and material from theft and accidental or other damages, and make good any damages thus occurring at no cost to the Owner.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

D. Provide measures to protect Owner's personnel and public from Work activities including, but not limited to, safety fence surrounding the work and staging, storage and stockpile areas.

1.12 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers, as required, to protect site from soil erosion.

1.13 DUST CONTROL

A. Provide all labor, equipment, machinery and other means to control dust emissions throughout the site for the duration of the project.

B. Abate dust nuisance by cleaning, sprinkling with water or other means as necessary.

C. The use of water, in amounts which result in ponding, is not acceptable as a substitute for other methods.

1.14 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

1.15 SECURITY

A. Provide security and facilities to protect Work and Owner's operations from unauthorized entry, vandalism, or theft.

B. Contractor is responsible for protection of the site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

C. No claim shall be made against the Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from his failure to provide security measures as specified.

D. Security measures shall be at least equal to those usually provided by the Owner to protect the existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site and the public.

E. Keep all watershed access gates locked except during the time when they are attended. Key privileges will be defined in the Preconstruction meeting.

1.16 ACCESS ROADS

A. Conduct work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and

walks, whether public or private, provide and maintain suitable and safe detours, or other temporary expedients for the accommodation of public and private travel.

B. As approved and based on the site location, construct and maintain temporary roads accessing public thoroughfares to serve construction area. Locations and methods of construction proposed for temporary access roads must be submitted for approval in the Contractor's work plan.

C. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.

D. Provide means of removing mud from vehicle wheels before entering streets.

1.17 PARKING

A. Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities. The location of the Contractor's parking areas shall be as acceptable to, and approved by, the Owner

1.18 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition. Brush clean or wash roadway near construction entrance(s) regularly.

B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Remove waste materials, debris, and rubbish from site and dispose off-site.

D. Maintain all construction areas and adjacent sites in a dust free condition.

E. Do not allow any condition to exist during construction which creates a nuisance; a fire hazard; an environment injurious to water quality, air quality, health or safety; or an attraction for children, animals, birds, rodents, etc.

F. Failure to comply with this provision after due and proper notice has been given by the Owner or representative will be sufficient grounds for the Owner to proceed to clean up such material and debris, make repairs and charge same to the Contractor.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition as specified in the Specifications. Restore permanent facilities used during construction to specified condition.

1.20 PROJECT CONTROLS

A. Provide signs along access roads to direct subcontractors, vendors etc to the construction site along approved access roads.

1.21 CONTRACTOR'S FIELD OFFICE

A. During the performance of this Contract, maintain a suitable office at or near the site of the Work which shall be the headquarters of its representative authorized to receive drawings, instructions, or other communication or articles. Any communication given to the said representative or delivered at the Contractor's office at the site of the Work in its absence shall be deemed to have been delivered to Contractor.

B. Copies of the Drawings, Specifications, and other Contract Documents shall be kept at the Contractor's office at the site of the Work and available for use at all times.

1.22 TEMPORARY FACILITIES

A. The Contractor shall remove temporary facilities as approved by the Engineer when no longer required.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01515
CANAL CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Control of canal discharges by Owner and predicted canal flows from precipitation events.

1.2 COORDINATION

A. The Owner will be responsible for coordinating operation of the canal and siphon.

1.3 LEVEL OF RESPONSIBILITY

A. Construction shall be protected from stormwater runoff by methods proposed by the Contractor and approved by the Engineer. The Contractor is responsible for diversion and any costs and delays associated with damage from inadequate protection from stormwater.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 CANAL CONTROL

A. Under existing conditions, the canal is primarily supplied from upstream inflows from the siphon and precipitation events from the drainage basin that flows into the canal.

B. Work on the canal shall occur while the canal is dry.

C. The Owner will control the flow into the canal during construction. The Contractor is responsible for coordinating construction with the Owner.

D. The canal may flow during construction due to varying inflows from precipitation events.

END OF SECTION

SECTION 01550
CONSTRUCTION ACCESS ROADS AND PARKING AREAS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for construction access roads and parking areas.

1.2 GENERAL

A. Access the construction area using only established roads.

B. Contractor is responsible for all snow removal on roads when required for access to the Work and shall furnish all required equipment and labor necessary to remove snow. Owner will only remove snow if and when necessary for Owner operations.

C. All construction traffic shall stay on approved access roads.

D. Dust mitigation measures shall include at a minimum, control of vehicle speed on roads, and furnishing a water truck and operator for road dust control when required. Other dust mitigation measures such as palliatives may be considered and will require submittal approval.

E. Obtain any applicable federal, state, or Local County permits for hauling on state, county, or local roads.

1.3 PROTECTION OF EXISTING ROADS

A. When legal load limits are exceeded, the Contractor may be fined by the Federal Government, County or State at no additional cost to the Owner. Repair damage to County or State roads caused by construction activity to meet the applicable roadway standards.

B. Before using any existing roads for moving construction equipment or hauling materials and supplies to the site, the Contractor, Owner and Engineer will jointly perform a condition survey of roads in the vicinity of the project. Notify the Engineer at least 10 days in advance of hauling any equipment or materials to the site. A representative of the County may also be present for the condition survey.

C. Contractor is responsible for maintaining access roads in their preconstruction condition until all construction activities are complete. Roads degraded by Contractor operations shall be repaired/regraded in a timely manner.

1.4 CONSTRUCTION ACCESS ROADS

A. Unlined areas of the canal may be temporarily used for construction access. No equipment shall be allowed to operate on the existing culvert, existing concrete lined areas of the canal, and on new concrete canal liner. Any damage to existing or constructed concrete canal liner will be replaced by the Contractor and no cost to the Owner.

B. Construct and maintain temporary roads accessing public thoroughfares to serve construction area, with Owner approval and in accordance with all Federal, state, and local requirements.

C. Maintain public roadways free of mud and other construction debris. Install gravel tracking pad or other means to prevent tracking debris or mud onto public roads.

D. Extend and relocate as Work progress requires.

E. Construct, maintain, and reclaim temporary construction roads for access to borrow and disposal areas, and for other purposes required for the Work, in accordance with the requirements of the Specifications.

F. Indiscriminant construction of roads and travel will not be permitted.

1.5 PARKING

A. Provide temporary gravel surface parking areas at Contractor use areas to accommodate construction personnel, as approved by the Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01555
STAGING AND STOCKPILE AREAS

PART 1 GENERAL

1.1 STAGING AND STOCKPILE AREAS

A. Establish field offices in the staging and stockpile areas in areas shown on the Drawings or approved by the Owner.

B. Any clearing, grubbing, or grading in the staging and stockpile areas performed by the Contractor for setting up and maintaining this area requires the approval of the Engineer.

C. Strip and stockpile topsoil from the staging and stockpile areas in accordance with Section 02235: Stripping and Stockpiling Topsoil.

D. Reclaim staging and stockpile areas in accordance with Section 02920: Reclamation.

E. Stockpile earthfill, topsoil, and other construction materials in the Contractor staging and stockpile areas, and disposal and borrow areas shown on the drawings or as approved by the Engineer.

F. Stockpiling of materials outside the limits of the designated areas requires the approval of the Engineer.

1.2 SECURITY OF STAGING AND STOCKPILE AREAS

A. The Contractor is responsible for securing the staging and stockpile areas. Provide any security measures Contractor deems necessary to protect these work areas. All security fences and gates, if used by the Contractor, shall be removed by the Contractor at the end of construction.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01570
SEDIMENT AND EROSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing all labor, materials, equipment, and incidentals necessary to perform all installation, maintenance, removal, and cleanup related to erosion and sedimentation control work as specified herein and as required by local authorities and permit to prevent erosion and/or transport of silt or sediment outside the limits of disturbance.

B. The work includes, but is not necessarily limited to, installation of temporary access ways and staging areas, silt fences and sediment barriers, sediment removal and disposal, device maintenance, removal of temporary devices, temporary stabilization, best management practices (BMPs), and final cleanup.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Technical product literature for all commercial products to be used for sedimentation and erosion control.

C. Contractors Sedimentation and Erosion Control Plan: (BMPs) in accordance with Local, State and federal regulations.

1.3 QUALITY ASSURANCE

A. The Contractor is responsible for the timely installation, maintenance, and removal of all sedimentation control devices necessary to prevent the movement of slurry or sediment from the construction site to offsite areas or into the stream or wetland system or preservation/ conservation areas via surface runoff or underground drainage systems. Measures, in addition to those shown on the Drawings, necessary to prevent the movement of sediment outside the limits of construction shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered for the Work under this Section.

B. Sedimentation and erosion control products shall conform to the Drawings, this Section, County requirements, or CDOT standards as applicable.

C. The Contractor's means and methods for excavations and soil disturbing activities shall be conducted to minimize the risk of sediment transport downstream. Sediment control measures will be required to meet strict project and permit standards.

PART 2 PRODUCTS

2.1 MATERIALS

A. Silt Fence:

1. Posts: 2" x 2" wood, min. 4'-6" length as approved by the Project Manager.

2. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc.
3. Prefabricated commercial silt fence may be substituted for built-in-field fence. Pre-fabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc.

B. Erosion Bales:

1. Consisting of Certified Weed Free hay or straw certified under the Colorado Department of Agriculture Weed Free Forage Certification Program and inspected as regulated by the Weed Free Forage Act, Title 35, Article 27.5., CRS. Each certified weed free erosion bale shall be identified by one of the following:

a. One of the ties binding the bales shall consist of blue and orange twine, or
b. One of the ties binding the bale shall consist of specially produced shiny
c. galvanized wire, or
d. The bale shall have a regional Forage Certification Program tag indicating the
e. Regional Forage Certification Program Number.

2. Erosion bales shall be inspected for and Regionally Certified as weed free based on the Regionally Designated Noxious Weed and Undesirable Plant List for Colorado, Wyoming, Montana, Nebraska, Utah, Idaho, Kansas, and South Dakota. The Contractor shall not unload certified weed free erosion bales or remove their identifying twine, wire or tags until the Engineer has inspected and accepted them. The Contractor shall provide a certificate of compliance showing the transit certificate number or a copy of the transit certificate as supplied from the forage producer.

C. Erosion Logs: Curled aspen wood excelsior with a consistent width of fibers evenly distributed throughout the log and a seamless casing comprised of a photodegradable tube netting. The curled aspen wood excelsior shall be fungus free, resin free and shall be free of growth or germination inhibiting substances. Furnish logs with the minimum diameter and length shown on the Drawings.

PART 3 EXECUTION

3.1 LOCATION OF SEDIMENT/EROSION CONTROL DEVICES

A. Provide sediment/erosion control barriers as needed to control the transport of silt and sediments outside of the limits of construction.

B. Install around the base of all soil stockpile areas. All nonworking faces of soil stockpiles, which will be in place longer than three months, shall be seeded and mulched or otherwise stabilized as acceptable to the Engineer.

3.2 INSTALLATION

A. Silt Fence Installation:

1. Positioned as necessary to prevent movement of sediment produced by construction activities outside of the limits of construction or as approved.

2. Install pre-fabricated silt fence according to Manufacturer's instructions and Drawing details.

B. Hay bale Barrier:

1. Bales shall be either wire-bound or string-tied with the bindings oriented around the sides rather than over and under the bales.
2. Bales shall be placed lengthwise in a single row with the ends of adjacent bales tightly abutting one another.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4-inches. After bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfilled material shall conform to the ground level on the downhill side and shall be built up to 2 inches against the uphill side.
4. Each bale shall be securely anchored by at least two stakes or rebars driven through the bale. The first stake shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.
5. The gaps between each bale shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales.

C. Inlet Protection:

1. Install inlet protection for all catch basins, drop inlets, drop structures, inlets to drainage pipes, or other structures.

3.3 MAINTENANCE AND INSPECTIONS

A. Inspections:

1. Contractor shall make a visual inspection of all devices at least once every 14 days and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent erosion and/or movement of sediment to areas outside the limits of construction, Contractor shall promptly install additional devices as needed. Controls in need of maintenance shall be repaired promptly.
2. Contractor shall keep a log of all inspections indicating the following:

    a. Date and time of inspection
    b. Construction Project Inspector
    c. Amount of rainfall
    d. Erosion and sediment control devices inspected
    e. Condition of sediment and erosion control devices
    f. Repairs needed
    g. Date repair is completed

B. Minimum Device Maintenance:

1. Silt Fences:

    a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
    b. Replace damaged fabric, or patch with a 2-foot minimum overlap.

c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.

2. Hay bale Barriers:

a. Remove accumulated sediment once it builds up to one-half of the height of the hay bales.
b. Replace damaged hay bales.
c. Make other repairs as necessary to ensure that the hay bales are filtering all runoff directed to the barrier.

3. Inlet Protection:

a. Remove accumulated sediment once it builds up to one-half of the height of the barrier.
b. Remove all sediment accumulated within the barriers.
c. Make repairs as necessary to ensure that the inlet protection device is operating properly.

3.4 TEMPORARY STABILIZATION

A. The duration of the exposure of uncompleted construction to the elements shall be as short as practicable. Completed areas shall be permanently stabilized with seeding and mulching in accordance with Section 02920: Reclamation within seven calendar days after completion.

B. Disturbed areas where work is temporarily halted shall be temporarily stabilized within seven days after the activity ceased unless work is to be resumed within 30 calendar days after the activity ceased. Temporary stabilization required by Contractor's negligence, or lack of proper scheduling, or for the convenience of the Contractor shall be at no cost to the Owner.

C. Temporary stabilization is defined as the covering of disturbed areas with seed, mulch, mulch with a tackifier, or a combination thereof. Temporary soil stabilization techniques shall be proposed by the Contractor and approved by the Engineer. Furnish temporary seed, if required, in accordance with Section 02920: Reclamation.

3.5 REMOVAL AND FINAL CLEANUP

A. Once the Site has been fully stabilized against erosion as approved by the Engineer, remove sediment control devices and all accumulated sediment. Dispose of sediment and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Drawings or specified herein.

END OF SECTION

SECTION 01575
DISPOSAL OF WASTE MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Classification of Waste Materials.
2. Disposal of Waste Materials.

1.2 CLASSIFICATION OF WASTE MATERIALS

A. Waste materials to be disposed of are classified in three categories: 1) excavated waste materials, 2) cleared vegetation, and, 3) other waste materials

1. Excavated waste materials include only those materials which are excavated from the designated excavations at the site which are not suitable for use in construction as determined by the Engineer, or in excess of that needed for construction.
2. Cleared vegetation includes vegetation cleared from within the limits of site disturbance including excavation areas, borrow and disposal areas, staging and stockpile areas, and temporary construction roads.
3. Other waste materials include, but are not limited to demolished concrete and other demolished materials, sediment from sediment and erosion control devices reinforcing steel, pipe, miscellaneous metalwork etc., concrete truck wash water, oil and other petroleum products, solvents, paints and stains, refuse, garbage, debris, sanitary waste, crank case oil, grease, paint thinner, cleaning solvents or any other materials used in maintenance or operation of construction equipment.

1.3 DISPOSAL OF MATERIALS

A. The following materials shall be disposed of at an off-site disposal facility:

1. Other waste materials described in this Section.

B. The following materials may be disposed on-site:

1. Cleared vegetation.
2. Excavated waste materials described in this Section.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 OFF-SITE DISPOSAL OF WASTE MATERIALS

A. Remove waste materials from the construction area prior to the completion of the work by the Contractor. Dispose of waste materials in an approved solid-waste facility or other approved facilities.

B. It is the responsibility of the Contractor to make any necessary arrangements with private parties and with County officials pertinent to locations and regulations of area landfills. Any fees or charges required to be paid for disposal of materials shall be paid by the Contractor.

C. In the event that certain materials cannot be disposed of in the local waste disposal facility, the Contractor shall identify a suitable alternative approved waste disposal facility and shall dispose of the material at such facility at no additional cost to the Owner.

3.2 ON-SITE DISPOSAL OF EXCAVATED WASTE MATERIALS

A. Onsite disposal area must be approved by the Owner.

B. Clear, grub, and strip approved onsite spoils disposal area in accordance with Section 02230: Clearing and Grubbing, and Section 02235: Stripping and Stockpiling Topsoil.

C. Excavated waste materials may be disposed of in approved spoils disposal areas provided placement methods comply with the provisions specified herein.

D. Reduce excavated waste rock material with an average dimension greater than 3 feet in diameter to a maximum average dimension of 3 feet in diameter.

E. Spread excavated rock material evenly over the disposal area in approximately 3 foot lifts and in a manner that does not create nesting rocks or void areas that would cause post construction settlement as approved by the Engineer.

F. Place excavated waste material to fill voids between large excavated waste rock materials to the thickness required to fill areas between the larger material, moisture condition as directed by the Engineer and compact this layer with a minimum of 4 coverages of a D-6 or larger bulldozer or suitable roller as approved by the Engineer

G. Place remaining excavated waste material in maximum 12-inch loose lifts, moisture condition the material to near optimum as directed by the Engineer, and compact each lift with a minimum of 4 coverages of a D-6 or larger bulldozer or suitable roller as approved by the Engineer.

H. Grade and shape the placement area to match surrounding grade and such that existing drainage patterns are maintained and there are no areas that would pond water.

I. Place stockpiled topsoil over the spoils disposal area and revegetate in accordance with Section 02920: Reclamation.

END OF SECTION

SECTION 01720
LAYOUT OF WORK AND SURVEYING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section covers surveying requirements.

1.2 GENERAL

A. Existing site reference points and baselines as shown on the Drawings.

B. Provide all materials, items, operations or methods specified, listed or scheduled in specifications and drawings, including all materials, labor, equipment and incidentals necessary and required to conduct proper surveys required to stake and layout the Work.

C. Perform all surveys for the Work including checking existing survey control reference point locations and elevations; reestablishing construction control, resetting of stakes and monuments, measurement for payment of completed work, and performing surveys needed for restoration of public and private improvements that have been damaged, destroyed, or relocated by Contractor.

D. All surveys and staking shall be performed under the responsible charge of a Professional Land Surveyor licensed with the Board of Registration for Professional Engineers and Professional Land Surveyors (the Board) in the State of Colorado and in accordance with applicable CRS and Board rules.

E. The surveyor performing the on site construction staking shall have a minimum of 5 years of construction staking experience.

F. The cost to the Contractor of all work and delays occasioned by giving lines and grades, or making other necessary surveys and measurements, will be considered as having been included in the unit and lump sum prices for items of Work.

G. All field books, notes, and other data developed by Contractor in performing surveys required as part of the Work shall be available to Engineer for examination throughout the construction period. All such data shall be submitted to Engineer with the other documentation required for final acceptance of the Work.

H. Contractor shall keep neat and legible notes of measurements and calculations made in connection with the layout of the Work and measurement and payment. Copies of such data shall be furnished to the Engineer for use in checking Contractor's layout and measurement and payment.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Qualifications: Resume detailing the experience level of the licensed land surveyor shall be submitted to Engineer for review 10 days prior to the start of any staking activities. Include Telephone Number, Address, Qualifications, and License.

C. Survey Records: Contractor shall use the control points established and shown on the drawings. As the work progresses, all subsequent changes to the survey control plan shall be submitted.

D. A certificate signed by the PLS, stating that the elevations and locations of the Work are in conformance with Contract Documents shall be submitted at Contract closeout.

E. After a survey is conducted, submit survey data and field notes to the Engineer. Electronic data (drawings in AutoCAD-compatible .DWG format and data in ASCII format) also shall be submitted.

1.4 PROJECT PRIMARY SURVEY CONTROL

A. Horizontal and vertical primary survey control for the project consists of existing reference control points shown on the Drawings.

B. Contractor is responsible for checking the position of the reference points comprising the primary control prior to starting site work and to notify the Engineer of discrepancies found between actual and record measurements.

C. The existing reference points shall not be disturbed without prior written approval from the Engineer. If existing reference points are disturbed during construction, new reference points shall be installed by the Contractor to control the work. The locations of the new reference points will be approved by the Engineer prior to setting the new reference points.

D. Protection of monuments and stakes is the responsibility of Contractor. Replacement of damaged control and reference points shall be at Contractor's expense.

1.5 SECONDARY CONTROL

A. From the primary reference control provided by Engineer, establish secondary control points necessary for the construction of the Work. Secondary control shall consist of sufficient permanent points to establish the lines and grades for the various Work either directly or by offset. Layout lines for use in construction of the Work shall be established by the Contractor and taken directly from either the primary or secondary controls.

B. Secondary control shall be tied to and closed upon the primary control.

1.6 ACCURACY OF SURVEYS

A. Points for cross sections shall be located to the nearest 0.05 foot horizontally and vertically.

B. Vertical elevation surveys shall close within 0.05 foot times the square root of the length of the circuit in miles.

C. All grade stakes shall be set to 0.02 foot.

D. Alignment of tangents and curves shall be within 0.01 foot.

E. Points for structures shall be set to the nearest 0.02 foot, except where operational function of special features require closer tolerances.

F. Survey movement monuments shall be surveyed within an accuracy of 0.01 foot vertical and 0.01 foot horizontal.

G. Tolerances for all other Work shall be as shown or specified in the Contract Documents.

H. Survey instruments shall be accurate and shall be subject to inspection by Engineer for proper operation.

1. Electronic distance measuring (EDM) instruments used by Contractor on the Site shall be checked for calibration a minimum of once per month on an established base line approved by Engineer. Calibration results shall be kept in a log book, available Engineer's review, showing the date and distances measured on the base line. An EDM shall not be used if it does not meet the minimum advertised accuracy published by the manufacturer of the EDM.
2. Global Positioning System (GPS) equipment shall undergo a zero baseline test. A zero baseline test is a test on two or more receivers simultaneously gathering data from one antenna. The data is post processed to give a resulting vector between the receivers that is equal to zero.
3. Defective survey instruments shall be promptly replaced, repaired, or adjusted to operate within the tolerances of the instrument manufacturer.

I. All work not performed with the methods and equipment as submitted by Contractor and accepted by Engineer shall be removed and replaced by Contractor at its own expense.

1.7 PROTECTION OF MONUMENTS, STAKES, AND MARKS

A. Contractor shall preserve and protect all survey monuments and related marks. When removal is necessary, Contractor shall accurately reference the monuments or related marks, subject to the approval of Engineer.

1. All survey stakes, control points, monuments, benchmark, or reference stakes disturbed or destroyed during the work shall be replaced and reset to the satisfaction of Engineer at Contractor's expense.
2. Primary or secondary control monuments removed shall be reset by Contractor as soon as the Work requiring the removal is complete. Alternatively, other control points may be set so as to reestablish the control network.
3. The position of monuments, control points, or other marks that are subject to movement due to the passage of equipment or other forces shall be rechecked at regular intervals, but not less than monthly.

1.8 QUANTITY SURVEYS

A. Following the completion of all the clearing and grubbing operations in an area, and before commencing stripping, Contractor shall prepare a baseline survey consisting of, at a minimum, cross-sections at 50-foot intervals in all areas of disturbance as a basis for determining excavation, and placement of fill materials. Excavation and fill quantities shall be calculated by either the average end area method or by using digital terrain models.

B. Each month, determine the volume of excavation and earthwork accomplished. The quantities shall be determined using the same cross-sections established during the baseline survey.

C. At the point where the Work performed under each bid item is completed, perform a final survey using the same cross-sections established during the baseline survey. This survey shall be used by Contractor to calculate quantities (as described above).

D. The difference in calculated quantities between the initial and final cross-sections or digital terrain models for each item will be the basis for the total payment to Contractor for that item unless otherwise defined in the specifications. Submit a copy of cross-section survey data and quantity calculations to Engineer for each monthly payment.

E. The Engineer may perform check surveys in selected locations to verify measurements and quantities. Provide the Owner and Engineer access to the Work areas for survey measurements, as required.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 REQUIRED SURVEYS

A. Quantity surveys for payment including baseline surveys of existing ground and excavation surfaces.

B. Surveys for project boundaries, including easements, right of ways, and disturbance limits.

C. Surveys of existing structures, including structure and pipe inverts and elevations required to confirm, coordinate and attach existing work to new construction. Such surveys shall be completed as soon as features previously submerged or covered become accessible.

D. As-constructed surveys of new construction, including, but not limited to:

1. Canal, maintenance road and control structures;
2. New canal lining;
3. New HDPE pipeline.

E. All other surveys required for construction to plan elevation and locations and to provide as-constructed information for record documents.

END OF SECTION

SECTION 01770
CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. This section covers contract closeout items including closeout procedures, final cleaning, and project record documents.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's and Owner's review.

B. Provide submittals to Engineer that are required by the Contract Documents, and governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Temporary road cut transition.

C. Clean debris from the site.

D. Sweep paved areas, rake clean landscaped surfaces.

E. Disconnect all temporary utilities to the site, and temporary site facilities and utilities.

F. Remove all Contractor constructed access roads and parking areas.

G. Clear, grade, and seed as required.

H. Remove waste and surplus construction materials, rubbish, wood, bituminous concrete, concrete debris, demolished materials, other foreign material, and construction facilities from the site.

1.4 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Reviewed submittals including shop drawings, product data, and samples.
6. Requests for information, field directives and project correspondence.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to completed construction and the project datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements or benchmarks.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract Drawings.

F. Submit closeout documents to Engineer with request for final Application for Payment.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 02220
SELECTIVE DEMOLITION AND SALVAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selective demolition and salvage of existing features and items designated for removal and disposal.

B. Protection of existing items and features not identified for demolition, removal or dismantling.

1.2 DEFINITIONS

A. Demolish, Demolition, or Remove: Remove and dispose of designated existing equipment, materials, and ancillary features and components.

B. Remove and Salvage: Remove and deliver existing equipment, materials, and ancillary features and components to Owner at location as directed.

C. Remove and Relocate: Remove and relocate equipment, materials, and ancillary features and components.

D. Reinstall: Make service connections, and provide functional equipment at designated new location.

E. Retain or Protect: Leave designated existing equipment, materials, and ancillary features and components in place and protect from damage.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Demolition Plan including:

1. Schedule of demolition, including removals, salvage and replacement in conjunction with Progress Schedule.
2. Proposed methods of demolition including removals, salvage and replacement and equipment to be used.

C. Permits: Copies of current valid permits required by state and local regulations all State and local licenses and permits necessary to carry out the work.

D. After demolition is complete, if requested by the Engineer, submit reports describing quantities and type of demolition materials, and the locations, quantity, and method of disposal.

1.4 EXISTING CONDITIONS

A. Information contained in Contract Documents indicating the general scope of demolition is based on available historic drawings. The Design Drawings show major features and not details for each item.

B. The Demolition Schedule included in this Section is a general summary solely for convenience of Contractor; inspect facilities and verify nature and location of work.

PART 2 PRODUCTS

2.1 NOT USED.

PART 3 EXECUTION

3.1 PREPARATION

A. The extent of demolition work shown on the Drawings is based on site observations. The specific extent of demolition for the various items will be determined by the Engineer in the field.

B. Notify Owner and Engineer minimum 7 days prior to beginning demolition work.

C. Protect existing vegetation, facilities, equipment, and fixtures to remain.

D. Provide temporary barricades and other protection as required.

E. Erect and maintain dustproof and weatherproof partitions and closures as required.

F. Provide required shoring, bracing, and supports.

G. Equipment and Materials Designated for Salvage:

1. Do not remove and salvage features and materials without approval of Engineer.
2. Store and maintain salvaged equipment and materials in same condition as when removed.

H. Contractor and Engineer will document and record the condition of features and materials prior to removal.

3.2 DEMOLITION

A. Conduct demolition operations in a manner ensuring minimum interference with roads, structures, and other adjacent features and facilities.

B. Drawings define extent of demolition. Immediately notify the Engineer of damage to structures and features not identified for demolition or beyond the limits of demolition as shown or as determined by the Engineer.

C. Damage beyond the limits of demolition will be repaired or replaced using materials and methods appropriate for the particular location, as determined by the Engineer.

D. Remove materials to conform to new elevations, profiles, and sizes. Comply with specified tolerances and finishes.

E. Saw cut or otherwise isolate materials to be removed to minimize damage to adjacent surfaces.

F. Protect materials and equipment designated for reuse.

G. Remove items to be demolished to limits noted on Drawings.

H. Protect existing structures and surfaces from damage.

I. Use water sprinkling, temporary enclosures, and other methods to limit dust.

J. Comply with provisions of Section 01575: Disposal of Waste Materials for disposal of removed items, demolished materials, and debris.

K. Blasting is not allowed for demolition.

3.3 SALVAGE

A. Transport the following items identified for salvage to a location acceptable to Owner:

1. Demolished concrete shall be broken into pieces not greater than 12-inches in any dimension, reinforcement trimmed off and disposed of at the direction of the Owner.

3.4 DEMOLITION SCHEDULE

A. Existing canal control structures: Demolish only the canal control structures indicated on the Drawings unless otherwise directed by the Engineer. Protect adjacent concrete box culvert, existing concrete liner on right bank of canal, and earthen canal to remain.

B. Top slab of existing box culvert: Demolish only the top slab of the existing box culvert as indicated on the Drawings unless otherwise directed by the Engineer. Protect existing walls of the box culvert, concrete liner on right bank of canal, and earthen canal to remain.

END OF SECTION

SECTION 02230
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of all surface debris, grass, trees, and shrubs within limits of disturbance indicated on the Drawings, and as required to perform the work.

B. The general work areas which require site clearing include, but are not limited to:

1. Contractor staging and stockpile areas.
2. Borrow areas.
3. Excavation areas.
4. Spoils disposal area.
5. Temporary and permanent access roads.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Clearing and Grubbing Plan:

1. Describe method for vegetation removal and disposal.
2. Describe temporary barriers and methods to protect existing structures and property, existing plant life and features designated to remain, and areas beyond limits of disturbance as identified on the Drawings.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 PROTECTION

A. Verify the area to be cleared and existing plant life and features designated to remain with the Engineer before initiating any clearing operations in that area. Unauthorized clearing will not be approved for payment, and the Contractor is responsible for replacement of damaged existing plant life and features designated to remain.

B. Flag barricade and clearly mark existing plant life and features designated to remain.

C. Protect any trees, plant growth, and site features not designated for removal or designated for protection. Remove only those trees and plant growth required for the Work.

D. Do not disturb trees or shrubbery in public right-of-way or on property outside of the limits of disturbance shown on the Drawings.

3.2 CLEARING AND GRUBBING

A. Remove all trees, shrubs, undergrowth, deadwood, and other surface debris as required to perform the Work, within the limits of disturbance shown on the Drawings, except for those trees and shrubs designated to be protected.

B. Remove all trees, stumps, branches, brush and other material from clearing and grubbing activities. Cut tree trunks and branches into 10-foot maximum lengths and stockpile in staging and stockpile areas designated on the Drawings.

C. Do not leave logs, stumps, rocks, etc., lying in the public right-of-way or on adjacent property without written approval by the Engineer.

3.3 DAMAGED VEGETATION

A. Contractor is responsible for injuries to vegetation caused by Contractor operations, personnel, or equipment. Remove and replace damaged vegetation designated for protection with vegetation of same type and size at no additional cost to the Owner.

3.4 PLACEMENT AND DISPOSAL

A. Dispose of excess vegetative materials and debris materials in accordance with all applicable rules and laws and in accordance with the requirements of Section 01575: Disposal of Waste Materials.

3.5 MAINTENANCE OF CLEARED AREAS

A. Maintain cleared work areas in a condition free from additional vegetation growth for the duration of the project.

B. Compensation for clearing each area will occur only one time. If weeds and brush growth require additional clearing, it shall be performed solely at the Contractor expense.

END OF SECTION

SECTION 02235
STRIPPING AND STOCKPILING TOPSOIL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removing topsoil within the limits of site disturbance as shown on the Drawings, with the exception that Stripping and stockpiling of topsoil is not required under limits of the new concrete canal liner. Topsoil located within the limits of the new concrete canal liner will be paid as unclassified excavation.

B. Stockpiling topsoil in the staging and stockpile areas shown on the Drawings.

1.2 DEFINITIONS

A. Topsoil – Topsoil stripped from the site shall be the top surface soil that is dark brown or black, fertile, and contains organic matter or the soil that is located within 6 inches of the surface, or as directed by the Engineer. Topsoil shall be free of subsoil, noxious weed seed or reproductive vegetation plants, heavy clay, hard clods, toxic substances or other material which would be detrimental to plant growth.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Excavate topsoil from areas requiring stripping, as indicated on the Drawings or as directed by the Engineer.

B. Remove roots larger than 1 inch, rocks larger than 3 inches, and debris prior to stockpiling of the topsoil, unless determined otherwise by the Engineer. Existing grass layers may be incorporated into topsoil provided the layers are mixed adequately into the topsoil stockpiles.

C. Stockpile topsoil in area(s) designated on the Drawings unless otherwise approved.

D. Install erosion protection around all stockpiles. Protect topsoil stockpiles from wind and water erosion.

3.2 DISPOSAL

A. Remove and dispose of excess vegetation in accordance with the requirements of Section 01575: Disposal of Waste Materials, and in accordance with all applicable local, state, or federal rules and regulations.

END OF SECTION

SECTION 02240
DEWATERING AND DIVERSION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Providing materials, equipment, and labor to install and maintain all pumps, piping, drains, and other facilities required to effectively control, collect, and dispose of groundwater or surface water to permit safe and proper completion of the Work. Use appropriate equipment and methods for dewatering based on existing site conditions.

B. Maintaining the foundations and other portions of the Work free from water as required for constructing each part of the Work.

C. Compling with all applicable environmental protection laws and requirements in operation of the dewatering system.

D. Removing all components of the dewatering system after it is no longer required.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Dewatering Plan: Submit a Dewatering Plan prepared by a qualified dewatering specialist, with at least 10 years of experience in design, installation, and operation of dewatering installations. The Dewatering Plan shall be prepared by a Professional Engineer registered in the State of Colorado and shall include the following:

1. Details regarding the anticipated types and locations of various dewatering facilities and design calculations required to substantiate the Dewatering Plan.
2. Superintendence plan and schedule, indicating who will be responsible for observing the dewatering system and the proposed schedule describing when personnel will be on site to observe and maintain the system.
3. Coordination with other work including schedule, dewatering and diversion methods and operations, erosion and sediment control measures, equipment, and location and elevation of pumps, pipes, and any other features planned for use in the dewatering plan
4. Final recommendations for dewatering.
5. If the Contractor purchases, rents, installs, or mobilizes to the site any elements of the dewatering system before approval of the dewatering submittal, the Contractor does so at its own risk, and will not be due any additional compensation from the Owner if such elements are not subsequently used for the work.
6. Approval of the dewatering system proposed by the Contractor will only be with respect to the basic principles of the methods the Contractor intends to employ. Approval does not relieve the Contractor of full responsibility for adequacy of the dewatering system.

1.3 DEFINITIONS

A. Definitions

1. Dewatering: Removing water by single or multiple stage wellpoints, deep wells, ejector wells or sumps, as approved based on the Contractor's submittals.
2. Hydrostatic Groundwater Level: The groundwater level at any location during construction and before dewatering.
3. Sump: A depression excavated or constructed, from which water is pumped as part of dewatering.

1.4 AVAILABLE DATA

A. No subsurface or groundwater data has been collected in the Santa Maria Canal; however, there is a natural spring(s) that produces standing water within the canal between approximately STA 62+00 and 68+00.

1.5 QUALITY ASSURANCE AND QUALITY CONTROL

A. Dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the Contractor.

PART 2 PRODUCTS

2.1 DEWATERING SYSTEM

A. The dewatering system shall be single or multiple sumps used for dewatering and which fulfill the dewatering requirements specified in this Section. The materials and construction of the dewatering wells will be selected by the Contractor and the Contractors' dewatering specialist.

B. Unless otherwise approved by the Owner, gasoline, diesel, or other gas-powered pumps are prohibited.

PART 3 EXECUTION

3.1 GENERAL

A. Design, furnish, install, maintain, and operate a dewatering system that prevents loss of fines, boiling, quick conditions, or softening of foundation strata and maintain stability of bottom of excavations so that every phase of the work can be performed in the dry. The dewatering operations shall be operated such that excavation bottoms are firm, suitably dry, and free from standing water at all times.

B. Lowering of the groundwater level a minimum of 2 feet below the excavation bottom shall confirmed before commencement of excavation.

C. The location of every element of the dewatering system shall be such that interference with excavation and construction activity is minimized. Locations shall be subject to approval by the Engineer.

D. It shall be the Contractor's responsibility to evaluate site subsurface conditions with respect to required dewatering facilities.

E. At all times during construction, provide ample means and devices to remove promptly, and dispose of properly, all water entering excavations and keep the bottoms of

excavations firm and free of standing water until structures to be built thereon are completed and/or backfill to be placed therein is placed.

3.2 INSTALLATION AND OPERATION

A. The location of every element of the dewatering system shall be such that interference with excavation and construction activity is minimized.

B. The Contractor is responsible for any damage resulting from failure to maintain the dewatering system.

C. Provide complete standby equipment and power sources available for immediate operation as may be required, to adequately maintain the dewatering on a continuous basis in the event that all or any part of the dewatering system becomes inadequate or fails.

D. When the dewatering system does not meet the specified requirements, and as a consequence, loosening or disturbance of the foundations strata, instability of the slopes, or damage to the foundations or structures occurs, the Contractor is responsible for supplying all materials and labor and performing all work for restoring foundation soils, slopes, foundations, and structures, to the satisfaction of the Engineer, at no additional expense to the Owner.

E. When failure to provide adequate dewatering and drainage causes disturbance of the soils below design foundation or excavation grade, provide adequate dewatering and excavate and re-fill the disturbed areas with approved, properly compacted fill material. Such work shall be at the Contractor's expense and at no additional cost to the Owner.

3.3 REMOVAL

A. Obtain written approval from the Engineer before discontinuing operation of any portion of the dewatering system(s).

B. Remove all elements of the dewatering system(s) and observation wells from the site at the completion of dewatering work.

C. Abandon observation wells by removing casing and backfilling holes with approved cement grout.

END OF SECTION

SECTION 02315
EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Required site excavations as shown on the Drawings.

1.2 WORK NOT INCLUDED IN THIS SECTION

A. Work associated with clearing and grubbing or stripping and stockpiling topsoil and are not considered as excavation and shall be performed in accordance with Section 02230: Clearing and Grubbing or Section 02235: Stripping and Stockpiling Topsoil.

B. Excavation by blasting is not allowed.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Proposed excavation plan at least 14 calendar days prior to performing any excavations. Include: Proposed excavation method(s) to be used; proposed excavation slopes, trench shields, bracing or other methods of construction to complete the construction safely; proposed excavation equipment; and proposed excavation sequence. Combine the excavation plan submittal in the Earthwork Plan required in Section 02330: Earthwork.

1.4 EXCAVATED MATERIALS CLASSIFICATION

A. Make provisions and plan for potential winter operations. This shall be documented in Contractor's method submissions and accommodated in their schedule.

B. Excavated materials are classified as follows:

1. Rock Excavation – For purposes of classification of excavation, rock excavation is defined as a sound and solid mass, layer, or ledge of mineral matter in place and of such hardness and texture that it cannot be effectively loosened or broken down by ripping in a single pass with a late model tractor-mounted hydraulic ripper equipped with one digging point of standard manufacturer's design adequately sized for use with and propelled by a crawler-type tractor rated between 385- and 410-net flywheel horsepower, operating in low gear. In areas where the use of the ripper described above is impracticable, rock is defined as sound material of such hardness and texture that it cannot be loosened or broken down by a 6-pound drifting pick. The drifting pick shall be Class D, Federal Specification GGG-K-506D, with handle not less than 34-inches in length. All boulders or detached pieces of solid rock more than 1 cubic yard in volume will be classified as rock excavation.
2. Unclassified Excavation – Unclassified excavation includes all earth materials which do not meet the requirements of rock excavation as defined above. All boulders or detached pieces of solid rock less than one cubic yard in volume shall be classified as unclassified excavation.

1.5 PROTECTION

A. Comply with all safety requirements of OSHA.

B. Protect existing structures and facilities to remain. Damage to existing structures and facilities by the Contractor shall be repaired by the Contractor at no cost to the Owner and to the satisfaction of the Engineer

1.6 EXISTING SITE CONDITIONS

A. Use equipment and methods appropriate for site conditions.

B. Exploratory investigations cannot be relied on to accurately characterize all conditions that may exist in the foundations and that may be encountered during construction. Therefore, final excavated lines and grades will be determined in the field by the Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION REQUIREMENTS

A. Identify required excavation lines, levels, contours, and datum, as shown on the Drawings.

B. Verify locations of buried underground utilities and pipes and overhead utilities prior to excavations. Immediately notify the Engineer if underground utilities or other unexpected underground structures are encountered. Repair any utilities or pipes damaged during construction at no cost to the Owner.

C. Excavate to the lines and grades as shown on the Drawings.

D. Repair damage to the work caused by the Contractor operations including disturbance of the material beyond the required excavation at no additional cost to the Owner. Make repairs in accordance with this section as directed by the Engineer, and at no additional cost to the Owner.

E. Assume all responsibility for determinations as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.

F. The Engineer reserves the right, during the progress of the Work, to vary the slopes, grades, or the dimensions of the excavations from those specified herein. Where the Engineer determines that foundation material is unsuitable through no fault of the Contractor, additional excavation will be ordered in writing and payment will be made in accordance with Section 01200: Price and Payment Procedures.

G. Take all necessary precautions to preserve the material below and beyond the established lines of all excavation. Repair any damage to the Work or the foundations as a result of the Contractor operations as directed by the Engineer at the expense of and by the Contractor.

H. Unless authorized in writing by the Engineer, all excavations shall be in the dry and in accordance with Section 02240: Dewatering.

I. Do not excavate in frozen materials, except with written approval of the Engineer.

J. Side slopes of all earth excavations shall be no steeper than that shown on the drawings. In all cases, excavations shall conform with all safety requirements of OSHA

K. Notify the Engineer as soon as possible of any unusual soil conditions, soil conditions that vary from test borings, or soils of questionable stability or bearing capacity.

L. Dispose of excavated materials which are excess or deemed unsuitable. Dispose of unsuitable/excess excavated materials in accordance with Section 01575: Disposal of Waste Materials.

M. Do not waste any excavated material without the approval of the Engineer.

N. Excavated material will not be judged "unsuitable" due to moisture content alone.

O. If slumping, heaving, or any other evidence of instability is observed during excavation, immediately report evidence of instability to the Engineer, whether it is observed during working or non-working hours.

P. Be prepared to temporarily backfill any unstable excavation to stabilize the area, if directed to do so by the Engineer.

3.2 EXCAVATED MATERIAL SUITABLE FOR FILL

A. Stockpile excavated materials that are acceptable for use as fill materials. Suitability of excavated material shall be based on specified material requirements in Section 02330: Earthwork.

B. Transport excavated materials suitable for use as fill to designated (or mutually agreeable) stockpile areas.

C. Condition and re-use suitable materials from required excavations in the permanent construction as directed by Engineer.

D. Perform operations so that the excavations will yield as much suitable material for construction purposes as practicable.

E. Separate suitable materials for construction purposes from materials to be wasted; and minimize handling by placing suitable materials directly in the designated final locations, if possible and so directed by the Engineer.

F. Excavated materials that are acceptable for use as fill but are too wet for immediate compaction shall be aerated, by discing and mixing until the moisture content is reduced sufficiently to permit them to be placed in the embankment.

3.3 FOUNDATION PREPARATION

A. Excavate foundations to final grade so that the subgrade is not disturbed.

B. Should the excavation be carried below the lines and grades specified on the Drawings without Engineer approval, or should the bottom of a soil excavation be disturbed because of the Contractor operations, refill the excavation to the proper elevation with

appropriate compacted fill material meeting the requirements in Section 02316: Earthwork at no additional cost to the Owner.

C. Backfill over-excavation of rock foundations with concrete at no additional cost to the Owner.

D. For areas identified by the Engineer as unsuitable foundation in soil areas or in indurated materials, gravel with large cobbles, or elsewhere, remove this material to the depths established by the Engineer, and refill the excavation to the proper elevation with appropriate compacted fill material meeting the requirements in Section 02316: Earthwork.

E. Structure foundations - The bottom and side slopes of soil excavations upon or against which concrete will be placed shall be excavated to the required dimensions as shown on the drawings or as required by OSHA. No material will be permitted to extend within the neat lines of the structure.

3.4 FIELD QUALITY CONTROL

A. The Engineer will conduct visual inspections of excavations bottoms and foundation subgrades. Subgrades shall be approved by the Engineer in writing. Soft or yielding areas, indurated materials, gravel with large cobbles, or elsewhere, as determined by the Engineer, shall be excavated and backfilled as determined by the Engineer.

B. When the excavation on rock cut faces and benches has been completed, clean loose rock to a safe condition for the purposes of inspection.

END OF SECTION

SECTION 02330
EARTHWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing, placing, and compacting fill materials.

1.2 REFERENCES AND DEFINITIONS

A. All references are the most recent version.

B. American Society for Testing and Materials International (ASTM)

1.	ASTM C 117	Standard Test Method for Materials finer than 7-μ (No. 200) Sieve in Mineral Aggregates by Washing
2.	ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
3.	ASTM D 422	Standard Test Method for Particle Size Analysis of Soils
4.	ASTM D 698	Standard Specification for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
5.	ASTM D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
6.	ASTM D 2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
7.	ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
8.	ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
9.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
10.	ASTM D 4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
11.	ASTM D 4254	Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
12.	ASTM D 4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
13.	ASTM D 4643	Standard Test Method for Determination of Water Content of Soil by the Microwave Oven Method
14.	ASTM D 4718	Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
15.	ASTM D 5080	Standard Test Method for Rapid Determination of Percent Compaction
16.	ASTM D 6913	Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis.
17.	ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil- Aggregate by Nuclear Methods (Shallow Depth).

B. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO T272 Standard Method of Test for Family of Curves—One Point Method

C. Colorado Department of Transportation (CDOT), Standard Specifications for Road and Bridge Construction, 2005.

D. Definitions

1. Fines: Material passing the No. 200 sieve.
2. Borrow: Material excavated on the site, or taken from designated areas approved by the Owner and Engineer.
3. Well-graded: A mixture of particle sizes that has no specific concentration, or lack thereof, of one or more sizes. A material type that, when compacted, produces a strong and relatively incompressible soil mass with a minimum of voids.
4. Coverage: One coverage is defined as the result of successive passes by a piece of compaction equipment, which by means of sufficient overlap, will ensure that all areas of the layer or lift being compacted have been subjected to one pass of the compaction equipment.
5. Optimum Moisture Content: That moisture content which will result in a maximum dry unit weight of the soil resulting from the ASTM D 698 laboratory compaction test.
6. Percent Compaction: The percent compaction in place shall be calculated as the ratio (in percent) of the in place dry density to the estimated maximum dry density, in accordance with ASTM D 698, of the representative fill material at the location of the in-place density test. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as accepted by Engineer.
7. Prepared Subgrade: Ground surface after completion of clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and scarification and compaction of subgrade.
8. Proof Rolling: Rolling a soil surface with a minimum of 4 passes with approved compaction equipment for the purpose of detecting and compacting soft or loose areas that will not support future loading without excessive settlement.
9. Subgrade: Layer of existing soil after completion of clearing, grubbing, scalping of sod, or stripping of topsoil and excavation to grade prior to placement of fill or concrete.
10. Unsuitable Materials: Materials that contain waste, debris, roots, organic matter, frozen matter, or any other materials determined by the Engineer to not meet the specifications for required fills. Unsuitable materials does not include wet or dry materials requiring moisture conditioning for placement, or materials requiring processing to remove oversize particles in order to meet the specifications for a particular fill.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Complete Earthwork Plan. The Earthwork Plan may be combined with the Excavation Plan in Section 02315: Excavation. The earthwork plan shall be submitted at least 30 days in advance of the start of earthwork. The earthwork construction plan shall be approved by the Engineer prior to any earthwork activities. Include all the following in the earthwork construction plan:

1. Proposed schedule.
2. Proposed borrow source(s) for offsite materials and proposed method(s) of sampling on-site and offsite source(s) for acceptance.
3. Proposed soil excavation, transport, processing, placement, compaction, and moisture control equipment, including equipment catalog with weight, dimensions, and operating data.
4. Proposed equipment and methods for removing embankment material from required excavations.
5. Proposed plan and sequencing for excavation including the extent and quantity of excavation, and an excavation schedule.
6. Proposed excavation, stockpiling, and staging plan describing handling and transport of on-site and off-site materials including proposed haul routes.
7. Proposed plan to obtain, convey, and store construction water, including proposed water source.
8. Proposed methods for processing including means and methods of moisture conditioning in advance of excavation and after placement.
9. Proposed method of protecting Work, to include temporary dewatering, drainage, moisture conditioning, and frost protection measures.
10. Proposed placement plan for drain materials that limits waste of these materials. Include proposed equipment, and methods proposed for temporary stockpiling, hauling, spreading, placing, and compacting the granular drain materials.

C. Samples: Submit samples of on-site excavated materials and off-site materials for Engineer's approval. For imported material, submit samples and laboratory test results prior to shipment of the material to site.

D. Submit gradation and moisture density compaction curve test reports for all imported earthwork materials, material from designated borrow areas, and on-site excavated materials suitable for use as fill. Any time the Contractor changes the source and/or stockpile from which materials are obtained, or should proposed material not meet requirements, additional gradation and moisture density compaction curve test reports for these new sources shall be required. Include costs for all testing in the bid price. No additional compensation will be allowed for testing.

E. Certified truckload weight bills: Provide the original certified truckload weight bills at the time of delivery for all materials delivered to the site.

PART 2 PRODUCTS

2.1 FILL

A. Fill shall consist of approved, well-graded materials obtained from on-site excavations and approved on-site borrow areas.

B. Fill shall consist of graded materials in the USCS classification system as GM-GC, SC, SM, or SP-SM.

C. The maximum particle size for fill is 3/4 inches.

D. A list of required material QC testing for fill is presented in Table 02330-1. The tests shall be conducted by the Contractor's independent testing firm at the frequencies designated in these specifications unless otherwise directed by the Engineer.

TABLE 02330-1
FILL TESTING

Test	Test Method (Current Version)	Test Frequency
Classification	ASTM D 2487	Minimum 2 tests per source[(1)]
Grain size with – #200 Wash	ASTM D 422, D-1140	
Moisture content	ASTM D 2216	
Atterberg limits	ASTM D 4318	
Laboratory Moisture-Density (Standard Proctor) [(3)]	ASTM D 698	Minimum 2 tests per material classification

Notes:

(1) Material classification tests, including grain size and Atterberg limits for fill from on site or imported sources shall be conducted on samples from stockpiled material.

(2) Samples for Standard Proctor testing shall be obtained from material mixed and stockpiled on site and tested after material classification testing to represent the variation in material types.

(3) If compacted fill consists of free draining granular materials where a moisture density relationship cannot be established in accordance with D698 as approved by the Engineer, test material in accordance with ASTM D 4253 and D 4254.

2.2 COMPACTION EQUIPMENT

A. Compaction equipment shall conform to the manufacturer's specifications and shall be maintained in good working condition at all times.

B. Compaction Equipment: Self propelled, padfoot, vibratory compactors with a minimum static operating weight of 25,000 pounds, and capable of producing a centrifugal force of 25,000 to 50,000 pounds. Smooth drum rollers meeting the static and centrifugal forces specified above may be approved at the discretion of the Engineer for compaction of free draining granular materials except where special compaction is required. Operate vibrating compactors at a constant frequency of vibration, as recommended by the equipment manufacturer for the material type being compacted, and as approved by the Engineer.

C. Special Compaction: Use hand operated power tampers, vibratory plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other special compaction equipment acceptable to the Engineer to obtain the compaction specified. Use special compaction equipment in locations where other compactors specified in this Section cannot operate effectively, and as specified for areas requiring special compaction as specified herein.

D. All equipment and tools used in the performance of the Work are subject to review by the Engineer before work is started.

E. Provide compaction equipment appropriate for the material types as approved by the Engineer, and sufficiently sized to obtain the specified densities.

F. Provide hand-operated compaction equipment in areas closer than 3 feet from structures or 2 feet from pipes (for special compaction).

G. Operate and maintain compaction equipment in accordance with the manufacturer's instructions and recommendations.

H. Provide equipment for applying water of a type and quality adequate for the work, free of leaks and equipped with a distributor bar or other approved device to ensure uniform application.

I. Provide equipment for mixing, aerating and moisture conditioning fill materials, such as blades, discs, or other approved equipment.

PART 3 EXECUTION

3.1 FILL PLACEMENT

A. Before placing fill material, verify that the subgrade has been prepared and inspected by the Engineer. Do not place fill without written approval from the Engineer.

B. Do not place fill material until the subgrade has been dewatered in accordance with Section 02240: Dewatering, and the prepared subgrade has been inspected and approved by the Engineer.

C. Moisten earth-excavated surfaces upon or against which concrete is to be placed with water, and tamp or roll to form a firm foundation upon which to place concrete.

D. The compacted surface of any layer of fill or subgrade which is too wet or too dry for bonding to the next layer of material shall be dried or moistened, scarified, and compacted before the next layer is placed.

E. Place fill to the lines, grades and cross-sections shown on the Drawings and written field clarifications by the Engineer.

F. Take special care to ensure bonding of fill to previously placed or existing material by benching in approximately one foot horizontally into the previously placed and compacted embankment, as each new fill layer is placed and compacted, unless otherwise directed by the Engineer. If the surface of the fill or the adjacent embankment dries and cracks after exposure, or if loose material is present, bench into existing

embankments sufficiently to remove loose material, rework the dry material into new moisture conditioned fill, and still extend into compacted fill. For filter or drain materials, place directly against compacted fill, do not bench or mix edges of filter or drain materials into compacted fill.

G. The distribution and gradation of materials throughout the fill shall be such that the material will be free from lenses, pockets, streaks or layers of material differing substantially in texture, gradation and moisture from the surrounding material. The combined excavation and placing operations shall be such that the fill shall be mixed and blended sufficiently to provide the most homogeneous section and best practical degree of compaction and stability.

H. Control and conduct all operations including but not limited to transporting, stockpiling, excavating, producing, and placing the materials to minimize contamination, segregation, and particle breakdown.

I. Do not place frozen fill material, and do not place fill below water or on frozen ground. Stop fill placement temporarily during unsuitable weather conditions, as directed by the Engineer.

J. Fill materials shall be thoroughly moisture treated as necessary to achieve compaction, and shall be maintained at the appropriate moisture content during compaction.

K. Re-work materials which have not been placed in accordance with these specifications. Re-working may include removal, rehandling, reprocessing, recompacting, or combinations of these procedures, as required by the Engineer.

L. Do not place fill adjacent to structures before the concrete has attained sufficient strength to withstand the applied construction loads. Unless otherwise approved by the Engineer, do not place fill against structure walls until the concrete has attained at least 100% of the 28-day design compressive strength per Division 3 of these specifications.

M. Where applicable, place fill against structures in uniform lifts on both sides of the structure such that no unbalanced loading will occur against the structure.

N. Place fill materials in uniform horizontal layers not exceeding 9-inches.

O. Add water to the fill prior to compaction. Use moisture addition procedures, as approved by the Engineer.

P. The placement moisture content for Common fill, select fill and aggregate base course shall be 2 percentage points below to 2 percentage points above the optimum moisture content (ASTM D 698).

Q. Compact Common fill, select fill, and aggregate base course to not less than 95% of the laboratory maximum dry density (ASTM D 698).

R. If compacted fill consists of free draining granular materials where a moisture density relationship cannot be established in accordance with D698 as approved by the Engineer, compact material by thoroughly wetting and compacting with vibratory compactors to obtain a minimum of 75% relative density as determined by ASTM D 4253 and D 4254.

3.2 SUBGRADE PREPARATION

A. Excavate to final grade in accordance with Section 02315: Excavation so that the subgrade is not disturbed.

B. The foundation for all structures shall be placed on prepared natural soils, bedrock or, in the case of fill conditions, foundations shall be placed on fill approved by the Engineer. Compacted, approved fill will be required where excavation is required to remove unsuitable existing materials below structures.

C. Notify the Engineer as soon as possible of any unusual soil conditions, soil conditions that vary from test borings, or soils of questionable strength or bearing capacity.

D. Soil subgrade preparation shall consist of scarifying the material a minimum of 6 inches in depth, moisture conditioning the scarified material to the Optimum Moisture Content, and compacting the area with a minimum of 4 passes with approved compaction equipment prior to fill placement.

E. Excavate soft/yielding subgrade as determined by the Engineer and replace with the appropriate compacted new fill material for the location in the foundation and new embankment zone.

F. For areas identified by the Engineer as unsuitable, remove the material to the depths and limits established by the Engineer. Replace removed material with suitable compacted fill material placed per these specifications and to the required elevations.

3.3 SPECIAL COMPACTION

A. Special compaction shall be required within 3 feet laterally of all structures, and in tight, restricted, or steep areas not accessible by larger rollers, and within 2 feet of pipes. The intent of the zones of special compaction is to prevent damage to structures or pipes from compaction equipment loads.

B. Place specially compacted fill in accordance with paragraph 3.5 above, except for the following:

1. Compact in maximum 6-inch thick loose lifts.
2. Compaction equipment used in special compaction areas shall be small rollers, walk-behind sheeps-foot rollers, vibratory plates, or other small compactors appropriate for the material and as approved by the Engineer. No equipment may be used which by its weight or movement will damage, move or tilt out of alignment any part of the pipe or structure above, adjacent, or below the ground surface.

3.4 TOLERANCES

A. Finished earthen surfaces shall be within an allowable tolerance of plus or minus 0.1 foot from the grades shown on the Drawings.

3.5 FIELD QUALITY CONTROL

A. Give advance notice of at least 48 hours to Engineer for the following:

1. Before commencement of foundations proof-rolling.
2. Before commencement of placement and compaction of fill.
3. Before sampling or testing fill materials.

B. Specified QC testing is the responsibility of the Contractor and shall be performed by qualified, approved personnel and by a qualified, approved commercial testing laboratory/firm, subject to approval by the Engineer.

C. The final acceptance or rejection of the fill will be based on the Engineer's judgment considering test results and the general disposition of the fill.

D. If the fill is rejected, remove and replace rejected material at no cost to Owner.

E. Contractor's qualified independent testing firm shall conduct testing at the minimum frequencies for materials under Part 2 in this Section.

F. All testing and sampling locations are subject to approval by the Engineer

G. Contractor's qualified independent testing firm shall conduct field testing for Common fill, select fill and aggregate base course at the minimum frequencies specified in Table 02330-2 below.

H. The Engineer will select the location of testing. When observations indicate proper moisture conditioning and compaction are not being followed, or if there is a pattern of failing tests, the Engineer reserves the right to increase the specified testing frequency. Such additional testing shall be at no cost to the Owner.

TABLE 02330-2
FIELD QUALITY CONTROL TESTING

Test	Test Method (Current Version)	Test Frequency
Common Fill		
Field density and moisture (nuclear method)	ASTM D 6938	Minimum one per 500 CY Placed [(1)]
Select Fill		
Field density and moisture (nuclear method)	ASTM D 6938	Minimum one per 100 CY Placed [(1)]
Aggregate Base Course		
Field density and moisture (nuclear method)	ASTM D 6938	Minimum one per 50 CY Placed [(1)]
Correlation Testing		
Sand Cone	ASTM D 1556	1 per 20 nuclear density tests[(2)]
Moisture correlation (oven dried)	ASTM D 2216	1 per 20 nuclear density tests[(2)]

Notes:
[(1)]Minimum one per day (on days of placement) or one per area of placement, whichever results in the greatest number of tests.
[(2)]Specified correlation testing frequency shall be following an initial calibration check and moisture calibration adjustment, if necessary, in accordance with ASTM D 6938 and a minimum of 4 density and moisture correlation tests using ASTM D 1556 on each material type at the start of testing.

CY = Cubic yards

I. If any of the analyses or visual inspection by the Engineer indicates the material may not meet specifications or has changed significantly from material represented by material testing, additional testing shall be performed by the Contractor to treat the changed material as a new material type. No fill material will be permitted in the work that has not, in the Engineer opinion, been represented by material QC testing. For subsequent tests to prove conformance with the Technical Specifications, additional soil samples shall be collected from the borrow area, on-site stockpiles, or from in-place areas as directed and as deemed appropriate by the Engineer. Such additional testing shall be carried out in accordance with the requirements and the standard test methods for pre-construction testing set forth in the specifications.

J. The percent compaction requirements for materials where a moisture density relationship can be established will be evaluated as follows: The in-place density as compacted by the Contractor will be determined by the field density test using the nuclear method (ASTM D 6938) or sand-cone method (ASTM D 1556). The maximum dry density of the fill at the location of the in-place density test will be estimated using a one-point moisture density test and full-curve moisture density tests (family of curves) of representative fill materials. Both the one-point and the full-curve laboratory moisture-density tests will be performed according to ASTM D 698. The one-point test results will be compared to the representative moisture density curves to estimate the maximum dry density of the compacted fill at the location of the in-place density test. Comparison of the one-point laboratory moisture density test to the family of curves will be in accordance with AASHTO T 272, except that ASTM D 698 will be used as the laboratory moisture density test. The percent compaction in-place will be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density of the compacted fill at the location of the in-place density test.

K. The Contractor shall be responsible for scheduling work activity in accordance with material QC testing and Engineer review period.

L. The Engineer may retain its own quality assurance laboratory for material testing services. The Contractor shall provide equipment and labor to assist the Engineer in any quality assurance testing and in obtaining soil samples. The Contractor shall cooperate in every way with this effort.

END OF SECTION

SECTION 02375
RIPRAP

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing and placing riprap and riprap bedding at the locations shown on the Drawings.

1.2 REFERENCES

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

1.	ASTM C 88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
2.	ASTM C 127	Test Method for Specific Gravity and Absorption of Coarse Aggregate.
3.	ASTM C 131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

B. American Association of State Highway and Transportation Officials (AASHTO)

1.	AASHTO T103	Standard Method of Test for Soundness of Aggregates by Freezing and Thawing

C. Colorado Department of Transportation (CDOT), Standard Specifications for Road and Bridge Construction, 2005.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. List of equipment proposed for use in hauling and placing riprap.

C. Certified copies of test certificates from a qualified testing laboratory stating that the riprap conforms to the requirements of this Section.

D. Samples of riprap if requested by the Engineer. Minimum sample size: 1 ton for riprap.

E. Proposed plan and list of equipment for screening, sorting, stockpiling, and processing on-site riprap.

PART 2 PRODUCTS

2.1 RIPRAP

A. Riprap shall be dense, angular, reasonably well-graded, and with sound fragments resistant to abrasion. Material shall be free of cracks, seams, clay, organic material and other defects that would hasten degradation by water and/or frost action. Rounded boulders or cobbles shall not be accepted as riprap.

B. Riprap material shall meet the following properties:

1. Bulk specific gravity (saturated surface dry) shall be equal or greater than 2.6 as determined in accordance with ASTM C 127.
2. The weight loss of the material as tested under ASTM C 88 for 5 cycle sodium sulfate soundness shall be 10% or less.
3. The weight loss of the material when tested for resistance to abrasion in accordance with ASTM C 131 shall be 10% or less after 100 revolutions and not more than 40% after 500 revolutions.
4. The weight loss of the material when tested for resistance to disintegration by freezing and thawing in accordance with AASHTO T 103 shall be 5% or less.
5. Neither the breadth or thickness of any piece of riprap shall be less than one-third of its length.
6. Material used for riprap may be approved by the Engineer if, by visual inspection, the rock is determined to be sound and durable. The Engineer may require the Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable.
7. Riprap shall be well-graded, from the smallest to the largest size, and shall be graded within the limits in Table 02375-1 below.

Table 02375-1
Riprap Gradation

D_{50} Size[1] (Inches)	**% Of Total Wt Smaller Than Given Size[2]**	**Typical Stone Dimensions[3] (Inches)**	**Typical Stone Weight[4] (Pounds)**
12	70-100	21	440
	50-70	18	275
	35-50	12	85
	2-10	4	3

[1] D_{50} = nominal stone size
[2] based on typical rock mass
[3] equivalent spherical diameter
[4] based on a specific gravity = 2.5

2.2 RIPRAP BEDDING

A. Riprap bedding shall be a free draining, well-graded sand and crushed gravel mixture. Riprap bedding shall be imported from off-site sources.

B. Riprap Bedding for riprap with a shall meet the Colorado Department of Transportation 2005 Standard Specifications for Road and Bridge Construction – Section 703, Table 703-3, Class 1 Aggregate Base Course, and be graded within the following limits:

Table 02375-2
Riprap Bedding Gradation

U.S. Standard Sieve	Percent Passing by Weight
2 1/2 inch	100
2 inch	95-100
No. 4	30-65
No. 200	3-15

PART 3 EXECUTION

3.1 PLACING RIPRAP BEDDING

A. Place riprap bedding at the locations, thicknesses, lines, and grades shown on the Drawings.

B. General: Surfaces to receive bedding materials shall be smooth and firm, free from deleterious materials, and shall be brought to the lines and grades shown on the Drawings. Prepare the surfaces that are to receive bedding materials, by rolling and trimming as necessary to enable a uniform lift of bedding of the specified thickness to be placed thereon. Surface preparation will include, but not be limited to, bringing all low spots up to the lines and grades shown on the Drawings with compacted fill and removing all material projecting above lines and grades shown on the Drawings.

C. Placement: Place the bedding materials in a manner that minimizes segregation and results in uniform lifts of bedding materials of the thicknesses shown on the Drawings. Place riprap bedding materials from the bottom of the slope working up the slope.

D. Moisture condition the materials as necessary to control dust and to minimize segregation.

E. Compaction is not required for the bedding materials; however, bedding materials shall be spread in such a manner as to form a smooth, uniform layer under underlying bedding and riprap.

3.2 SCREENING, SORTING AND PROCESSING EXISTING RIPRAP

A. Excavate existing rock from the canal and stockpile for measurement and payment.

B. Screen, sort, and process rock obtained from site excavations to create mixtures of material that are graded to meet the specified riprap grading. Placed graded material in separate stockpiles and obtain Engineer approval before placing.

3.3 PLACING RIPRAP OVER RIPRAP BEDDING

A. Place riprap at the locations, thicknesses, lines, and grades shown on the Drawings.

B. Place riprap by dumping and working with a hydraulic excavator, and smoothing by moving rocks in such a manner as to produce a well-graded mass of rock with a minimum practical percentage of voids and that the material, when in place, is stable. Place riprap from the bottom of the slope working up the slope. The finished riprap shall

be free from objectionable pockets of unacceptable soil fines, small stones and clusters of nested large rocks, as determined by the Engineer.

C. Place riprap materials to full layer thickness in one operation in such a manner as to minimize segregation and avoid displacement of underlying bedding materials.

D. Chinking: Provide laborers during placement for rearrangement of loose rock fragments, "chinking" of void spaces, and hand placement as needed to comply with the requirement of a well-keyed and stable layer of rock riprap.

3.4 TESTING

A. Riprap obtained on-site does not need to be tested for physical properties before use.

B. Conduct specified testing for physical properties of imported riprap using the services of an independent testing laboratory acceptable to the Engineer. Physical properties include specific gravity, sodium sulfate soundness, LA Abrasion, and freeze/thaw durability.

C. If acceptable certificates of compliance are provided by the imported riprap supplier physical properties testing may be waived at the Engineer's discretion.

D. Test placements of riprap and riprap bedding (with a minimum volume of 50 cubic yards each) shall be prepared by the Contractor, and observed by the Engineer to develop a procedure for placement of riprap and riprap bedding, and to confirm the placement methods result in suitably placed riprap and riprap bedding.

E. Control of gradation will primarily be by visual inspection. The Engineer will be the sole judge of riprap gradation acceptability by visual inspection. If the Engineer elects to perform a gradation test(s) of the riprap, provide equipment and labor to assist the Engineer in performing the tests.

END OF SECTION

SECTION 02620
HDPE PIPE

PART 1 GENERAL

1.1 SCOPE

A. This Specification Section covers dual wall HDPE pipe for use in gravity flow applications.

1.2 REFERENCES

A. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

B. ASTM D1238 - Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer

C. ASTM D4218 - Standard Test Method for determination of Carbon Black Content in Polyethylene Compounds by Muffle-Furnace Technique

D. ASTM F2306 - Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

E. AAS HTO M294 - Corrugated Polyethylene Drainage Pipe, 12 to 60 in. [300 to 1500 mm]

F. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe

G. ASTM D2444 - Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

H. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

I. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible

J. ASTM D2321 - Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications

K. AAS HTO Section 30 - Construction Standard for Thermoplastic Pipe

L. ASTM F2487 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene Pipelines

M. ASTM F1417 - Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Material Certifications

1. Manufacturer's certification that raw materials and pipe to be furnished meet the requirements of this Section. The certification shall state that pipe complies with these specifications based on complete tests which the manufacturer has conducted on the lot.
2. Product data for piping materials, fittings, and jointing methods; and recommended method of installation of pipe and construction of branches in pipe.

C. Pipe Restrain System

1. Structural calculations and details of pipe restrains during encasement in concrete. Calculations must demonstrate that the pipe restrain system is adequate to resist uplift forces resulting from the floatation of the pipe in the freshly placed concrete and maintain pipe position to match lines and grades as shown in the Drawings. Contractor shall locate horizontal construction joints in the encasement concrete as shown on the drawings to limit the uplift forces. Calculate forces based on the buoyant force to displacement of fresh concrete of 150 lb/ft^3 and the weight of the HDPE pipe.

D. Installation Plan

1. Installation plan outlining the proposed plan for constructing the pipe shall be submitted to the Engineer for approval at least 14 days prior to the anticipated commencement of the Work. Plan shall include a proposed schedule, proposed products to be used during installation, and measures that will be put in place to protect the Work during construction. Contractor shall include in the plan, measures to keep the pipe materials from becoming contaminated with soil, or other materials during stockpiling and construction activities.

1.4 QUALITY ASSURANCE

A. Pipe manufacturer shall be a participating member of the National Transportation Product Evaluation Program. Only products from suppliers whose manufacturing plant and PE pipe products comply with this specification will be approved.

1.5 STORAGE AND HANDLING

A. Handle materials to ensure delivery to installation locations in sound undamaged condition.

B. Pipe shall be unloaded and handled with reasonable care. Do not drop pipe, for pipes smaller than 18" in diameter manual handling is acceptable. For pipes larger than 36" in diameter, lift with a sling at two points spaced 10 feet apart. Do not use a loading boom or forklift to directly on or inside the pipe.

C. Non-palletized pipe may be temporarily stockpiled on a flat, clear area. Stack pipe no higher than 6 feet.

D. Do not drag or strike pipe ends against anything.

E. Store and block pipe in a manner that prevents warping or distortion.

PART 2 PRODUCTS

2.1 DRAIN PIPE

A. HDPE Resin

1. HDPE pipe and fittings shall be manufactured from virgin resin. HDPE pipe and fittings manufactured from reclaimed or recycled resin will be rejected.
2. Virgin material for pipe and fitting production shall be high density polyethylene conforming with the minimum requirements of cell classification 424420C for 4- through 10-inch diameters, or 435400C for 12- through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%.

B. HDPE Pipe

1. Furnish pipe in the nominal sizes shown on the Drawings.
2. Solid pipe

    a. AASHTO M294, Type S pipe with corrugated exterior and smooth interior.
    b. Pipe shall be manufactured in accordance with ASTM F2306 and F2648.

3. Pipe Joints

    a. Join pipes using a bell and spigot joint meeting AASHTO M252, AASHTO M294 or ASTM F2306.
    b. 12-inch through 60-inch pipe shall have a reinforced bell with dual gasket spigot.
    c. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant supplied by the manufacturer shall be used on the gasket and bell during assembly.

C. HDPE Fittings

1. Suitable for use in perforated and solid corrugated drain pipe
2. Manufactured for the diameter of pipe being connected.
3. Water–tight or soil-tight connections as specified herein.
4. Standard degrees of bends shall be used if possible.
5. Maximum deflection at any joint shall be 2 degrees.

D. Manufacturer and product:

1. JM Eagle Corr PE (Dual Wall), or equal, as approved by the Engineer.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Install drain pipes in accordance with this Section, ASTM D 2321 and the manufacturer's written installation instructions. In case of a conflict, this specification shall govern.

B. Place concrete encasement carefully around the drainage pipe so as not to disturb the drainage pipe and to hold it securely in position while the concrete is being placed.

C. Due to the polyethylene corrugated drainage pipe's light weight and buoyancy, special care shall be exercised in laying the drainage pipe and placing materials adjacent to the pipe to ensure that the pipe is laid in a manner to remain on grade and in alignment.

D. Method of laying the drainage pipe shall prevent stretching of the pipe during laying operations.

E. Install couplings with a close fit and in accordance with the manufacturer's deflection tolerances. Install in a manner that maintains alignment of the pipe, prevents separation of the joints, and maintains gasket integrity.

F. Any drainage pipe which is broken, cracked, or otherwise unsuitable for use, as determined by the Engineer, shall be removed and replaced by the Contractor.

G. Check interior of pipes before making connections. Keep the drainage pipe free from deposits of snow, ice, mud, sand, gravel, or other foreign matter and in good working condition for the duration of the Work.

H. Remove and replace damaged sections of pipe.

I. Use straight pipe sections and elbows not exceeding 33°.

J. Do not drop materials directly on pipe.

K. Support drain pipe circumferentially with drain material prior to backfilling above pipe.

L. Prevent introduction of contaminants in concrete encasement..

3.2 FIELD INSPECTION AND TESTS

A. Do not bury, cover, or conceal piping until it has been inspected, tested and approved by the Engineer.

B. Deflection Test

1. The pipe shall evaluated to determine whether the internal diameter of the barrel has been reduced more than 5% of nominal internal diameter when measured not less than 30 days after installation. Deflection testing may be waived at the discretion of the Engineer if video inspection can demonstrate that deflection has not occurred.
2. Pipes shall be checked for deflection using a mandrel or any other device approved by the Engineer. The mandrel shall be a nine arm mandrel and shall be sized and inspected by the Engineer prior to testing. The mandrel shall be pulled through the pipe with a force not exceeding 1000 pounds.

3. For locations where the pipe exceeds 5% of nominal internal diameter an evaluation of the deflection shall be conducted by the Contractor and submitted to the Engineer for review. Pipe remediation or replacement is required for locations where the Engineer determines that the deflection may compromise the drain integrity. For pipe deflections greater than 7.5% of the nominal metric inside diameter, remediation or replacement of the pipe is required.

3.3 PROTECTION AND CLEANING

A. Do not allow traffic loads on pipe and structures until the pipe has been covered to a depth sufficient to prevent damage or breakage.

B. All drain pipes shall be clear and free from debris at the time of final acceptance.

END OF SECTION

SECTION 02920
RECLAMATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reclaiming and restoring areas disturbed by construction within the limits of disturbance as shown on Drawings. Reclamation work includes preparing subsoil, placing topsoil, applying soil amendments, seeding, mulching, and maintaining vegetation establishment through the warranty period.

B. Areas to be seeded and reclaimed:

1. All areas disturbed during construction unless otherwise specified require seeding.

C. Areas that do not require seeding and reclamation:

1. Access roads.
2. Concrete structures.
3. Riprap areas.
4. Exposed rock areas as approved by the Engineer.

1.2 REFERENCES AND DEFINITIONS

A. Colorado Department of Transportation, Standard Specifications for Road and Bridge Construction, 2005 (CDOT Specifications).

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Seeding and planting plan containing:

1. Qualifying experience for person(s) responsible for supervision of seeding, hydraulic mulching, and seedling planting, for approval. Qualifying experience shall include names, addresses, and telephone numbers of references for proposed individual(s).
2. Proposed seeding and hydraulic mulch installation procedures.
3. Name and address of seed suppliers.

C. Seed Mixture Certification:

1. Origin of seed.
2. Percent purity and germination.
3. Prohibited and restricted weed seed content.
4. Species of cover crop.

D. Hydro mulch product data.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Seed which has become wet, moldy or damaged in transit or in storage will not be accepted. No seed will be accepted with a test date of more than 9 months before delivery date to the site.

B. Soil amendments which become caked or damaged will not be accepted.

C. Seeded areas shall be reviewed by the Engineer for bare soils caused by surface or wind erosion. Bare areas caused by surface or gully erosion, blown away mulch, etc. shall be regraded, seeded, and have hydro mulch tackifier applied as necessary.

D. The seeding and planting contractor shall have experience seeding and planting in the Colorado high country on at least 5 projects of similar size and scope.

1.5 DELIVERY STORAGE AND HANDLING

A. Seed containers.

1. Sealed: Each type of seed shall be delivered in separate sealed containers and fully tagged unless exception is granted in writing by the Engineer.
2. Labeled: Seed shall be labeled in accordance with the state laws and the U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect on the date of invitations for bids. Bag tag figures are evidence of purity and germination.
3. Interstate Shipping: In accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act.

PART 2 PRODUCTS

2.1 TOPSOIL

A. Native soil materials removed and stockpiled shall consist of soil material free of subsoil, refuse, stumps, large roots, large rocks (greater than 6 inches), brush, noxious weed seeds or reproductive vegetative parts, heavy clay, hard clods, toxic substances, or other material which would be detrimental to plant growth.

2.2 SEED

A. Provide the following live seed mixture to be used in disturbed areas as indicated in the Drawings:

Scientific Name	Common Name	Variety	Lbs. PLS per acre
Bromus marginatus	Mountain brome	Garnet	9.0
Festuca saximontana	Rocky Mountain fescue	VNS	7.3
Poa ampla	Big bluegrass	VNS	3.9
Poa alpina	Alpine bluegrass	Sherman	2.1
Festuca brachyphylla	Alpine fescue	VNS	1.5
Elymus trachycaulus	Slender wheatgrass	San Luis	6.0
Penstemon strictus	Rocky Mountain penstemon	VNS	0.8
Achillea lanulosa	Common yarrow	VNS	0.8
Helianthella quinquenervis	Aspen sunflower	VNS	3.0
Eriogonum sp.	Sulfur flower	E. *subalpinum* or high altitude variety of *E. umbellatum*	4.5
Bouteloua gracilis	Blue grama	VNS	6.0
		Total	44.9

Lbs. = pounds
PLS = Pure Live Seed
VNS = Variety Not Specified

B. Rates provided are for broadcast seeding. Minimum germination percentage is 85 percent. Substitutions will be allowed only when the designated material is not available and as authorized by the Engineer. Except for named varieties, all seed shall be from sources native to Colorado and adapted to the site.

C. All seed shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net mass (weight), origin, the percent of weed seed content, the guaranteed percentage of purity and germination, pounds of pure live seed (PLS) of each seed species, and total pounds of PLS in the container. All seed shall be free from noxious weeds, including but not limited to Canadian thistle, musk thistle, dalmation toadflax, knapweed, leafy spurge, and other species listed by the Colorado Department of Agriculture and Mineral County. The Contractor shall furnish to the Engineer a signed stated certifying that the seed is from a lot that has been tested by a recognized laboratory for seed testing within six months prior to the date of seeding. Seed which has become wet, moldy, or damaged in transit or in storage will not be accepted.

D. Seed and seed labels shall conform to all current State and Federal regulations and will be subject to the testing provisions of the Association of Official Seed Analysis. If seed

available on the market does not meet the minimum purity and germination percentages specified, the Contractor must compensate for a lesser percentage of purity or germination by furnishing sufficient additional seed to equal the specified product. Product comparison shall be made on the basis of PLS in pounds.

2.3 AMMENDMENTS

A. The soil amendment used shall be Biosol® 6-1-1 or other compost type amendment as approved by the Engineer. Soil amendments shall meet the standard for grade and quality specified by Colorado State law. Where soil amendments are furnished from bulk storage, the contractor shall furnish a supplier's certification of analysis and weight. If required by the Engineer, a representative sample of the soil amendments shall be furnished to the Engineer for chemical analysis.

2.4 EXTENDED TERM-FLEXIBLE GROWTH MEDIUM

A. Hydraulically applied mulch product with incorporated adhesive binder (tackifier), that does not contain any mineral filler, recycled cellulose fibers, clays, or other substances which may inhibit germination or growth of plants, and be non-toxic and non-injurious to plants, wildlife, or personnel.

B. Product: Flexterra Extended Term-Flexible Growth Medium (ET-FGM) with Cocoflex addition, fully bio-degradable with a functional longevity of up to 24 months.

C. ET-FGM shall consist of wood and coconut fibers and manufacturer’s proprietary biodegradable fibers bound together by adhesive and premixed at the factory. The wood fibers shall be manufactured expressly from clean whole wood chips and contain a range of fiber lengths. The adhesive binder shall be formulated to form a water resistant bond. The fibers shall be colored yellow or green with a water-soluble, non-toxic dye to help the operator apply the material uniformly. The mixture shall also contain a copolymer gel. A sample of the ET-FGM shall be submitted for approval at least two weeks in advance of its use on the project.

D. Mix Water: Clean, fresh and free of substances which could inhibit vigorous growth of plant material.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared soil base is ready to receive the Work of this Section.

3.2 TOPSOIL PLACEMENT

A. In preparation for seeding, spread stripped and stockpiled topsoil evenly over areas to be reclaimed.

B. Final grade disturbed areas with a smooth blade grader, bull dozer, or other approved equipment, to the lines and grades shown on the Drawings or specified, or as directed by the Engineer.

C. In areas where equipment cannot be operated, the seedbed shall be prepared by hand.

D. If the topsoil is compacted, a spring tooth harrow equipped with utility or seedbed teeth, or similar equipment, will be used to loosen and smooth the soil surface either after or in conjunction with incorporation of soil amendments.

E. If topsoil is loose, it shall be compacted with a cultipacker or similar implement to provide a firm seedbed.

F. Before seeding slopes flatter than 2H:1V, the top 4 inches of the surface shall be tilled into an even and loose seedbed 4 inches deep. Before seeding slopes steeper than 2H:1V, the top 1 inch of surface shall be raked or tilled. Slopes shall be free of clods greater than 4 inches in diameter.

3.3 SEEDBED PREPARATION

A. Complete prior to seeding.

B. Scarify topsoil to minimum depth of 3-inches. Where equipment can operate on slopes safely, the seedbed shall be adequately loosened (4 to 6 inches deep) and smoothed.

C. Remove stiff clods, lumps, roots, litter, stones, and other foreign material greater than 6 inches in size from the surface. Dispose of removed materials in accordance with Section 01575: Disposal of Waste Materials.

D. Fill or smooth topsoil surface to remove rills, gullies and depressions.

E. Unless otherwise approved, apply soil amendment (Biosol or other soil amendment as specified by the Engineer) at a rate of 1,800 pounds per acres.

F. Protect prepared topsoil surfaces from erosion and washouts. Repair damaged surfaces as required.

3.4 SEEDING

A. Seed only from September 15 until consistent ground freeze or snow accumulation to avoid seed germination and breaking of dormancy and to prevent seedling frost damage. Seed shall not be sown when the surface soil or topsoil is in a frozen or crusted state. Do not seed outside this time period unless approved by the Engineer or when the Contractor's request is approved in writing.

B. If seeding cannot be conducted by the time it is no longer feasible due to freezing, erosion control shall be maintained until seeding and mulching is completed.

C. Seed will be hand broadcast only. Hydroseeding is not allowed. A spike-toothed harrow or similar equipment will be used to cover the broadcast seed. Seeded areas shall be raked or covered with soil to a depth of ¼ to ½ inch.

D. Seeded areas shall be raked or covered with soil to a depth of ¼ to ½ inch.

3.5 EXTENDED TERM-FLEXIBLE GROWTH MEDIUM

A. Apply ET-FGM over all seeded areas after broadcast seeding is completed. Do not mix seed into ET-FGM.

B. A technical representative of the manufacturer or authorized distributor shall be present for the initial mixing and application of the ET-FGM. Handle, mix and place ET-FGM in accordance with the manufacturer's written instructions and technical representative's sit-specific recommendations.

C. Do not apply when rain is imminent and manufacturer's minimum cure time cannot be met. Replace damaged ET-FGM.

D. Apply ET-FGM mixture at the manufacturer's recommended rate of application for site-specific conditions and slopes, but at a rate no less than 2,600 lbs/acre

E. Apply mixture in even layers, working back and forth between top and bottom of the slope, to uniformly cover soil with the mixture. Spray the product through a fan or slit-type nozzle (22 to 50 degree tip). The nozzle shall create a fine, uniformly dispersed spray that "rains down" on the soil. Unless otherwise approved, apply tackified mulch in opposing directions to ensure complete coverage with no "shadowing" in accordance with the manufacturers written instructions.

F. Do not apply tackified mulch in the canal or other areas of concentrated flow.

3.6 MAINTENANCE

A. Maintain the reclaimed areas for a period of 2 years after completion of seeding and planting.

B. Maintenance shall consist of repairing areas where damage is due to the Contractor's operations, failure to establish a satisfactory stand of permanent grass seed as specified herein, or failure of ET-FGM mulch to prevent gullying or other seed and seedbed loss. Areas to be repaired shall be re-amended, reseeded, and remulched.

C. After Final Completion, access to the site will be allowed each year for inspections and maintenance. Coordinate all access for maintenance activities with Owner.

D. Reseed areas that show bare spots by the end of October of the year following the seeding.

E. Any seeded areas which are not producing a satisfactory stand of permanent grass seed within 2 years of the seeding operations shall be reseeded and remulched at no expense to the Owner.

F. Satisfactory Stand of Seed: A satisfactory stand of permanent grass seed is defined as a uniform coverage of the area to be seeded that prevents the formation of rills or other erosion damage, has a coverage rate equal to or greater than adjacent native grassed areas, and is acceptable to the Owner.

END OF SECTION

SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in place concrete with shoring, bracing, and anchorage, openings for other work, form accessories, and form stripping.

1.2 REFERENCES AND DEFINITIONS

A. American Concrete Institute (ACI)

1.	ACI 117	Standard Specifications for Tolerances for Concrete Construction and Materials.
2.	ACI 301	Specifications for Structural Concrete for Buildings
3.	ACI 318	Building Code Requirements for Structural Concrete
4.	ACI 347	Guide to Formwork for Concrete.
5.	ACI SP-4	Formwork for Concrete

B. American Plywood Association

1.	APA PS-1	Construction and Industrial Plywood.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01330: Submittals.

B. Shop Drawings:

1. Drawings and design computations for all formwork shall be submitted to the Engineer for approval at least 30 days prior to the commencement of the Work.
2. Include type, size, quantity, and strength of all form materials, plan for jointing of facing panels, details affecting the appearance, and assumed design values and loading conditions.

C. Product Data:

1. Manufacturer's literature for form materials, form accessories, prefabricated forms, and form coating materials shall be submitted to the Engineer for approval at least 30 days prior to the commencement of the work.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Include Work required in Contractor Quality Control plan submitted under Section 01450: Quality Control.

B. Perform Work in accordance with ACI 301, ACI 318 and ACI 347. Tolerance shall be as necessary to provide completed concrete structure within the tolerance specified in ACI 117.

C. Supply all labor, tools, equipment and materials to set forms so that resultant concrete conforms to required shapes, lines, and dimensions of the design, as well as the necessary code requirements. It is the Contractor responsibility to design and build adequate forms and to leave them in-place until the forms can be safely removed. The Contractor is responsible for damage and injury caused by removing forms carelessly or before the concrete has gained sufficient strength.

D. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design and that supports, fastenings, wedges, ties, and items are secure.

E. Monitor forms during concrete placement and correct deficiencies.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Plywood: Concrete form plywood, exterior grade, mill-oiled and edge-sealed as specified herein and in accordance with APA PS-1. High-density overlaid, or provided with an equivalent smooth form liner as the minimum form material for surfaces indicated to receive smooth form finish or any rubbed finish.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.

C. Lumber: Fir species; No. 2 grade or better; with grade stamp clearly visible.

D. Steel: Minimum 16 gauge sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished surfaces.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Removable snap-off type, galvanized metal, ¾-inch break back dimension, fixed length, cone type, neoprene rubber washer for water seal, free of defects that could leave holes larger than 1-1/4 inch in concrete surface.

B. Form Release Agent: Standard manufactured product specifically formulated for form release. Colorless material that will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete. Provide NSF 61 certified product where in contact with potable water.

C. Corners: Chamfered, rigid plastic or wood strip, 3/4 x 3/4 inch size, maximum practical lengths.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

E. Joint Filler: A dense, closed-cell, foam rubber approved by the Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Construct formwork for cast-in place concrete with shoring, bracing, and anchorage. The formwork shall include the openings for other work, form accessories, and form stripping.

3.2 INSPECTION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with the Drawings.

3.3 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

B. Do not use rock cuts for forms except where specifically indicated on the Drawings or approved by the Engineer in writing.

C. When rock form is indicated or allowed, the rock face shall be sound.

3.4 DESIGN

A. Design, engineering, and construction of formwork shall be the responsibility of the Contractor.

B. Design, support, brace, and maintain formwork to safely support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Vertical and lateral loads shall be carried to the ground by the formwork system until the in-place concrete has attained adequate strength.

C. Design formwork for anticipated live and dead loads.

D. Comply with tolerances specified in Section 03300: Cast-In-Place Concrete

E. Design as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others.

F. Monitor adequacy of formwork design and construction prior to and during concrete placement.

3.5 ERECTION - FORMWORK

A. Erect formwork, shoring, and bracing to achieve design requirements in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shoring.

D. Align joints and make watertight to prevent leakage of mortar. Keep form joints to a minimum.

E. Provide chamfer strips on all external corners, unless indicated otherwise.

3.6 APPLICATION - FORM RELEASE AGENT

A. Clean form surfaces of encrustations of mortar, grout, or other foreign material.

B. Apply form release agent on formwork in accordance with manufacturer's recommendations.

C. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.

D. After form release agent is applied to form, the concrete shall be placed within 14 calendar days. If concrete is not placed within 14 calendar days, the forms shall be removed and form release agent reapplied.

E. Do not apply form release agent where concrete surfaces are scheduled to receive special finishes which may be affected by the agent such as crystal forming waterproofing. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.7 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Provide formed openings where required for items to be embedded in or pass through concrete work.

B. Locate and set in place items which will be cast directly into concrete.

C. Coordinate Work of other Sections in forming and placing openings, sleeves, bolts, anchors and other inserts.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Secure all embedded items before placing concrete. Ensure that items are not disturbed during concrete placement. Fill voids with readily removable material to prevent entry of concrete.

E. Provide blockouts for mechanical and electrical Work wherever necessary, and as shown on the Drawings.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.8 FORM CLEANING

A. Clean and remove foreign matter within forms as erection proceeds.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heat enclosure. Use compressed air or other means to remove foreign matter.

3.9 FORM REMOVAL

A. Notify the Engineer prior to removal of forms.

B. Remove forms in a manner, which will not damage concrete.

C. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.

D. Forms for walls, columns, and sides of beams and girders may be removed no less than the following number of days after concrete placement provided that the forms do not support formwork for slab or beam soffits:

1. Lifts under 15 feet: 1 day
2. Lifts over 15 feet: 2 days

E. It shall be the Contractor responsibility to limit construction loads at all times to those which can be carried safely by the developed strength of the structure at time of loading, and by formwork and shoring in-place at time of loading.

F. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03150
CONCRETE JOINTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Forming contraction joints in concrete canal lining, and control joints in concrete encasement around pipe, the tooling or chamfering exposed edges of concrete.

1.2 REFERENCES

A. American Concrete Institute (ACI)

1.	ACI 224.3R	Joints in Concrete Construction.
2.	ACI 318-05	Building Code Requirements for Structural Concrete

B. International Concrete Repair Institute (ICRI)

1.	ICRI 0372	Selecting and Specifying Concrete Surface Preparation for Sealing, Coatings, and Polymer Overlays

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.
B. Joint preparation equipment, materials and methods.

1.4 CONTRACTOR QUALITY CONTROL

A. Perform concrete work in accordance with ACI 318 and ACI 224.

1.5 DEFINITIONS (Note: The following language regarding concrete joints takes precedence over the language in the referenced American Concrete Institute Document entitled "Joints in Concrete Construction.")

A. Construction Joints (CJ):

1. Construction joints are joints which are purposely placed in concrete to facilitate construction; to reduce initial shrinkage stresses and cracks; to allow time for the installation of embedded metalwork; or to allow for subsequent placing of other concrete.
2. Bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.

B. Contraction Joints (CRJ):

1. Contraction joints are joints placed in concrete to provide for volumetric shrinkage of a monolithic unit or movement between monolithic units.
2. Contraction joints are constructed so no bond exists between concrete surfaces forming the joint
3. Except as provided for dowels, reinforcement is never continuous across a contraction joint.

C. Control Joints (CTJ):

1. Control joints are joints placed in concrete to provide for control of initial shrinkage stresses and cracks of monolithic units.
2. Control joints are constructed the same as contraction joints, with the exception that reinforcement is continuous across control joints.

D. Expansion Joints (EJ):

1. Expansion joints are joints provided to allow for expansion and contraction between two adjacent concrete members.
2. Joints are filled with sponge rubber joint filler.

E. Tooled Edges: Tool permanently exposed edges of slabs to a radius of ¼ inch.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 CONCRETE JOINTS

A. Construction Joints:

1. Locate construction joints where shown on Drawings or approved by the Engineer in writing. Show proposed locations of construction joints on the placement Drawings submitted under Section 03300: Cast-In-Place Concrete. Relocation, addition, or elimination of construction joints is subject to approval by the Engineer.
2. Locate horizontal joints in walls at the tops of footings or grade slabs. Place haunches at the same time as slabs.
3. Prepare construction joint surfaces for bonding by sandblasting, steel shot blasting, or high-pressure water jetting (6,000 psi minimum), or other method approved by the Engineer to thoroughly clean the surface. Remove all laitance, loose or defective concrete, coatings, sand, curing compound, and other foreign material to expose coarse aggregate uniformly, free of laitance, loose aggregate, or damaged concrete. Roughen concrete to produce minimum roughness profile of 1/4 inch. Surface preparation shall be conducted in a manner sufficient to keep from undercutting the edges of the larger particles of aggregate
4. Thoroughly moisten surfaces of construction joints to be covered with fresh concrete to surface saturated dry condition and remove standing water leaving the surface damp just before concrete placement.

B. Contraction Joints:

1. Contraction joints are joints placed in concrete to provide for controlled cracking due to volumetric shrinkage of a monolithic unit or movement between monolithic units.
2. The joints shall be constructed as shown on the Drawings.
3. For tooled joints, install while concrete is still workable.
4. For saw cut joints, concrete shall be strong enough to resist tearing from the saw blade. Do not saw cut later than 12 hours after placement.

C. Control joints:

1. Construct control joints so that there shall be no bond between the concrete surfaces forming the joint.
2. The joints shall be made by forming the concrete on one side of the joint and allowing it to set before concrete is placed on the other side of the joint. Coat the surface of the concrete first placed at the contraction joint with curing compound, or other approved bond breaker, before the concrete on the other side of the joint is placed. Protect reinforcement from application of curing compound so that reinforcement does not become coated with curing compound. The curing compound shall be as specified in Section 03300: Cast-In-Place Concrete.
3. The language in these specifications regarding control joints takes precedence over the language in the referenced American Concrete Institute Document entitled "Joints in Concrete Construction".

D. Bond Breaker:

1. Where shown in drawings, existing concrete surfaces adjacent to new concrete shall be coated with curing compound, or other approved bond breaker, as specified in Section 03300: Cast-In-Place Concrete.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars and accessories for cast-in-place concrete, and epoxy dowels.

1.2 REFERENCES

A. American Society of Testing and Materials International (ASTM)

1.	ASTM A 615	Standard Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.

B. American Concrete Institute (ACI)

1.	ACI 301	Standard Specifications for Structural Concrete for Buildings.
2.	ACI 315	Details and Detailing of Concrete Reinforcement.
3.	ACI 318	Building Code Requirements for Structural Concrete.

C. Concrete Reinforcing Steel Institute (CRSI)

1.	CRSI	Manual of Standard Practice.
2.	CRSI 63	Recommended Practice for Placing Reinforcing Bars.
3.	CRSI 65	Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Reinforcement Placement Drawings:

1. Indicate bar sizes; spacings; locations and quantities of reinforcing steel; bending and cutting schedules; and supporting and spacing devices.
2. Show locations of splices. Proposed reinforcing splices not indicated on the Drawings will require written approval by the Engineer.

C. Mill Test Reports:

1. Submit certified copies of mill test reports of reinforcement material analyses.

D. Smooth dowel coating.

E. Epoxy adhesive manufacturers installation instruction for epoxy dowels.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Perform concrete reinforced work in accordance with the CRSI Manual of Standard Practice and Document 63 and 65.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid rusting.

B. Protect from contaminants such as grease, oil, and dirt.

C. Provide identification after bundles are broken and tags removed.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel and Foundation Anchors: ASTM A 615; billet steel deformed bars; uncoated finish; Grade 60.

B. Steel Dowels

1. Dowels: ASTM A615, Grade 60 steel bars, size as shown on the Drawings.
2. Bond Breaking Compound: Use a bond-breaking compound approved by the Engineer.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, in accordance with CRSI Manual of Standard Practice. Use of concrete block, rocks, or other items for reinforcement support will not be allowed.

C. Dowel Epoxy Adhesive: Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System (HIT HY-150), or approved equal.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315.

B. Reinforcing splices have been located on the Drawings. Additional splices must be reviewed and approved in writing by the Engineer.

C. Welding reinforcing bars is not permitted.

PART 3 EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of loose rust, loose mill scale, dirt, grease, and other substances, which would impair bond with concrete. Remove rust by vigorous rubbing with burlap cloth or wire brushing.

B. Accommodate formed openings.

C. Place, support, and secure reinforcement against displacement. Do not deviate from required position.

D. Place reinforcement in accordance with the Drawings, Contractor reinforcing steel placement submittals and CRSI 65.

E. See Drawings for structural notes, and for reinforcement cover requirements.

F. Splice reinforcing bars by lapping and securely wiring together. Splices at locations other than those indicated are subject to written approval by the Engineer and shall conform, to the requirements of ACI 318. Do not use mechanical splices. Do not weld or tack weld reinforcing bars.

G. Place and secure embedded metalwork and conduit so as to not interfere with reinforcement installation.

H. Field bending of reinforcement is not allowed unless approved by the Engineer in writing.

I. Place reinforcement with clear distance of 1-inch, minimum, between reinforcement and anchor bolts, form ties, or other embedded metalwork unless otherwise shown on Drawings.

J. Tolerances:

1. Maintain concrete cover over reinforcement within 1/2 inch of specified cover where specified cover is greater than 2-1/2 inches.
2. Maintain concrete cover over reinforcement within 1/4 inch of specified cover where specified cover is 2-1/2 inches or less.
3. Maintain spacing of reinforcing bars within 1 inch of required spacing.

3.2 EPOXY DOWEL INSTALLATION

A. Install epoxy dowels only where shown on the Drawings or otherwise approved by the Engineer.

B. Install epoxy dowels in strict accordance with the manufacturers written instructions, including hole drilling and hole size, hole cleaning and preparation, epoxy injection, dowel placement, and cure times.

3.3 INSPECTION

A. Notify the Engineer at least 24-hours in advance of a requested concrete reinforcement inspection. Provide sufficient time in the schedule for the Engineer to inspect the reinforcing steel prior to placement of concrete. Concrete placed without inspection and approval by the Engineer may be subject to rejection and removal at no additional cost to the Owner.

B. Engineer inspection of steel reinforcing prior to concrete placement will not relieve the Contractor from responsibility to conform to the Drawings and Specifications.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete for new lined canal, pipe encasement concrete, and manhole sections.

1.2 REFERENCES AND DEFINITIONS

A. American Concrete Institute (ACI)

1.	ACI 117	Standard Tolerances for Concrete Construction and Materials (ACI 117) and Commentary (ACI 117R-06)
2.	ACI 301	Specification for Structural Concrete.
3.	ACI 302.1R	Guide for Concrete Floor and Slab Construction.
4.	ACI 304.2R	Placing Concrete by Pumping Methods.
5.	ACI 305R	Hot Weather Concreting.
6.	ACI 306.1	Standard Specification for Cold Weather Concreting.
7.	ACI 306R	Cold Weather Concreting.
8.	ACI 308.1	Standard Specification for Curing Concrete.
9.	ACI 308R	Guide to Curing Concrete.
10.	ACI 309R	Guide for Consolidation of Concrete
11.	ACI 309.2R	Identification and Control of Consolidation-Related Surface Defects in Formed Concrete.
12.	ACI 318	Building Code Requirements for Structural Concrete.

B. American Society for Testing and Materials International (ASTM)

1.	ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
2.	ASTM C 33	Standard Specifications for Concrete Aggregates.
3.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
5.	ASTM C 94	Standard Specifications for Ready-Mixed Concrete
6.	ASTM C 114	Standard Test Methods for Chemical Analysis of Hydraulic Cements
7.	ASTM C 138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
8.	ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
9.	ASTM C 150	Standard Specifications for Portland Cement.
10.	ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete.
11.	ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
12.	ASTM C 260	Standard Specification for Air Entraining Admixtures for Concrete.

13. ASTM C 309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
14. ASTM C 441 Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
15. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete.
16. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
17. ASTM C 1017 Standard Specification for Chemical for Use in Producing Flowing Concrete
18. ASTM C 1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
19. ASTM C 1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

C. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M182 Burlap Cloth Made from Jute or Kenaf.

D. American National Standards Institute (ANSI)

1. ANSI/NSF 61 Drinking Water System Components–Health Effects

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Material Approval Data

1. Mix Design: For each concrete mix design submit proposed mix designs in accordance with ACI 301 for review and approval.
2. Name and manufacturer of each cementitious material, aggregate source, admixture, and curing compound.

a. The Engineer reserves the right to require submission of manufacturer's test data and certification of compliance with specification.
b. The Engineer reserves the right to require submission of samples of concrete materials for testing before or during use in concrete.

3. Cementitious materials certifications and test reports:

a. Manufacturer's certification and test reports for each lot from which shipments are drawn.

1) Certify materials were tested during production or transfer in accordance with specified reference specification.
2) Submittal of certification and test reports shall not relieve Contractor of responsibility for furnishing materials meeting specified requirement.

C. Concrete Placement Drawings:

1. Drawings for each individual concrete placement. An individual concrete placement is defined as a portion of concrete Work placed in one continuous operation between specified lines or joints.
2. Show locations, dimensions, blockouts, openings, recesses, waterstops, and finishes. Identify construction joints, control joints, contraction joints, and expansion joints.
3. Show details of items embedded in or associated with placement except reinforcing steel.
4. Include a separate drawing showing placement sequence.
5. Place a title block with Contractor's name, contract title and number, placement identification, and identifying drawing number in lower right hand corner of each drawing.
6. List reference drawings from which details shown on placement drawing were obtained on each drawing.
7. Reference related steel reinforcement drawings associated with placement on each drawing.

D. Concrete Placement Schedule

1. Complete, detailed concrete placement schedule showing the Contractor's plan for placement of individual features, units, and other elements of concrete work.
2. Detail as necessary to show location, sequence, and date of concrete placements scheduled for each item of concrete work.
3. Show submittal of detail drawings and placement of reinforcement and embedded items.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Include quality control required for Section 03100: Concrete Formwork in Contractor Quality Control Plan.

B. Include provisions for hot or cold weather concrete in Contractor Quality Control plan.

C. Perform Work in accordance with provisions of all applicable ACI standards.

D. Obtain materials from same source throughout the Work.

E. Project Record Documents

1. Accurately record as-built concrete dimensions and tolerances and locations of embedded utilities and components on placement drawings.

F. Sequencing and Scheduling

1. Notify the Engineer at least 48 hours prior to commencing concrete Work.
2. Allow the Engineer to perform an immediate inspection of concrete surfaces upon removal of forms.
3. Notify the Engineer upon discovery of any honeycombing, foreign-embedded items, and/or defective concrete.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C 150 Portland Cement, Type I/II;

1. Meet equivalent alkalies requirements of ASTM C 150 – Table 2.
2. Meet false-set requirement of ASTM C 150 – Table 4.

B. Pozzolan: ASTM C 618, Class F, Except,

1. Sulfur trioxide, maximum: 4.0 percent.
2. Loss on ignition, maximum: 2.5 percent.
3. Test for effectiveness in controlling alkali-silica reaction under optional physical requirements in Table 2 of ASTM C 618. Use low-alkali cement for test.
4. Does not decrease sulfate resistance of concrete by use of pozzolan.
5. Demonstrate pozzolan will have an "R" factor less than 2.5.

    a. R = (C-5)/F
    b. C: Calcium oxide content of pozzolan in percent determined in accordance with ASTM C 114.
    c. F: Ferric oxide content of pozzolan in percent determined in accordance with ASTM C 114.

6. Pozzolan when tested in accordance with ASTM C 441, shall conform to the following: 65 percent minimum reduction in mortar expansion at 14 days, and 0.02 percent maximum mortar expansion at 14 days. Expansion shall be less than control sample expansion.
7. Pozzolan content shall be 20 percent plus or minus 5 percent by weight of the total cementitious materials.
8. Pozzolan and cement shall be stored and batched separately.

C. Aggregates:

1. Fine aggregate: ASTM C 33.
2. Coarse aggregate ASTM C 33, Size No. 67
3. Fine and coarse aggregate shall not be of a carbonate-based rock. Coarse and fine aggregates shall not contain any materials that are deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of mortar or concrete. The amount of coal and lignite in the fine aggregate shall be less than 0.5 percent.

D. Water: Water for concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement in accordance with ASTM C 1602, including optional requirements of Table 2.

2.2 ADMIXTURES

A. Air Entraining Admixture:

1. ASTM C 260.

2. Use a neutralized vinsol resin formulation for air-entraining admixture used with ASTM C 494, Type F or G; and ASTM C 1017, Type I or II chemical admixtures.

B. Other Admixtures: Use only when approved and at no additional cost to the Owner. Conform to ASTM C 494:

1. Accelerators: Approval does not relax cold-weather placement requirements. Calcium chloride is prohibited.
2. Set-retarders or stabilizers: Approval does not relax hot-weather placement requirements.
3. Water reducers: Type A, D, E, F or G, to achieve workability without exceeding specified water/cement ratio and slump.
4. Mineral admixtures to be used or furnished under this Specification shall be certified to comply with this Specification by the supplier. Certification shall include test results on Specifications, source, and location.

2.3 FIBER REINFORCEMENT

A. Fiber reinforcement shall conform to ASTM. C 1116 Type III (Synthetic Fiber).

B. Synthetic fibers shall be commercially available polypropylene fibers or chemically inert equivalent. Fiber content in concrete shall be between 0.1 and 0.2 percent by volume to produce a mix designed to control plastic shrinkage.

2.4 CURING MATERIALS

A. Water: ASTM C 1602, including optional requirements of Table 2.

B. Curing Compound: ASTM C 309

C. Polyethylene Film: ASTM C171.

2.5 GROUTS

A. Non-Shrink Grout: Proprietary, premixed non-ferrous, minimum 5000 psi compressive strength at 28 days, with a flowable consistency.

B. Dry-Pack Grout: One part cement to two parts sand, with sufficient water to thoroughly moisten ingredients designed for zero slump, 28 day compressive strength of 4000 psi; or dry-pack formulation of specified non-shrink grout.

2.6 CONCRETE ENCASEMENT MIX

A. Mix and deliver concrete in accordance with ASTM C 94.

B. Select proportions for normal weight concrete in accordance with ACI 301 and ACI 318.

C. Provide concrete to the following criteria:

1. Compressive Strength (28 days): 3000 psi minimum concrete for all structures.
2. Slump: In accordance with ASTM C 143, and with ASTM C 1017, Type I or II chemical admixtures, use slump appropriate for placing conditions, with a maximum slump of 8 inches.

3. Entrained Air: 4% to 7% at point of placement in accordance with ASTM C 231.
4. Maximum water/cementitious material ratio: 0.45.
5. Concrete temperature at placing: 50 to 80 degrees F.

D. Use accelerating admixtures in cold weather only when approved by the Engineer in writing. Use of admixtures will not relax cold weather placement requirements.

E. Use of calcium chloride is not permitted.

F. Use set retarding admixtures during hot weather only when approved by the Engineer.

G. Use set-controlling admixtures to increase allowable concrete delivery and placement restrictions in accordance with applicable provisions of this Section only when approved by the Engineer.

H. Add other approved admixtures (water reducer/superplasticizer, etc.) in accordance with the manufacturer's recommendations.

I. Superplasticizer shall be added to the concrete trucks at the site and the following requirements shall be followed:

1. The manufacturer's recommendations for dosage, mixing, and use.
2. A calibrated field dispenser shall be used. Records of dosage for each concrete truck shall be recorded by the Contractor and provided to the Engineer.
3. Each truck shall be mixed after dosing with the minimum number of drum rotations in accordance with the requirements of ACI and the admixture manufacturer.
4. Field concrete tests (air content, temperature, and slump) shall be performed on each truck before and after adding the admixture.

J. Concrete mix shall meet all specified requirements. Failure to meet any one specified requirement shall be sufficient cause for rejection.

K. Concrete shall be able to flow completely around and below pipe, leaving no voids or gaps.

2.7 FIBER REINFORCED CANAL LINER CONCRETE MIX

A. The canal liner concrete shall comply with the requirements of Concrete Encasement Mix in paragraph 2.6 in this section with the following exceptions:

1. Compressive Strength (28 days): 3000 psi
2. Slump: In accordance with ASTM C 143 – 3 inches ±1 inch at point of placement.
3. Include fiber mesh reinforcing in accordance with this Section.
4. Superplasticizer admixture shall not be used.

2.8 CONCRETE CONSOLIDATION EQUIPMENT

A. Consolidation equipment shall be flexible, electric or pneumatic-drive immersion-type vibrators with an operating speed of 7000 rpm when immersed in concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint locations conform to the approved placement drawings.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement, embeds, openings, water stops, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

D. Verify appropriate mix design for designated placement.

E. Engineer inspection and approval of foundations is required prior to any concrete being placed. Verify with the Engineer that all surfaces on which concrete is to be placed has been inspected and is adequate for concrete placement.

3.2 PREPARATION

A. Remove standing water, ice, mud, and debris from foundation surfaces to be covered by concrete.

B. Prepare rock surfaces free from oil, objectionable coatings, and loose, semi-detached, and unsound fragments. Immediately before placement of concrete, wash rock surfaces with an air-water jet and dry to a uniform surface-dry condition.

C. Prepare earth foundations free from frost or ice.

D. Thoroughly moisten surfaces of absorptive foundations to be covered with concrete so that moisture will not be drawn from fresh concrete.

E. Remove hardened concrete, wood chips, ice, and other debris from the interior of forms.

F. Place form release agent or wet forms just prior to placing concrete. Form release agent or any other deleterious material is not acceptable on concrete surfaces.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304, ACI 309 and ACI 318.

B. Notify the Engineer a minimum of 48 hours prior to commencement of operations. The Engineer shall inspect all surfaces on which concrete is to be placed.

C. No concrete shall be placed until all formwork, installation of items to be embedded, and preparation of surfaces involved in the placement have been approved. Formwork and foundation surfaces on which cast-in-place concrete is placed shall be moistened and kept moist until overlying concrete is placed.

D. Place concrete in as nearly a continuous operation as practical and in a manner to produce a concrete mass with sufficient continuity and continuance so that it shall harden and act as a monolithic mass with no discontinuous joints or potential places of separation or weakness.

E. Concrete shall be placed in near horizontal layers; the depth of each layer shall not exceed 20 inches. Place mixture on prepared foundation or previously completed concrete materials with spreading equipment that prevents segregation and that produces layers of widths and thicknesses as necessary for compaction to the required dimensions. Place each successive layer as soon as practicable after the preceding layer is completed.

F. Ensure reinforcement, inserts, embedded parts, and waterstops are not disturbed during concrete placement.

G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

H. Deposit concrete as close as practicable to its final position. Concrete shall be placed by methods that do not cause segregation. Do not drop concrete more than 3 feet.

I. Do not re-temper concrete.

1. Provide sufficient concrete placing capacity and equipment to deliver and place concrete without undue delay; do not permit cold joints to occur. Discharge concrete into forms within 90 minutes following the first introduction of water and cement or cement and aggregates, whichever occurs first. If the air temperature is 85° F or higher, the time limit specified above shall be reduced to 60 minutes unless the Engineer's approval has been obtained for means to maintain acceptable concrete quality without such time reduction. The Engineer may approve longer placement times provided no water is added after the specified time period above, and the approved concrete mix contains a water reducing and retarding admixture.

J. Cast-in-place concrete shall not be placed during heavy rain (more than 0.3 inch per hour or 0.03 inch in 6 minutes as defined by the Weather Bureau Glossary of Meteorology). If unusual adverse weather such as heavy rain, severe cold, heavy snow, high wind, or other adverse weather occurs, or is forecast to occur during placement, an interruption in placing operations may be approved or directed. All placed concrete materials shall be fully compacted before stopping Work. Allow for construction schedule risk and added expense that could occur as a result of adverse weather. Weather delays shall not be cause to receive additional compensation. Conform to ACI 306R for additional cold weather placement requirements.

K. Consolidate concrete in accordance with ACI 309. Do not place vibrator against reinforcing or forms or use vibrator to transport concrete within forms. Have one extra vibrator and one extra generator on site at all times during placement of concrete to be used in the event of breakdown of primary equipment.

L. Do not use concrete which has been subjected to more than 250 total revolutions of any combination of mixing and agitating equipment following the first introduction of aggregates to the mixer.

M. Contractor may place concrete by pumping, at Contractor's option. Appropriate mix design provisions must be included in Contractor's approved concrete submittal before any concrete is placed by pumping methods. Concrete placement by pumping methods shall be performed in accordance with applicable provisions of ACI 304.2R.

N. Maintain concrete cover around reinforcement as indicated on the Drawings and in accordance with ACI 318.

O. Place concrete continuously between predetermined construction, contraction, control and expansion joints. Do not break or interrupt successive pours such that cold joints occur.

P. Wait at least 3 days between adjacent placements of sections of structures with control joints.

3.4 CONCRETE FINISHING

A. Finish all exposed concrete as follows:

1. All exterior slab surfaces shall be sloped a minimum of 1/8 inch in 1 foot or as indicated on the drawings. All exterior slab surfaces shall have a floated finish as defined in ACI 301.
2. All smooth, exposed, exterior vertical surfaces shall have a smooth form finish as defined in ACI 301 unless otherwise approved by the Engineer.
3. All interior formed surfaces shall have a smooth form finish as defined in ACI 301.
4. Edges:

a. Chamfer edges of permanently exposed concrete, except slabs and top edges of walls, with a 45 degree bevel ¾ inch by ¾ inch unless otherwise shown on the drawings.
b. Tool exposed edges of slabs and top edges of walls to a radius of ¼ inch unless shown otherwise on the drawings.

B. All other exposed concrete surfaces on the project shall be as follows:

1. Formed surfaces shall be smooth form surfaces as defined in ACI 301.
2. All unformed surfaces shall have a floated finish as defined in ACI 301.

C. Broomed Finish: Provide where determined by the Engineer, or as indicated on the Drawings.

1. First provide a monolithic finish as specified above, except immediately after steel troweling brush surface with a stiff bristle brush.
2. Brush in parallel strokes at right angles to the normal flow of traffic.

D. Tolerances for Concrete Construction:

1. Tolerances are defined as allowable variations from specified lines and grades, and dimensions and as the allowable magnitude of the surface irregularities. Allowable variations from specified lines, grades, and dimension shall be in accordance with ACI 301 and ACI 117.

3.5 CURING AND PROTECTION

A. Cure fresh unformed concrete surfaces immediately, and formed surfaces following the removal of forms, for a minimum of 7 days, and as described in ACI 308.1 using one of the following methods as approved by the Engineer:

1. Using an approved clear membrane compound.
2. Other methods specified in ACI 308.1 submitted and approved by the Engineer.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

3.6 FIELD QUALITY CONTROL

A. Furnish a batch ticket (delivery ticket) with each load of concrete. Concrete delivered without a batch ticket containing complete information as specified shall be rejected. Collect and complete the batch ticket at the placement site and deliver all batch tickets to the Engineer on a daily basis. The Engineer shall have access to the batch tickets at any time during the placement. The following information shall be provided on each batch ticket:

1. Supplier's name and date
2. Truck number
3. Project number and location
4. Concrete class designation and item number
5. Cubic yards batched
6. Time batched
7. Mix design number
8. Type, brand, and amount of each admixture
9. Type, brand, and amount of cement and pozzolan
10. Mass (weights) of fine and coarse aggregates
11. Moisture of fine and coarse aggregate
12. Gallons of batch water (including ice)

B. Add the following information to the batch ticket at the placement site:

1. Gallons of water added by truck operator plus quantity of concrete in the truck each time water is added
2. Number of revolutions of drum at mixing speed (for truck mixed concrete)
3. Discharge time
4. Location of batch in placement
5. Water cement ratio

C. The Contractor will be allowed to add water to the batched concrete once at the site, based upon concrete supplier approval and direction and provided that the specified water to cement ratio is not exceeded and the amount of water withheld at the batch plant is on the delivery ticket.

D. Maintain records of placed concrete items. Record truck number, date, start and stop times, location of placed concrete, quantity, air temperature, concrete placement temperature, slump, air content, admixture quantities, test samples collected and times, and cast test cylinder numbers.

E. Perform Work in accordance with ACI 301.

F. Maintain one copy of each document on site.

G. Acquire cement from same source for all Work.

H. Acquire aggregate from same source for all Work.

I. Conform to ACI 305R when concreting during hot weather.

J. Conform to ACI 306R when concreting during cold weather.

K. Concrete to be placed directly on earth or bedrock will not be placed without written approval by the Engineer that the earth or bedrock foundation has been prepared suitably for concrete placement.

L. Perform quality assurance inspection and testing using the contractors approved independent testing firm. Provide access and samples as required by the Engineer.

M. The Contractor's independent testing agency shall prepare 5 concrete test cylinders for each 50 or less cubic yards or at least once each day of concrete placement.

1. Test cylinders shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.
2. Note on Record Drawings placement location represented by cylinders.
3. Test 2 cylinders from each set at 7 days, and 2 from each set at 28 days. Maintain the last cylinder from each set for testing in the event the 28-day tests fall below the required strength.

N. One additional test cylinder will be taken during cold weather concreting and cured on jobsite under the same conditions as the concrete it represents.

O. One slump test will be taken for each truck and for each set of test cylinders taken. Slump of concrete shall be determined at point of discharge from the mixer in accordance with ASTM C 143.

P. Air content (ASTM C 231), Unit Weight (ASTM C 138), and temperature (ASTM C 1064) shall be taken for each set of test cylinders taken.

3.7 PATCHING

A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Honeycombing or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery, and repair as determined by the Engineer.

C. Patch imperfections if approved by the Engineer:

1. Place repair materials to the full depth of repair and such that the repaired surface matches the original structure dimensions.
2. Prepare surfaces to receive repair materials by wetting to a surface saturated dry condition and remove standing water.
3. Finish and cure repair materials in accordance with the manufacturers instructions and as determined by the Engineer.

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, levels, details, elevations, dimensions, tolerances or specified requirements.

B. Defective concrete will be determined by the Engineer and repaired or replaced at no additional cost to the Owner.

C. Repair of Hardened Concrete Not Within Specified Tolerances: Hardened concrete that is not within specified tolerances shall be repaired to bring it within those tolerances. Such repair shall be accomplished in a manner approved by the Engineer. Concrete repair to bring concrete within tolerances shall be done only after consultation with the Engineer regarding the repair method. The Engineer shall be notified as to the time when repair shall be performed.

D. Concrete that shall be exposed to public view shall be repaired in a manner that shall result in a concrete surface with a uniform appearance. Grinding of concrete surfaces exposed to view shall be limited in depth such that no aggregate particles are exposed more than 1/6 inch in cross section at the finished surface. Where grinding has caused or shall cause exposure of aggregate particles greater than 1/6 inch in cross section at the finished surface, concrete shall be repaired by excavating and replacing the concrete at no additional cost to the Owner.

E. Prevention of Repeated Failure to Meet Tolerances: When concrete placements result in hardened concrete that does not meet specified tolerances, the Contractor shall, upon request, submit to the Engineer an outline of all preventative actions, such as modifications to forms, modified procedure for setting screeds, and different finishing techniques, to be implemented by the Contractor to avoid repeated failures. The Engineer reserves the right to delay concrete placements until the Contractor implements such preventative actions that are approved by the Engineer.

F. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

G. Repair or replace concrete not properly placed or not of the specified type.

3.9 PROTECTION

A. Protect finished Work under provisions of ACI 301.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical damage in accordance with the applicable provisions of ACI.

C. Unless otherwise approved by the Engineer, protect curing concrete from freeze thaw cycles until concrete has attained a compressive strength of 2500 psi. Control rate of temperature drop per day in accordance with ACI 306.1 and 306R and as required to prevent temperature cracking.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for the period necessary for hydration of cement and hardening of concrete.

E. Removal of formwork shall conform to requirements of Section 03100: Concrete Formwork.

END OF SECTION

TECHNICAL SPECIFICATIONS

SANTA MARIA SIPHON SUPPORT SYSTEM STABILIZATION PROJECT

MINERAL COUNTY, COLORADO

Prepared for

Santa Maria Reservoir Company
PO Box 288
Monte Vista, CO 81144

June 2012

URS
8181 East Tufts Avenue
Denver, Colorado 80237

Santa Maria Siphon Support System Stabilization Project

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DEFINITIONS

Addenda	Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.
Agreement	The written instrument which is evidence of the agreement between OWNER and CONTRACTOR covering the Work.
Application for Payment	The form acceptable to ENGINEER which is to be used by CONTRACTOR during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
Asbestos	Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
Bid	The offer or proposal of a bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
Bidding Documents	The Bidding Requirements and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).
Bidding Requirements	The Advertisement or Invitation to Bid, Instructions to Bidders, Bid security form, if any, and the Bid form with any supplements.
Bonds	Performance and payment bonds and other instruments of security.
Change Order	A document recommended by ENGINEER which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
Claim	A demand or assertion by OWNER or CONTRACTOR seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
Contract	The entire and integrated written agreement between the OWNER and CONTRACTOR concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

Contract Documents	The Contract Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEER's written interpretations and clarifications issued on or after the Effective Date of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by OWNER to CONTRACTOR are not Contract Documents.
Contract Price	The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.03 in the case of Unit Price Work).
Contract Times	The number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment.
CONTRACTOR	The individual or entity with whom OWNER has entered into the Agreement.
Cost of the Work	See paragraph 11.01.A for definition.
Drawings	That part of the Contract Documents prepared or approved by ENGINEER which graphically shows the scope, extent, and character of the Work to be performed by CONTRACTOR. Shop Drawings and other CONTRACTOR submittals are not Drawings as so defined.
Effective Date of the Agreement	The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
ENGINEER	The individual or entity named as such in the Agreement.

ENGINEER's Consultant	An individual or entity having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.
Field Order	A written order issued by ENGINEER which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
General Requirements	Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.
Hazardous Environmental Condition	The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto in connection with the Work.
Hazardous Waste	The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
Laws and Regulations; Laws or Regulations	Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
Liens	Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
Milestone	A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
Notice of Award	The written notice by OWNER to the apparent successful bidder stating that upon timely compliance by the apparent successful bidder with the conditions precedent listed therein, OWNER will sign and deliver the Agreement.
Notice to Proceed	A written notice given by OWNER to CONTRACTOR fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform the Work under the Contract Documents.
OWNER	The individual, entity, public body, or authority with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be performed.

Partial Utilization	Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.
PCBs	Polychlorinated biphenyls.
Petroleum	Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
Project	The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part as may be indicated elsewhere in the Contract Documents.
Project Manual	The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
Radioactive Material	Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
Resident Project Representative	The authorized representative of ENGINEER who may be assigned to the Site or any part thereof.
Samples	Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
Shop Drawings	All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.
Site	Lands or areas indicated in the Contract Documents as being furnished by OWNER upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by OWNER which are designated for the use of CONTRACTOR.
Specifications	That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor	An individual or entity having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the Site.
Substantial Completion	The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.
Supplementary Conditions	That part of the Contract Documents which amends or supplements these General Conditions.
Supplier	A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.
Underground Facilities	All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
Unit Price Work	Work to be paid for on the basis of unit prices.
Work	The entire completed construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
Work Change Directive	A written statement to CONTRACTOR issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change

	Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.
Written Amendment	A written statement modifying the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

SIPHONSECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project description, work summary, and work by Owner.

1.2 BACKGROUND

A. The Santa Maria Siphon is located in Mineral County in southwest Colorado. The canal is located approximately 10 miles west of the town of Creede, Colorado. The 7-ft diameter siphon conveys water from Continental Reservoir and direct runoff to a canal that discharges into Lakeman Lakes. The upstream portion of the siphon is above ground, then continues below grade to the canal. The siphon is owned and operated by the Santa Maria Reservoir Company.

B. The upstream portion of the siphon was constructed along a glacial till slope. It is supported by concrete thrust blocks, with smaller intermediate supports which bear directly on the slope. The slope has been experiencing active sliding for years, which has shifted some of the smaller intermediate supports downslope several inches to over a foot, resulting in loss of support of the siphon pipe.

C. The concrete supports and thrust blocks have experienced freeze-thaw damage of varying degrees of severity.

D. An access road was installed adjacent to the siphon several years ago. It is adequate for small vehicles, but heavy equipment such as concrete trucks may experience difficulty.

1.3 PROJECT DESCRIPTION

A. Major work items associated with the Santa Maria Siphon Support System Stabilization include:

1. Mobilization and preparatory work
2. Erosion and sediment controls
3. Clearing and grubbing
4. Selective Demolition - Thrust Blocks
5. Selective Demolition - Intermediate Supports
6. Reinforced Concrete Overlays - Thrust Blocks
7. Reinforced Concrete Overlays - Intermediate Supports
8. Fabrication and Installation of Steel Bearing Plates
9. Removal of Loose Rock and Boulders
10. Demobilization

1.4 OWNER OCCUPANCY

A. The Owner may occupy the premises during the period of construction to conduct normal operations.

B. It is anticipated that the siphon will be empty during construction activities. As such, temporary support of the siphon pipe is not expected to be necessary.

C. Cooperate with Owner to minimize conflicts, and to facilitate Owner operations.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01120
CONTRACTOR WORK PLAN

PART 1 GENERAL

1.1 SUMMARY

A. This section covers the Contractor Work Plan.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Prepare and submit a project-specific Work Plan to the Engineer for approval within 14 days after Award. Include the following topics in the Work Plan:

1. Construction implementation plan to include work approach, equipment to be used for each item of construction, methods, and management.
2. Key personnel names and qualifications, list of subcontractors, including an organizational chart and project directory with contact information.
3. Health and Safety Plan. See Section 01145: Health and Safety.
4. Environmental Protection. See Section 01350: Environmental Protection.
5. Waste Handling and Disposal Procedures. See Section 01575: Disposal of Waste Materials.
6. Spill prevention and control procedures. See Section 01350: Environmental Protection.
7. Fire prevention and protection. See Section 01350: Environmental Protection.
8. Dust control. See Section 01350: Environmental Protection. (BMPs to be used).
9. Construction sequence and schedule. See Section 01320: Construction Progress Schedule.
10. Construction Quality Control Plan (CQCP). See Section 01450: Quality Control.
11. Other applicable items to describe work approach.

1.3 WORK PLAN REQUIREMENTS

A. The Work Plan shall be carefully thought out, prepared in accordance with all applicable Federal, state, and local laws and regulations, these specifications, and good engineering and construction practices. The Work Plan shall include a complete discussion of conformance with applicable laws, regulations, guidelines, and other applicable procedures, and shall be approved by the Engineer before beginning field activities.

B. A statement in the Work Plan that “all applicable laws will be followed” is not sufficient detail for the Work Plan submittal. Repetition of specification wording and requirements shall only be used to present the elements of the work plan, not as a substitute for the detail that is expected to present the Contractor’s work approach.

C. The Work Plan shall be developed in accordance with the requirement of the individual specifications indicated and other requirements in this specification.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01145
HEALTH AND SAFETY

PART 1 GENERAL

1.1 REFERENCES

A. Williams - Steiger Occupation Safety and Health Act of 1970 (OSHA).

B. All other applicable Federal, State, and Local Safety and Health requirements.

1.2 CONTRACTOR'S RESPONSIBILITY

A. Provide and implement a Health and Safety Plan (HSP) that conforms to all applicable regulations.

B. The HSP shall include the possibility of encountering hazardous or controlled waste at the site, worker protection, actions to be taken, and responsible parties for managing such waste streams.

1.3 OWNER AND ENGINEER'S RESPONSIBILITY

A. Owner and Engineer will have no responsibility for enforcing the Contractor's Health and Safety program.

1.4 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Prepare and submit the Contractor's Project Health and Safety Plan in accordance with the General Conditions. The plan is for informational purposes only.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01200
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Measurement and payment criteria applicable to work performed under a unit price payment method.

B. Measurement and payment criteria applicable to work performed under a lump sum payment method.

C. List of unit price and lump sum pay items.

D. Schedule of value requirements for lump sum pay items.

E. Defect assessment and non-payment for rejected work.

1.2 AUTHORITY

A. Measurement methods delineated in the individual Specification Sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Specification Section shall govern.

B. Take all measurements and compute quantities for unit price pay items. The Engineer will verify measurements and quantities of work performed by the Contractor for payment purposes.

C. Assist the Engineer in the taking of measurements by providing necessary equipment, workers, and survey personnel as required.

1.3 QUANTITIES OF UNIT PRICE PAY ITEMS

A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Actual quantities and measurements supplied or placed in the work and verified by the Engineer shall determine payment.

1.4 MEASUREMENT OF QUANTITIES FOR UNIT PRICE PAY ITEMS

A. Measurement Devices:

1. Weigh scales: inspected, tested, and certified by the appropriate Colorado Weights and Measures Division within the past year.
2. Platform scales: of sufficient size and capacity to accommodate the conveying vehicle.
3. Metering devices: inspected, tested, and certified by the appropriate Colorado Weights and Measures Division within the past year.

B. Measurement by volume: Measured by cubic dimension using mean length, width, and height or thickness.

C. Excavation quantities will be based on the calculated volume between the baseline survey, as defined in Section 01720: Layout of Work and Surveying and the excavation limits shown on the Drawings or described in these Specifications, or to the most

practicable lines, grades and dimensions as prescribed by the Engineer, and will include only material that is actually removed within the prescribed pay lines.

D. Fill quantities will be based on the calculated volume between the approved excavation limits or the approved base surface and the fill limits shown on the Drawings or described in these Specifications, or to the most practicable lines, grades and dimensions as prescribed by the Engineer, and will include only material that is actually placed within the described pay lines.

E. Compute excavation and fill quantities in accordance with the requirements of Section 01720: Layout of Work and Surveying.

F. Where concrete for structures is to be placed directly upon or against the excavations and the character of the material cut into is such that the material cannot be trimmed efficiently to accurate dimensions by ordinary excavation finishing methods, as determined by the Engineer, measurement for payment thereof will be made to the prescribed average dimension lines. The prescribed average dimension lines shall be considered as 6 inches outside the neat lines of the concrete for the purposes of measurement, for payment.

G. Measurement, for payment, of excavations upon or against which concrete is not required to be placed will be limited to the neat lines shown on the Drawings, to the most practicable lines, grades, and dimensions as established by the Engineer.

H. Measurement by area: Measured by square dimension using mean length and width or radius. Items which are measured by the acre, such as revegetation, shall be measured horizontally.

I. Linear measurement: Measured by linear dimension, at the item centerline or mean chord. Items which are measured by the lineal foot, such as pipes, culverts, underdrains, fence, etc., shall be measured parallel to the base or foundations upon which the items are placed, unless otherwise specified or shown on the Drawings.

J. Stipulated sum/price measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as completed items or units of the Work.

K. Lump sum items will not be measured for payment. However, measurements may be made to monitor work progress.

1.5 PAYMENT

A. Payment includes: Full compensation for furnishing all required labor, materials, products, tools, equipment, plant, transportation, services, incidentals; erection, application or installation of an item of the work, and all other costs of whatsoever nature for the items of work complete, will be included in the various bid items; overhead and profit.

B. Contractor shall submit a Schedule of Values for all lump sum bid items listed in the Bid Schedule within 30 days of the Notice to Proceed. The Schedule of Values will be used to help assess the intermediate value of work completed for the purpose of making progress payments

C. Payment for unit price items will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by the unit price.

D. Payment for lump sum price items will be made on the basis of the contract lump sum prices in the Bid Form. If the Contractor requests progress payments for lump sum items, such progress payments will be made in accordance with a detailed program of payment apportioning in the schedule of values, prepared by the Contractor and submitted to the Engineer for approval.

1.6 DEFINITION OF BID ITEMS

A. Bid Items:

1. Mobilization, Demobilization, and Preparatory Work and (Lump Sum Item)

a. This item includes the mobilization of personnel, equipment and temporary construction facilities to the project site and their subsequent removal; providing temporary utilities; safety fence; traffic control signage and barricades; and other miscellaneous items required to begin construction and closeout the Contract. The cost of all work specified in Division 1 - General Requirements, unless specifically covered in other bid items, will not be paid separately, but shall be included in the lump sum price bid in the Schedule for Mobilization and Preparatory Work.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.
d. Mobilization, Preparatory Work and Demobilization is limited to maximum of ten percent (10%) of the total Bid Price.

2. Erosion and Sediment Control (Lump Sum Item)

a. Erosion and Sediment Control includes installation, maintenance, and removal of all sediment control devices required for the Work, including hay bales, silt fence, sedimentation ponds, and associated compliance work required by Federal, State, and County permits in accordance with Section 01570.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.

3. Clearing and Grubbing (Unit Price Item)

a. This item includes clearing and grubbing within the limits of site disturbance for required excavations, staging and stockpile areas, and borrow areas. Includes removal, cutting, grubbing, mowing, etc in accordance with Section 02230.
b. Measurement: Measurement will be based on the acres cleared and grubbed within the disturbed areas, measured to the nearest 0.1 acre.
c. Payment will be made at the Contract Unit Price per acre.

4. Selective Demolition - Thrust Blocks (Lump Sum Item)

a. This item includes all work associated with the demolition, salvage, and disposal of items pertaining to the thrust blocks designated on the Drawings as salvage, demolish, remove, or similar terms in accordance with Section 02220.

b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.

5. Selective Demolition - Intermediate Supports (Lump Sum Item)

a. This item includes all work associated with the demolition, salvage, and disposal of items pertaining to the intermediate supports designated on the Drawings as salvage, demolish, remove, or similar terms in accordance with Section 02220.
b. Measurement: Measurement will be based on the approved Schedule of Values.
c. Payment: Payment will be made at the Contract Lump Sum Price.

6. Reinforced Concrete Overlays - Thrust Blocks (Unit Price Item)

a. This item includes procuring, batching, transporting, forming, placing, vibrating, finishing, and curing the reinforced concrete for the thrust block overlays as shown in the Drawings. Also includes procuring transporting, and installing reinforcing steel, accessories, and joint preparation in accordance with Sections 03100 to 03300.
b. Measurement: Concrete encasement will be measured in place by volume (cubic yards) to the limits approved by the Engineer.
c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

7. Reinforced Concrete Overlays - Intermediate Supports (Unit Price Item)

a. This item includes procuring, batching, transporting, forming, placing, vibrating, finishing, and curing the reinforced concrete for reconstructing the intermediate support blocks as shown in the Drawings. Also includes procuring transporting, and installing reinforcing steel, accessories, and joint preparation in accordance with Sections 03100 to 03300.
b. Measurement: Concrete encasement will be measured in place by volume (cubic yards) to the limits approved by the Engineer.
c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

8. Fabrication and Installation of Steel Bearing Plates (Unit Price Item)

a. This item includes fabricating, delivering, and installing steel bearing plate assemblies for the intermediate supports as defined in Section 05500.
b. Measurement: Measurement will be by number of bearing plate assemblies installed as shown in the Drawings.
c. Payment: Payment will be made at the Contract Unit Price per each steel bearing plate assembly.

9. Removal of Loose Rock and Boulders (Unit Price Item)

a. This item includes excavation of loose rock materials as defined in Section 02315: Excavation, required for removing material adjacent to portions of the siphon pipe in the areas shown on the Drawings.

b. Measurement: Measurement will be by volume (cubic yards) of rock removal to the neat lines and grades on the Drawings.
c. Payment: Payment will be made at the Contract Unit Price per cubic yard.

1.7 SCHEDULE OF VALUES

A. The Contractor shall submit Schedule of Values for lump sum items listed in this Section within 15 days after date of Notice to Proceed.

B. The Schedule of Values will be used to assess the intermediate value of Work for pay applications.

1.8 DEFECT ASSESSMENT

A. The Contractor shall replace the work, or portions of the work, not conforming to the Drawings or the Specifications.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the work that does not conform to the Drawings or the Specifications, the Owner will direct one of the following remedies:

1. The defective work will remain, but the corresponding unit or lump sum price of the work will be adjusted to a new unit or lump sum price at the discretion of the Owner.
2. The defective Work will be partially repaired at the instruction of the Owner, and the corresponding unit or lump sum price of the work will be adjusted to a new unit or lump sum price at the discretion of the Owner.
3. The individual Specification Sections may modify the options specified in this Section or may identify a specific formula or percentage unit or lump sum price reduction. In the event of conflict, the requirements of the individual Specification Section shall govern.
4. The authority of the Owner to assess the defect and identify payment adjustment is final.

1.9 NON-PAYMENT FOR REJECTED PRODUCTS

A. Payment shall not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products not completely unloaded from the transporting vehicle.
4. Products placed beyond the lines and grades of the required Work.
5. Products remaining on hand of the Contractor after completion of the Work.
6. Loading, hauling, and disposing of rejected products.
7. Rejected materials including, but not limited to, overly wet or frozen earth material.
8. Excavation or fill made for the convenience of the Contractor for any purpose or reason.
9. Overexcavation and replacement materials.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01310
PROJECT COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 WORK INCLUDED IN THIS SECTION

A. The work of this section includes, but is not limited to: coordination; preconstruction meeting; progress meetings; and task start-up meetings.

1.2 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Coordinate all work with progress meetings to explain unique features of the work to the work forces. The Engineer will attend such meetings. Meet daily with the Engineer to explain work progress, quality control, and any issues affecting successful completion of the work.

C. Coordinate completion and clean up of work of separate sections in preparation for Substantial Completion.

D. After the Owner occupancy of premises, coordinate access to site for correction of defective work and the work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 PRECONSTRUCTION MEETING

A. Within ten days after Notice to Proceed and prior to starting the Work except mobilization, the Contractor, accompanied by a representative from each principal subcontractor, shall meet with the Owner and the Engineer for a Preconstruction Meeting. The Preconstruction Meeting will be scheduled by the Owner. The principal features of work will be reviewed and any questions regarding the Contract and work site will be addressed.

B. Attendance Required: the Owner, the Engineer, and the Contractor Superintendent, the Contractor Safety and Health Officer, principal subcontractors, and other key personnel as requested by the Contractor or Owner.

C. Unless previously submitted to the Owner, the Contractor shall bring to the conference a schedule for each of the following:

1. Preliminary Progress Schedule.
2. Procurement schedule.
3. Shop Drawings and other submittals schedule.
4. Schedule of Values

D. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda will include:

1. Distribution of Contract Documents, including Contractor executed bond, certificate of insurance, and Contract.
2. Submission of list of Subcontractors, list of Products, schedule of values, and preliminary progress schedule.
3. Designation of personnel representing the parties in the Contract, and the Engineer.
4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
5. Contractor schedules.
6. Critical Work sequencing.
7. Processing Applications for Payment.
8. Field decisions and Change Orders.
9. Use of premises by the Owner, the Engineer and the Contractor.
10. Owner's requirements.
11. Construction facilities and controls provided by the Owner.
12. Use of premises, office and storage areas, security, housekeeping, and Owner needs.
13. Survey and layout.
14. Security and housekeeping procedures.
15. Contractor assignments for safety and first aid.
16. Quality Control and Inspection Program.
17. Procedures for maintaining record documents.
18. Major equipment deliveries and priorities.
19. Requirements for start-up of equipment.
20. Inspection and acceptance of equipment put into service during construction period.
21. Record drawings.

E. The Engineer will preside at the conference and will arrange for keeping the minutes and distributing the minutes to all persons in attendance.

1.4 PROGRESS MEETINGS

A. The Engineer will schedule and hold regular progress meetings at least weekly and at other times as requested by the Owner or required by progress of the Work. The purpose of the meetings will be to review the progress of the Work, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop.

B. Additional meetings may be called by the Owner, the Engineer, or the Contractor during any stage of the project when it is deemed necessary to raise any significant questions, establish new guidelines, introduce a new aspect to the project, or any other items that will affect the progress of work.

C. Meetings may take place at the project site or some other location that is satisfactory to the Owner, the Engineer and the Contractor.

D. The Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

E. Attendance Required: The Contractor and all Subcontractors active on the site shall be represented. The Contractor may at its discretion request attendance by representatives of its Suppliers, manufacturers, and other Subcontractors.

F. All expenses associated with attending the meetings that are incurred by other than the Owner and the Engineer shall be born by the Contractor.

G. Proposed Agenda:

1. Review and approval of minutes of previous meetings.
2. Review of Work progress of minutes of previous meeting.
3. Field observations, problems, conflicts, and decisions.
4. Identification of problems which impede the schedule and proposed corrective actions.
5. Review of submittals schedule and status of submittals; expedite as required.
6. Requests for information status.
7. Review of off-site fabrication and delivery schedules.
8. Revisions to project schedule.
9. Maintenance of progress schedule.
10. Corrective measures and procedures to regain projected schedules.
11. Planned progress during succeeding Work period.
12. Coordination of project schedules and projected progress. Review of three week look-ahead schedule provided by Contractor to ensure proper coordination with Owner, Engineer, and subcontractors.
13. Maintenance of quality, and Safety and Work standards.
14. Pending changes and substitutions.
15. Effect of proposed changes on progress schedule and coordination, and effect on other contracts of the project.
16. Other business relating to Work.

H. The Engineer shall record minutes; include significant proceedings and decisions and distribute copies after meeting to participants and those affected by decisions made.

1.5 TASK START-UP MEETING

A. Before the start of any significant site activity, as determined by the Engineer, conduct a start-up meeting to discuss procedures, quality control, inspections, and related activities. Attendance at the meeting should include the Contractor project manager, site supervisor, representatives of key Subcontractors, and the Engineer and his designated representatives. Notify Engineer at least 72 hours in advance of meeting to allow the Engineer to invite necessary offsite personnel.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01320
CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.1 SUMMARY

A. Construction Progress Schedules developed in accordance with this Section and the General Conditions.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. With each Progress Schedule submission provide the following:

1. Contractor certification that progress schedule submission is the actual schedule being utilized for execution of the Work and certification by all Subcontractors with 10 percent or more of Work that they concur with Contractor progress schedule submission.
2. Five legible copies of the progress schedule.

C. Preliminary Progress Schedule:

1. Within 10 days following the effective date of the Agreement, the Contractor shall prepare and submit a preliminary Critical Path Method (CPM) Gantt progress schedule covering all Work to be done on the Project. The schedule shall include the major construction activities and their durations and start/finish dates.
2. The Gantt schedule and subsequent revisions shall be submitted to the Owner and shall reflect the actual progress of the Project to within 5 days prior to submittal.
3. If the schedule or any subsequent revision is not acceptable to Owner, the schedule shall be revised and resubmitted as many times as necessary until the schedule is acceptable. Acceptance of the schedule will not be unreasonably withheld.
4. The initial progress schedule, when accepted by the Owner, will be the project baseline schedule.

D. Shop Drawings and Engineering Data Schedule.

1. At the time the preliminary Gantt progress schedule is submitted, a schedule shall be submitted of the items of materials, equipment, qualifications, plans, and data for which Shop Drawings and/or engineering data are required by the Specifications. For each required submittal item, the date shall be given for intended submission of the item to Engineer for review and the date required for its return to avoid delay in any activity beyond the scheduled start date. Sufficient time shall be allowed for initial review, correction and resubmission, and final review of all submittals.

E. Bi-weekly Progress Reports:

1. At the end of each two week period, the activities that have been completed, with their actual start and completion dates, and a list of the activities on which Work

is currently in progress and the number of working days required to complete each, shall be submitted to Owner.

F. Submit adjusted schedule or confirm validity of current schedule with each monthly Application for Payment in accordance with this Section and the General Conditions, and at such other times as necessary to reflect the following:

1. Progress of Work to within 5 days prior to submission.
2. Changes in Work scope and activities modified since submission.
3. Delays in Submittals or resubmittals, deliveries, or Work.
4. Adjusted or modified sequences of Work.
5. Other identifiable changes.
6. Revised projections of progress and completion.

G. Narrative Progress Report: Submit with each monthly submission of progress schedule.

1.3 PROGRESS OF THE WORK

A. If Contractor fails to complete activity by its latest scheduled completion date and this failure may extend Contract Times (and/or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to the acceptable current progress schedule. Actions by Contractor to complete Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.

B. Engineer may request a schedule recovery or mitigation plan if Contractor fails to: (i) complete a critical scheduled activity by its latest Milestone completion date, or (ii) satisfactorily execute Work as necessary to prevent delay to the overall completion of the Work.

C. Owner may require Contractor, at Contractor expense, to add to its plant, equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule.

1.4 PRELIMINARY PROGRESS SCHEDULE

A. As a minimum, submit two computer generated CPM schedules as follows:

1. The Gantt schedule shall be sufficiently detailed to indicate such activities as shop drawing submittal and review, equipment manufacture and delivery, installation of equipment, earthwork, demolition activities, concrete placements, and subcontractor’s items of work. Construction activities of less than 1 day's duration or more than 5 days' duration shall be kept to a minimum. Each activity on the diagram shall be labeled with the following information: description, duration, start date, and finish date

B. Planned durations and start dates shall be indicated for each Work item subdivision. Work item durations for any activity shall not exceed thirty (30) working days. Each major component and subdivision component shall be accurately plotted on time scale sheets 11 inches by 17 inches or 24 inches by 36 inches in size. Not more than four sheets shall be employed to represent this overview information.

1.5 PROGRESS SCHEDULE

A. General:

1. Schedule(s) shall reflect Work logic sequences, restraints, delivery windows, review times, Contract Times, and Milestones set forth in the Agreement, and shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
2. The schedule requirement herein is the minimum required. Contractor may prepare a more sophisticated schedule if such will aid Contractor in execution and timely completion of Work.
3. Submit assumptions for base schedule describing work week duration, numbers of shifts, hours per shift, holidays, assumed weather days, assumed productivity, crew size, etc.
4. Adjust or confirm schedules in accordance with this Section and the General Conditions on a monthly basis.
5. The update of the Project Schedule shall be an integral part of the estimate upon which progress payments will be made. If, in the judgment of the Owner, the Contractor fails or refuses to provide information required to accomplish a complete Project Schedule Update or revision as specified hereafter, the Contractor shall be deemed to have not provided the required estimate upon which progress payments may be made, and shall not be entitled to progress payments until it has furnished the information necessary for a complete schedule update to the satisfaction of the Owner.
6. Float time is a Project resource available to both parties to meet contract Milestones and Contract Times.
7. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of Owner and Contractor.
8. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends Work beyond contract completion date.
9. If Contractor provides an accepted schedule with an early completion date, The Owner reserves the right to reduce Contract Times to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

B. Format:

1. Computer generated baseline schedule, on maximum 11-inch by 17-inch or 24-inch by 36-inch sheet size to include at least:

    a. Identification and listing in chronological order of those activities reasonably required to complete Work, including, but not limited to, subcontract work, fabrication, and delivery dates including required lead times, move-in and other preliminary activities, Project closeout and cleanup, and specified Work sequences, constraints, and Milestones, including Substantial Completion date(s). Listings to be identified by Specification section number.
    b. Identify: (i) horizontal time frame by year, month, and week, (ii) duration, early-start, and completion for each activity and subactivity,

and (iii) critical activities and Project float, (iv) assumed weather allowances, (v) planned holidays, (vi) production rates and (vii) assumed work hours per day and number of work days per week.

c. Subschedules to further define critical portions of the Work.

d. Monthly Schedule Submissions: Show overall percent complete, projected and actual, and completion progress by listed activity and subactivity.

1.6 NARRATIVE PROGRESS REPORT

A. Include, as a minimum:

1. Summary of Work completed during the past period between Narrative Progress Reports.
2. Work planned during the next period.
3. Explanation of differences between summary of Work completed and Work planned in previously submitted Narrative Progress Report.
4. Current and anticipated delaying factors and their estimated impact on other activities and completion Milestones.
5. Corrective action taken or proposed.

1.7 CLAIMS FOR ADJUSTMENT OF CONTRACT TIMES

A. Reference the General Conditions.

B. Where Engineer and Owner has not yet rendered formal decision on Contractor claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in progress schedule, Contractor shall reflect that amount of time adjustment in progress schedule as Engineer and Owner may accept as appropriate for the interim. It is understood and agreed that such interim acceptance by Engineer and Owner will not be binding and will be made only for purpose of continuing to schedule Work, until such time as formal decision as to an adjustment, if any, of the Contract Times acceptable to the Engineer and Owner has been rendered. Contractor shall revise progress schedule prepared thereafter in accordance with Engineer and Owner formal decision.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01330
SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittal requirements. Submittals shall be in accordance with this Section and the General Conditions.

1.2 DEFINITIONS

A. Work-related submittals of this Section are categorized for convenience as follows:

1. Product Data: Product Data includes standard printed information on materials, products and systems not specifically prepared for the Work, other than designation of selections from among available choices printed therein.
2. Shop Drawings: Shop Drawings include specially prepared technical data for the Work, including drawings, diagrams, performance curves, data sheets, schedules, templates, patterns, reports, calculations, instructions, measurements and similar information not in standard printed form for general application to other contracts.
3. Samples: Samples include both fabricated and unfabricated physical examples of materials, products and units of Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis.
4. Miscellaneous Submittals: Miscellaneous Submittals related directly to the Work (non-administrative) include construction permits, Stormwater Pollution Prevention Plan (SWPPP) requirements, Spill Prevention Control and Countermeasures Plan (SPCC), Work Plan, Health and Safety Plan, warranties, maintenance agreements, workmanship bonds, project photographs, survey data and reports, physical Work records, quality testing and certifying reports, copies of industry standards, records, drawings, field measurement data, operation and maintenance materials, overrun stock; and similar information, devices and materials applicable to the Work and not processed as Product Data, Shop Drawings or Samples.

1.3 QUALITY ASSURANCE

A. Submittals shall verify compliance with the Contract Documents, and shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; performance characteristics; and dimensions needed for installation and correlation with other materials and equipment. When an item consists of components from several sources, Contractor shall submit a complete initial submittal including all components.

1.4 SUBMITTAL SEQUENCING AND SCHEDULING

A. Coordinate preparation and processing of submittals with performance of the Work so that Work will not be delayed by submittal review process.

B. Coordinate and sequence different categories of submittals for the same Work, and for interfacing units of Work, so that one will not be delayed for coordination with another.

C. The Contractor shall make all submittals far enough in advance of scheduled installation dates to provide all time required for reviews, for possible revisions and resubmittals, and for placing orders and securing delivery. Submittals shall be received at least 21 calendar days prior to any scheduled work for the activity covered by the submittal unless otherwise noted in individual specification Sections or agreed to in writing by the Engineer.

D. Timing of submittals shall allow for review time by the Engineer.

E. Contractor scheduling shall include preparation of a submittal schedule to be coordinated with the Contractor construction sequencing and scheduling, including allowance for Engineer review time.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 SUBMITTAL PROCEDURES

A. All submittals, regardless of origin, shall be stamped with the approval of Contractor and identified with the name and number of this Contract, Contractor name, and references to applicable specification paragraphs and Contract Drawings. Each submittal shall indicate the intended use of the item in the Work. When catalog pages are submitted, applicable items shall be clearly identified and inapplicable data crossed out. The current revision, issue number, and date shall be indicated on all drawings and other descriptive data. The forms shall be sequentially numbered.

B. The Contractor shall certify by signing the submittal that review, verification of products required, field dimensions and coordination of information is in accordance with the Work as specified in the Contract Documents.

C. Process submittals in accordance with this section.

D. Identify specific variations from the Contract Documents and Product or system limitations which conflict or may be detrimental to successful performance of the completed Work.

E. Provide space for the Contractor and Engineer review stamps. Submittals shall contain Contractor's executed review and approval marking. Submittals which are received from sources other than through Contractor or do not contain the Contractor approval marking will be returned without action.

F. Revise and submit resubmittal as required and identify all changes made since the previous submittal. Submission of resubmittals shall be performed in a similar manner as that of the submittals described in Paragraph 3.1 of this section.

G. Distribution:

1. Six copies of each drawing and necessary data shall be submitted. Engineer will return two marked copies to Contractor. Engineer will not accept submittals from anyone but Contractor. Submittals shall be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
2. Distribute copies of reviewed submittals to all subcontractors whose work will interface with the subject of the submittal.
3. Provide additional distribution of submittals (not included in other copy submittal requirements specified in this Section) to subcontractors, suppliers, fabricators, installers, governing authorities and others as necessary for performance of the Work.
4. Include such additional copies in transmittal to Engineer where required for status before final distribution, and show such distribution on transmittal form.

H. The Engineer will review submittals only for general conformance with the Contract Documents. Such review by the Engineer shall not relieve the Contractor or any subcontractor of responsibility for full compliance with Contract requirements; for correctness of dimensions, clearances and material quantities; for proper designing of details; for proper fabrication and construction techniques; for proper coordination with other trades; and for providing all devices required for safe and satisfactory construction and operation.

I. Submittals reviewed by the Engineer and returned to the Contractor will be marked with one of the following designations:

1. No Exceptions Taken
2. Furnish As Noted
3. Revise and Resubmit

J. Processing of Revise and Resubmit Submittals

1. When the drawings and data are returned marked “Revise and Resubmit” Contractor shall not proceed with manufacture and the corrections shall be made as noted thereon and as instructed by Engineer and six corrected copies resubmitted.
2. Resubmissions will be handled in the same manner as first submissions. Direct specific attention, in writing or on the resubmittal, to revisions other than the corrections requested by the Engineer on previous submittals using the notation specified in this Section.

K. Processing of Furnish As Noted Submittals

1. When the drawings and data are returned marked "Furnish As Noted”, Contractor may proceed with manufacture at its own risk on the basis of incorporating all comments noted on the returned drawings and data, and six corrected copies submitted.
2. Resubmissions will be handled in the same manner as first submissions. Direct specific attention, in writing or on the resubmittal, to revisions other than the corrections requested by the Engineer on previous submittals using the notation specified in this Section.

L. Processing of No Exceptions Taken Submittals:

1. Each copy of the submittal so designated by the Engineer will be identified accordingly by being so stamped and dated.
2. Construction shall be carried out in accordance therewith and no further changes made therein except upon written instructions from the Engineer. Final drawings (paper, mylar, or electronic) and/or microfilms shall be submitted to the Engineer.

3.2 RESUBMITTAL OF DRAWINGS AND DATA

A. Contractor shall accept full responsibility for the completeness of each resubmittal. Contractor shall verify that all corrected data and additional information previously requested by Engineer are provided on the resubmittal.

B. Promptly notify the Engineer, if any correction or notation indicated on submittals constitutes a change of the Contract requirements.

C. Requirements specified for initial submittals shall also apply to resubmittals. Resubmittals shall bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal.

D. Resubmittals shall be made within 7 days of the date of the letter returning the material to be modified or corrected.

E. Any need for more than one resubmission, or any other delay in obtaining Engineer review of submittals, will not entitle Contractor to extension of the Contract Times unless delay of the Work is directly caused by a change in the Work authorized by a Change Order or by failure of Engineer to review any submittal within the submittal review period specified herein and to return the submittal to Contractor.

3.3 PROPOSED PRODUCT LIST

A. Within 30 days from execution of the Agreement between Owner and Contractor, submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product, and the lead time for procurement, fabrication and delivery of all products with a lead time of more than 30 days.

B. For products specified only by reference standards, give manufacturer, trade names, model or catalog number, and reference standard.

3.4 PRODUCT DATA, SHOP DRAWINGS, AND SAMPLES

A. Product Data:

1. Collect required data into one submittal for each unit of Work or system; and mark each copy to show which choices and options are applicable to the Work. Include manufacturer's standard printed recommendations for application of labels and seals, notation of field measurements which have been checked, and special coordination requirements.
2. Maintain one set of Product Data (for each submittal) at project site, available for reference by Engineer and others.
3. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide all information unique to this Project.

4. After review, distribute in accordance with paragraph 3.1 of this section.

B. Shop Drawings:

1. Reproduce and distribute in accordance with Paragraph 3.1 of this section and for Record documents described in Section 01770: Contract Closeout.

C. Samples:

1. Provide units identical with final condition of proposed materials or products for the Work.
2. Include "range" samples (not less than three units) where unavoidable variations must be expected, and describe or identify variations that must be expected, and describe or identify variations between units of each set.
3. Provide full set of optional samples where Owner selection is required. Prepare samples to match Owner sample where so indicated.
4. Include information with each sample where so indicated. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards. Samples are submitted for review and confirmation of color, pattern, texture, and "kind" by Owner.
5. Engineer will not "test" samples (except as otherwise indicated) for compliance with other requirements. Conformance with the Contract Documents is the exclusive responsibility of the Contractor.

3.5 MISCELLANEOUS SUBMITTALS

A. Construction Permits:

1. Acquire, maintain, and submit copies of all construction permits that are required by agencies to execute the Work.

B. Manufacturers' Instructions:

1. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing in quantities specified herein.
2. Identify any conflicts between manufacturers' instructions and Specifications

C. Manufacturers' Certificates:

1. When specified in individual specification Sections, submit manufacturers' certificates to Engineer, in quantities specified herein.
2. Indicate that a material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
3. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer. If these are outdated and/or not acceptable to Engineer, the Contractor shall submit to the Engineer the new certificates and test results on materials or product.

D. Tests and Test Reports:

1. Classify each as either "project related" or Product Data, depending upon whether report is uniquely prepared for project or a standard publication of workmanship control testing at point of production, and process accordingly.

2. All test equipment used shall be verified to be in calibration at the time of each test and test reports shall so indicate. No test shall be made without such verification.

E. Standards:

1. Where copy submittal is indicated, and except where specified integrally with Product Data submittal, submit a single copy for Engineer's use.
2. Where workmanship at project site and elsewhere is governed by standards, furnish additional copies to fabricators, installers and others involved in performance of the work.

END OF SECTION

SECTION 01350
ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Landscape preservation; prevention of water pollution; abatement of air pollution; abatement of noise; and temporary drainage provisions.

1.2 LANDSCAPE PRESERVATION

A. Exercise care to preserve the existing landscape outside of specified limits of areas of site disturbance. Conduct construction operations to prevent any unnecessary destruction, scarring, or defacing of the natural or man-made surroundings in the vicinity of the work.

B. Shape irregularly the edges of clearings and cuts through trees, shrubbery, and vegetation to soften the undesirable visual impact of straight lines. Perform movement of crews and equipment within the right-of-way, within easements, and over routes provided for access to the work in a manner to prevent damage to vegetation and property.

C. Destruction, scarring, damage, or defacing of the landscape resulting from the Contractor's operations shall be repaired, replanted, reseeded, or otherwise corrected as directed by the Owner and at the Contractor's expense.

D. The locations, alignments, and grades of construction roads are subject to approval of the Owner. Site clearing shall be conducted in accordance with Section 02230: Clearing and Grubbing. When no longer required by the Contractor, areas of construction roads and staging, stockpiling/disposal and storage areas shall be restored to the original topographic contours except as otherwise specified for excess excavation materials. All areas disturbed by construction shall be reclaimed in accordance with Section 02920: Reclamation. All contouring and reclamation work completed in disturbed areas shall be conducted in such a manner as to provide for proper drainage and to prevent erosion.

E. Except where clearing is required for permanent works or excavation operations, all trees, shrubbery, vegetation, and wetlands shall be preserved and protected from damage by the Contractor's construction operations and equipment.

F. Exercise special care where trees or shrubs are exposed to injuries by construction equipment, excavating, dumping, chemical damage, or other operations. Adequately protect such trees by use of protective barriers or other methods approved by the Owner. Removal of trees and shrubs shall be permitted only after approval by the Owner.

G. The layout of the Contractor construction facilities such as shops, trailers, storage areas, and parking areas; location of access and haul routes; and operations in the stockpile areas shall be planned and conducted in such a manner that all trees and shrubbery not approved for removal by the Owner shall be preserved and adequately protected from either direct or indirect damage by the Contractor operations.

H. No equipment shall be allowed to operate within the dripline of any tree to be protected.

I. Trees shall not be used for anchorages.

J. The Contractor shall be responsible for injuries to trees and shrubs caused by their operations. The term injury shall include, without limitation, bruising, scarring, tearing, and breaking of roots, trunks, or branches. All injured trees and shrubs shall be repaired or treated without delay, at the Contractor's expense. If injury occurs, the Owner shall determine the repair method or treatment to be used for injured trees and shrubs as recommended by an experienced horticulturist or a licensed tree surgeon provided by and at the expense of the Contractor. All repairs or treatment of injured trees shall be performed under the direction of an experienced horticulturist or a licensed tree surgeon provided by and at the expense of the Contractor.

K. Injured trees or shrubs that, in the opinion of the Owner, are beyond saving shall be removed and replaced early in the next planting season. The replacements shall be the same species, or other approved species, and of the maximum size that is practicable to plant and sustain growth in the particular environment. Replacement trees and shrubs shall be guyed, watered, and maintained for a period of one month. Any replacement tree or shrub that dies shall be removed and replaced, as directed by the Owner, with such replacements being maintained for a period of one month from the replacement date. Replacement of injured trees and shrubs not required to be cleared or removed for construction shall be at the Contractor's expenses.

1.3 SPILL PREVENTION AND CONTROL

A. Prepare and provide spill prevention and control procedures in the Work Plan submittal, See Section 01120: Contractor Work Plan. Prepare and implement spill prevention and control procedures and appropriate containment and diversionary structures, materials, and equipment to prevent and control the maximum spillage of any specific item within the scope of work. This includes the materials and equipment used in connection with this project. The procedures shall ensure that sufficient inspections and tests are performed on a continuing basis. All qualified personnel, appropriate facilities, instruments, equipment, and testing devices necessary for quality spill prevention and control shall be furnished. The spill prevention and control procedures shall be carefully thought out and prepared in accordance with all applicable Federal, State, and local laws and regulations, and good engineering practices. The necessary resources for procedures, methods, and equipment operations shall also be addressed.

B. Provide spill prevention and control procedures in the Work Plan as appropriate for the material being handled and hauled by the Contractor. Design, construct, operate and maintain preparedness and prevention facilities to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air or surface water which could threaten human health or the environment.

C. Implement special measures to prevent chemicals, fuels, oils, greases, bituminous materials, waste washings, herbicides, insecticides, harmful materials, biological materials, and concrete materials from entering the air, waters of the State, utilities, and storage areas.

D. Laws and Regulations: Do not pollute any area with any manmade or natural harmful materials. It is the sole responsibility of the Contractor to investigate and comply with all applicable Federal, State, county, and municipal laws and regulations concerning spill prevention and control procedures.

E. Communications: Provide internal communications or an alarm system to provide immediate emergency instruction to facility personnel if necessary. Provide a device, such as a telephone immediately available at the scene of operations, capable of summoning emergency assistance from local police departments, fire departments, State or local emergency response teams. A project telephone directory shall be included in the Work Plan.

F. Dispose of all materials off site in accordance with applicable Federal, State, and local laws and regulations. See Section 01575: Disposal of Waste Materials for additional requirements.

G. Required inspections and documentation shall be in accordance with written procedures developed by the Contractor. These written procedures shall be part of the Work Plan. A record of the inspections, signed by the appropriate supervisor or inspector, shall be maintained during the project and submitted to the Engineer for final close-out.

H. If materials are released provide a written description of the event, corrective action taken, and plans for preventing recurrence, as well as a written document of manpower, equipment, and materials required to expedite control and removal of any harmful quantity of materials released.

I. The Contractor is responsible for properly instructing Contractor personnel regarding applicable pollution control laws, rules, and regulations and in the operation and maintenance of equipment and BMPs to prevent the discharge of materials. Schedule and conduct spill prevention briefings for its operating personnel at intervals frequent enough to assure adequate understanding of spill prevention and control procedures for this project. Such briefings shall highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

J. Designate a person who is responsible for environmental protection to include but not limited to material spill prevention, BMPs maintenance, recordkeeping, permit condition compliance and who reports to management.

K. All facility communication systems and spill control equipment, shall be maintained by the Contractor as necessary to assure proper operation in time of emergency.

1.4 PREVENTION OF WATER POLLUTION

A. Comply with all project permit requirements, and all other applicable federal, state, and local laws, orders, regulations, permits, and water quality standards concerning the control and abatement of water pollution.

B. Perform construction activities by methods that shall prevent entrance or accidental spillage of solid matter, contaminants, debris, and other pollutants and wastes into streams, flowing or dry water courses, rivers, lakes, and underground water sources.

C. Such pollutants and wastes include, but are not restricted to, refuse, garbage, sediment from erosion of construction areas, concrete wash-out, sanitary waste, industrial waste, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

D. Do not allow wastewater from construction operations to enter streams, water courses, wetlands, or lakes without passing through suitable sedimentation ponds or treatment facilities approved by the Engineer.

E. Where the location of a construction site is such that oil or gas from an accidental spillage could reasonably be expected to enter into or upon the navigable waters of the United States or adjoining shorelines, and the aggregate storage of oil or gas at the site is over 1,320 gallons, or a single container has a capacity in excess of 660 gallons, prepare a Spill Prevention Control and Counter Measure Plan (SPCC) reviewed and certified by a registered professional engineer in accordance with 40 CFR, Par 112, as required by Public Law 92-500 as amended by Public Law 95-217 and Public Law 95-576.

F. Submit to the Engineer a certified statement that the SPCC, if required, was reviewed and certified by a professional engineer registered in the State of Colorado.

1.5 ABATEMENT OF AIR POLLUTION

A. Comply with applicable federal and state laws and County ordinances and regulations concerning the prevention and control of air pollution.

B. In conducting construction activities and operation of equipment, utilize such practicable methods and devices as are reasonably available to control, prevent, and otherwise minimize atmospheric emissions or discharges of air contaminants.

C. The emission of dust into the atmosphere shall be minimized during handling and storage of construction materials, and use such methods and equipment as are necessary to minimize or prevent dust during these operations. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust suppressant. When practicable, dusty materials in piles or in transit shall be covered to prevent blowing dust.

D. Do not operate equipment and vehicles that are found to have emissions of exhaust gases or particulates that exceed applicable limits established by federal, state, or local laws or authorities until corrective repairs or adjustments are made. If required by the Engineer, the Contractor shall provide acceptable evidence that equipment and vehicles have been tested for exhaust emissions and have been found to be in compliance with applicable limits.

E. Carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance, and to prevent dust from damaging crops, orchards, cultivated fields, and dwellings, or causing a nuisance to persons. The Contractor will be held liable for any damage resulting from dust originating from his operations under these Specifications.

1.6 ABATEMENT OF NOISE

A. Comply with applicable federal and state laws and County ordinances, orders, and regulations concerning the prevention, control, and abatement of excessive noise.

B. Take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the Work.

1.7 TEMPORARY DRAINAGE PROVISIONS

A. Provide for the drainage of storm water, and such water as may be applied or discharged on the site in performance of the Work. Drainage facilities shall be adequate to prevent damage to the Work, the site, and adjacent property.

B. See also Section 01570: Sediment and Erosion Control.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01410
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Responsibilities for obtaining permits in accordance with federal, state, and local agencies.

1.2 GENERAL PERMIT REQUIREMENTS

A. Comply with the conditions and requirements of all permits required by federal, state, county, and local governing agencies in the performance of this Contract. If the Contractor fails to comply with the conditions and requirements of any permit and such failure to comply results in fines, penalties, and/or suspension of Work by a regulatory agency, all liability for such fines, penalties and delays are the sole responsibility of the Contractor.

B. The Contractor is responsible for obtaining all permits necessary to complete the Work. The Contractor is also responsible for all monitoring, testing, and corrective measures necessary to maintain the permits throughout the duration of the Project, including modification of or renewal of the permits as necessary. Applicable permits may include, but are not limited to, the following:

1. Colorado Department of Health and Environment (CDPHE), Water Quality Control Division (WQCD) Construction Stormwater General Permit (includes preparation of a Stormwater Management Plan [SWMP] and a Storm Water Pollution Prevention Plan [SWPPP].
2. CDPHE, WQCD Construction Stormwater Dewatering Permit.
3. CDPHE, Air Pollution Control Division (APCD), Construction Permit (regulates fugitive dust).
6. Haul permits.

1.3 OWNER OBTAINED PERMITS

A. The Owner is responsible for obtaining certain permits that pertain to the Work.

B. The Contractor shall be responsible for implementing and coordinating the terms and requirements of all environmental permits obtained by the Owner.

C. A copy of the permits obtained by the Owner will be provided with the Bid Documents

1.4 RESPONSIBILITY AND COORDINATION

A. Accept full responsibility for contacting all Federal, State, and local agencies to obtain permitting requirements for construction related activities on lands under jurisdiction by those agencies, and be fully responsible to research and become familiar with regulatory requirements that must be met for the performance of the Contract work.

B. Perform all coordination and documentation, and engineering to obtain the required permits including providing a registered professional engineer for engineering to obtain permits where required.

C. Be fully responsible and solely accountable for meeting the requirements of all permits.

D. Unless otherwise specified by an agency, the Contractor shall be the sole permittee for all contractor-obtained permits.

1.5 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Contractor-Obtained Permits: Copies of all permits obtained by the Contractor.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Contractor quality control requirements.

1.2 QUALITY ASSURANCE/CONTROL

A. Provide a quality control system to perform inspections, tests, and retesting in the event of failure of items of work, including that of subcontractors, to ensure compliance with the Contract provisions. Quality control will be established for all work.

B. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.

C. Comply fully with manufacturers' instructions, including each step in sequence.

D. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform work by persons qualified to produce workmanship of specified quality.

G. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

H. For Products or workmanship specified by association, trades, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

I. Obtain copies of standards when required by Contract Documents.

J. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

K. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3 INSPECTION PROCEDURES

A. Preparatory inspection shall be performed by the Contractor before beginning any work, and, in addition, before beginning each segment of work. Preparatory inspection shall include a review of the Contract requirements, the review of shop drawings and other submittal data, a check to ensure that required control testing will be provided, a physical examination to ensure that materials and equipment conform to approved shop drawings and submittal data, and a check to ensure that required preliminary work has been completed.

B. An initial inspection shall be performed as soon as a representative segment of the particular item of work has been accomplished. Initial inspection shall include performance of scheduled tests, examination of the quality of workmanship, a review for omissions or dimensional errors, and approval or rejection of the initial segment of the work.

C. Follow-up inspections shall be performed as necessary, and shall include continued testing and examinations to ensure continued compliance with the Contract requirements.

D. Test results provided shall cite the Contract requirements, the test or analysis procedures used, and the actual test results, and shall include a statement that the item tested or analyzed conforms or fails to conform to the specification requirements. Each report shall be conspicuously noted in large letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements as the case may be. Test reports shall be signed by a testing laboratory representative authorized to sign certified test reports. The Contractor shall arrange for immediate delivery of the signed original of all test reports, certifications, and other documentation to the Engineer.

1.4 INDEPENDENT INSPECTION AND TESTING LABORATORY SERVICES

A. Conduct quality control testing for each item of Work to confirm work is in accordance with the contract documents.

B. Retain an independent geotechnical inspection and testing firm to perform the Contractor's specified quality monitoring and testing. Submit the name of the independent testing firm and laboratory and a statement of its qualifications. The firm shall have at least 5 years of experience in soil, and concrete inspection and testing, and shall be equipped to perform all field and laboratory tests specified that are the Contractor’s responsibility.

C. Submit names and resumes of the laboratory's key personnel and field testing personnel. Field personnel shall have at least 3 years experience in soil and concrete testing, and cannot be changed without prior approval of the Engineer.

D. Make available written results of all completed tests and inspections performed by the Contractor’s independent testing firm to the Engineer by the end of the next working day following completion of the tests. Provide verbal results to the Engineer upon test completion. Results of all completed tests shall be submitted to the Engineer.

E. Reports will indicate observations and results of tests and indicate compliance or non-compliance with Contract Documents.

F. Retesting required because of non-conformance to specified requirements is the Contractor’s responsibility and shall be performed by the Contractor’s approved testing agency.

1.5 ENGINEER TESTING

A. Engineer may perform and pay for quality assurance inspection and testing at their discretion, independent of testing and inspections performed by Contractor.

B. Cooperate with Engineer; furnish samples of materials, equipment, tools, storage, access, and assistance as requested.

C. Notify Engineer 24 hours prior to QC testing or sampling.

D. Engineer may obtain samples of material for testing. Contractor shall provide Engineer access and assistance in obtaining samples.

E. Engineer may inspect Contractor off-site producers of materials and products. Contractor shall provide access to these off-site facilities to the Engineer at all times during the Work.

1.6 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Quality Control Plan. Prepare and submit a Construction Quality Control Plan (CQCP) within 30 calendar days after receipt of the Notice of Award. The CQCP shall identify personnel, procedures, controls, instructions, tests, records, reports and forms to be used. Describe quality control for each work element. Submit as part of the Work Plan specified in Section 01120: Contractor Work Plan. Unless specifically authorized by the Engineer in writing, construction shall not be started and no requests for payment will be processed until the CQCP is approved. This plan shall include, as a minimum:

1. Names and qualifications of personnel responsible for quality control on the Contract.
2. Area of responsibility and authority of each individual in the quality control system.
3. A description of the services the Contractor will have provided by outside organizations such as testing laboratories, manufacture representatives architects, and consulting engineers.
4. Procedures for reviewing shop drawings, samples, certificates, or other submittals for contract compliance, including the name of the person(s) authorized to sign the submittals for the Contractor, as complying with the Contract.
5. A test and inspection schedule, keyed to the construction schedule and following the order of the specification technical sections, indicating inspections and tests, the names of persons responsible for the inspection and testing for each segment of work, and the time schedule for each inspection and test.
6. The procedures for documenting quality control operation, inspection, and testing, with a copy of forms and reports to be used for this purpose. The Contractor shall also include a submittal status log listing submittals required by the specifications and drawings and stating the action required by the Contractor or the Engineer.

C. Independent Laboratory Qualifications. Name of the independent laboratory, a statement of qualifications (SOQ), the most recent certification by state/federal or other appropriate independent testing services, and names, resumes, and experience of the laboratory and field key personnel. Include a statement indicating the laboratory and field key personnel meet the requirements of this specification.

D. Daily Quality Control Reports.

E. Results of all completed testing.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heating ventilation and air conditioning (HVAC), telephone service, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, project signage, and water control.

C. Construction Facilities: Access roads, parking, field offices.

1.2 TEMPORARY ELECTRICITY

A. Provide all power for HVAC, lighting, operation of Contractor's plant or equipment, or for any other use by Contractor.

B. Provide and pay for power service from utility sources as required.

C. Provide temporary electric feeder and electrical service as required.

D. Provide separate metering for cost of energy used as required.

1.3 TEMPORARY LIGHTING

A. Provide and maintain lighting for construction operations.

1.4 TEMPORARY HEAT

A. Provide HVAC devices and heat or cool as required to maintain specified conditions for construction operations.

1.5 TEMPORARY TELEPHONE AND INTERNET SERVICE

A. Make all necessary arrangements and pay all installation and monthly service charges for telephone and internet connection lines in engineer’s field offices at the site and provide all telephone instruments and modems.

1.6 TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations.

1.7 TEMPORARY SANITARY FACILITIES

A. Furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the Project.

B. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each

20 persons. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

1.8 CONSTRUCTION AIDS

A. Furnish, install, maintain, and operate all construction aids required by Contractor and its Subcontractors in the performance of the Work. Such construction aids shall include, but not be limited to, the following:

1. Cranes and hoists
2. Temporary enclosures
3. Scaffolding
4. Temporary stairs
5. Drainage provisions

1.9 PROTECTION OF PUBLIC AND PRIVATE PROPERTY

A. Protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by his construction operations. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences, and other surface structures affected by construction operations, shall be restored to their original condition. All replacements shall be made with new materials.

B. Contractor is responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or workers to or from the Work or any part or site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the Owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

1.10 DAMAGE TO EXISTING PROPERTY

A. Contractor will be held responsible for any damage to existing structures, Work, materials, or equipment because of his operations and shall repair or replace any damaged structures, Work, materials, or equipment to the satisfaction of, and at no additional cost to, the Owner.

B. Protect all existing structures and property from damage. Provide bracing, shoring, or other work necessary for such protection.

1.11 BARRIERS AND FENCING

A. Provide barriers or fencing to protect adjacent properties from damage from construction operations and demolition.

B. Provide barriers around all excavations or obstructions to prevent accidents and protect Work, apparatus, equipment, and material from theft and accidental or other damages, and make good any damages thus occurring at no cost to the Owner.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

D. Provide measures to protect Owner’s personnel and public from Work activities including, but not limited to, safety fence surrounding the work and staging, storage and stockpile areas.

1.12 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers, as required, to protect site from soil erosion.

1.13 DUST CONTROL

A. Provide all labor, equipment, machinery and other means to control dust emissions throughout the site for the duration of the project.

B. Abate dust nuisance by cleaning, sprinkling with water or other means as necessary.

C. The use of water, in amounts which result in ponding, is not acceptable as a substitute for other methods.

1.14 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

1.15 SECURITY

A. Provide security and facilities to protect Work and Owner's operations from unauthorized entry, vandalism, or theft.

B. Contractor is responsible for protection of the site, and all Work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons.

C. No claim shall be made against the Owner by reason of any act of an employee or trespasser, and Contractor shall make good all damage to Owner's property resulting from his failure to provide security measures as specified.

D. Security measures shall be at least equal to those usually provided by the Owner to protect the existing facilities during normal operation, but shall also include such additional security fencing, barricades, lighting, and other measures as required to protect the site and the public.

E. Keep all watershed access gates locked except during the time when they are attended. Key privileges will be defined in the Preconstruction meeting.

1.16 ACCESS ROADS

A. Conduct work to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and

walks, whether public or private, provide and maintain suitable and safe detours, or other temporary expedients for the accommodation of public and private travel.

B. As approved and based on the site location, construct and maintain temporary roads accessing public thoroughfares to serve construction area. Locations and methods of construction proposed for temporary access roads must be submitted for approval in the Contractor’s work plan.

C. Extend and relocate as Work progress requires. Provide detours necessary for unimpeded traffic flow.

D. Provide means of removing mud from vehicle wheels before entering streets.

1.17 PARKING

A. Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, Owner's operations, or construction activities. The location of the Contractor's parking areas shall be as acceptable to, and approved by, the Owner

1.18 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition. Brush clean or wash roadway near construction entrance(s) regularly.

B. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

C. Remove waste materials, debris, and rubbish from site and dispose off-site.

D. Maintain all construction areas and adjacent sites in a dust free condition.

E. Do not allow any condition to exist during construction which creates a nuisance; a fire hazard; an environment injurious to water quality, air quality, health or safety; or an attraction for children, animals, birds, rodents, etc.

F. Failure to comply with this provision after due and proper notice has been given by the Owner or representative will be sufficient grounds for the Owner to proceed to clean up such material and debris, make repairs and charge same to the Contractor.

1.19 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition as specified in the Specifications. Restore permanent facilities used during construction to specified condition.

1.20 PROJECT CONTROLS

A. Provide signs along access roads to direct subcontractors, vendors etc to the construction site along approved access roads.

1.21 CONTRACTOR’S FIELD OFFICE

A. During the performance of this Contract, maintain a suitable office at or near the site of the Work which shall be the headquarters of its representative authorized to receive drawings, instructions, or other communication or articles. Any communication given to the said representative or delivered at the Contractor's office at the site of the Work in its absence shall be deemed to have been delivered to Contractor.

B. Copies of the Drawings, Specifications, and other Contract Documents shall be kept at the Contractor's office at the site of the Work and available for use at all times.

1.22 TEMPORARY FACILITIES

A. The Contractor shall remove temporary facilities as approved by the Engineer when no longer required.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01515
SIPHON CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Control of siphon discharges by Owner.

1.2 COORDINATION

A. The Owner will be responsible for coordinating operation of the siphon.

1.3 LEVEL OF RESPONSIBILITY

A. Construction shall be protected from stormwater runoff by methods proposed by the Contractor and approved by the Engineer. The Contractor is responsible for diversion and any costs and delays associated with damage from inadequate protection from stormwater.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 SIPHON CONTROL

A. Under existing conditions, the siphon is primarily supplied from upstream inflows from Continental Dam and is controlled by an upstream gate.

B. Work on the siphon shall occur while the siphon is empty. Nominal flow due to upstream gate leakage and similar minor inflows shall constitute a nominally empty pipe.

C. The Owner will control the flow into the siphon during construction. The Contractor is responsible for coordinating construction with the Owner.

END OF SECTION

SECTION 01550
CONSTRUCTION ACCESS ROADS AND PARKING AREAS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for construction access roads and parking areas.

1.2 GENERAL

A. Access the construction area using only established roads.

B. Contractor is responsible for all snow removal on roads when required for access to the Work and shall furnish all required equipment and labor necessary to remove snow. Owner will only remove snow if and when necessary for Owner operations.

C. All construction traffic shall stay on approved access roads.

D. Dust mitigation measures shall include at a minimum, control of vehicle speed on roads, and furnishing a water truck and operator for road dust control when required. Other dust mitigation measures such as palliatives may be considered and will require submittal approval.

E. Obtain any applicable federal, state, or Local County permits for hauling on state, county, or local roads.

1.3 PROTECTION OF EXISTING ROADS

A. When legal load limits are exceeded, the Contractor may be fined by the Federal Government, County or State at no additional cost to the Owner. Repair damage to County or State roads caused by construction activity to meet the applicable roadway standards.

B. Before using any existing roads for moving construction equipment or hauling materials and supplies to the site, the Contractor, Owner and Engineer will jointly perform a condition survey of roads in the vicinity of the project. Notify the Engineer at least 10 days in advance of hauling any equipment or materials to the site. A representative of the County may also be present for the condition survey.

C. Contractor is responsible for maintaining access roads in their preconstruction condition until all construction activities are complete. Roads degraded by Contractor operations shall be repaired/regraded in a timely manner.

1.4 CONSTRUCTION ACCESS ROADS

A. Existing access roads provide access to the work areas, and no additional construction access roads are expected to be required. The access road adjacent to the exposed portion of the siphon is constructed of loose material on a slope, which may present difficulties for certain types of construction equipment and vehicles. Any damage to existing or access road will be repaired by the Contractor and no cost to the Owner.

B. Maintain public roadways free of mud and other construction debris. Install gravel tracking pad or other means to prevent tracking debris or mud onto public roads.

1.5 PARKING

A. Provide temporary gravel surface parking areas at Contractor use areas to accommodate construction personnel, as approved by the Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01555
STAGING AND STOCKPILE AREAS

PART 1 GENERAL

1.1 STAGING AND STOCKPILE AREAS

A. Establish field offices in the staging and stockpile areas in areas shown on the Drawings or approved by the Owner.

B. Any clearing, grubbing, or grading in the staging and stockpile areas performed by the Contractor for setting up and maintaining this area requires the approval of the Engineer.

C. Stockpiling of materials outside the limits of the designated areas requires the approval of the Engineer.

1.2 SECURITY OF STAGING AND STOCKPILE AREAS

A. The Contractor is responsible for securing the staging and stockpile areas. Provide any security measures Contractor deems necessary to protect these work areas. All security fences and gates, if used by the Contractor, shall be removed by the Contractor at the end of construction.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01570
SEDIMENT AND EROSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnishing all labor, materials, equipment, and incidentals necessary to perform all installation, maintenance, removal, and cleanup related to erosion and sedimentation control work as specified herein and as required by local authorities and permit to prevent erosion and/or transport of silt or sediment outside the limits of disturbance.

B. The work includes, but is not necessarily limited to, installation of temporary access ways and staging areas, silt fences and sediment barriers, sediment removal and disposal, device maintenance, removal of temporary devices, temporary stabilization, best management practices (BMPs), and final cleanup.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Technical product literature for all commercial products to be used for sedimentation and erosion control.

C. Contractors Sedimentation and Erosion Control Plan: (BMPs) in accordance with Local, State and federal regulations.

1.3 QUALITY ASSURANCE

A. The Contractor is responsible for the timely installation, maintenance, and removal of all sedimentation control devices necessary to prevent the movement of slurry or sediment from the construction site to offsite areas or into the stream or wetland system or preservation/ conservation areas via surface runoff or underground drainage systems. Measures, in addition to those shown on the Drawings, necessary to prevent the movement of sediment outside the limits of construction shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered for the Work under this Section.

B. Sedimentation and erosion control products shall conform to the Drawings, this Section, County requirements, or CDOT standards as applicable.

C. The Contractor’s means and methods for excavations and soil disturbing activities shall be conducted to minimize the risk of sediment transport downstream. Sediment control measures will be required to meet strict project and permit standards.

PART 2 PRODUCTS

2.1 MATERIALS

A. Silt Fence:

1. Posts: 2” x 2” wood, min. 4’-6” length as approved by the Project Manager.

2. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc.
3. Prefabricated commercial silt fence may be substituted for built-in-field fence. Pre-fabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc.

B. Erosion Bales:

1. Consisting of Certified Weed Free hay or straw certified under the Colorado Department of Agriculture Weed Free Forage Certification Program and inspected as regulated by the Weed Free Forage Act, Title 35, Article 27.5., CRS. Each certified weed free erosion bale shall be identified by one of the following:

a. One of the ties binding the bales shall consist of blue and orange twine, or
b. One of the ties binding the bale shall consist of specially produced shiny
c. galvanized wire, or
d. The bale shall have a regional Forage Certification Program tag indicating the
e. Regional Forage Certification Program Number.

2. Erosion bales shall be inspected for and Regionally Certified as weed free based on the Regionally Designated Noxious Weed and Undesirable Plant List for Colorado, Wyoming, Montana, Nebraska, Utah, Idaho, Kansas, and South Dakota. The Contractor shall not unload certified weed free erosion bales or remove their identifying twine, wire or tags until the Engineer has inspected and accepted them. The Contractor shall provide a certificate of compliance showing the transit certificate number or a copy of the transit certificate as supplied from the forage producer.

C. Erosion Logs: Curled aspen wood excelsior with a consistent width of fibers evenly distributed throughout the log and a seamless casing comprised of a photodegradable tube netting. The curled aspen wood excelsior shall be fungus free, resin free and shall be free of growth or germination inhibiting substances. Furnish logs with the minimum diameter and length shown on the Drawings.

PART 3 EXECUTION

3.1 LOCATION OF SEDIMENT/EROSION CONTROL DEVICES

A. Provide sediment/erosion control barriers as needed to control the transport of silt and sediments outside of the limits of construction.

B. Install around the base of all soil stockpile areas. All nonworking faces of soil stockpiles, which will be in place longer than three months, shall be seeded and mulched or otherwise stabilized as acceptable to the Engineer.

3.2 INSTALLATION

A. Silt Fence Installation:

1. Positioned as necessary to prevent movement of sediment produced by construction activities outside of the limits of construction or as approved.

2. Install pre-fabricated silt fence according to Manufacturer's instructions and Drawing details.

B. Hay bale Barrier:

1. Bales shall be either wire-bound or string-tied with the bindings oriented around the sides rather than over and under the bales.
2. Bales shall be placed lengthwise in a single row with the ends of adjacent bales tightly abutting one another.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4-inches. After bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfilled material shall conform to the ground level on the downhill side and shall be built up to 2 inches against the uphill side.
4. Each bale shall be securely anchored by at least two stakes or rebars driven through the bale. The first stake shall be driven toward the previously laid bale to force the bales together. Stakes shall be driven deep enough into the ground to securely anchor the bales.
5. The gaps between each bale shall be chinked (filled by wedging) with straw to prevent water from escaping between the bales.

3.3 MAINTENANCE AND INSPECTIONS

A. Inspections:

1. Contractor shall make a visual inspection of all devices at least once every 14 days and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent erosion and/or movement of sediment to areas outside the limits of construction, Contractor shall promptly install additional devices as needed. Controls in need of maintenance shall be repaired promptly.
2. Contractor shall keep a log of all inspections indicating the following:

    a. Date and time of inspection
    b. Construction Project Inspector
    c. Amount of rainfall
    d. Erosion and sediment control devices inspected
    e. Condition of sediment and erosion control devices
    f. Repairs needed
    g. Date repair is completed

B. Minimum Device Maintenance:

1. Silt Fences:

    a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
    b. Replace damaged fabric, or patch with a 2-foot minimum overlap.
    c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.

2. Hay bale Barriers:

a. Remove accumulated sediment once it builds up to one-half of the height of the hay bales.
b. Replace damaged hay bales.
c. Make other repairs as necessary to ensure that the hay bales are filtering all runoff directed to the barrier.

3.4 REMOVAL AND FINAL CLEANUP

A. Once the Site has been fully stabilized against erosion as approved by the Engineer, remove sediment control devices and all accumulated sediment. Dispose of sediment and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Drawings or specified herein.

END OF SECTION

SECTION 01575
DISPOSAL OF WASTE MATERIALS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Classification of Waste Materials.
2. Disposal of Waste Materials.

1.2 CLASSIFICATION OF WASTE MATERIALS

A. Waste materials to be disposed of are classified in three categories: 1) excavated waste materials, 2) cleared vegetation, and, 3) other waste materials

1. Excavated waste materials include only those materials which are excavated from the designated excavations at the site which are not suitable for use in construction as determined by the Engineer, or in excess of that needed for construction. Rock and gravel removed from areas adjacent to the siphon pipe is classified under this category.
2. Cleared vegetation includes vegetation cleared from within the limits of site disturbance including excavation areas, borrow and disposal areas, staging and stockpile areas, and temporary construction roads.
3. Other waste materials include, but are not limited to demolished concrete and other demolished materials, sediment from sediment and erosion control devices reinforcing steel, pipe, miscellaneous metalwork etc., concrete truck wash water, oil and other petroleum products, solvents, paints and stains, refuse, garbage, debris, sanitary waste, crank case oil, grease, paint thinner, cleaning solvents or any other materials used in maintenance or operation of construction equipment.

1.3 DISPOSAL OF MATERIALS

A. The following materials shall be disposed of at an off-site disposal facility:

1. Other waste materials described in this Section.

B. The following materials may be disposed on-site:

1. Cleared vegetation.
2. Excavated waste materials described in this Section.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 OFF-SITE DISPOSAL OF WASTE MATERIALS

A. Remove waste materials from the construction area prior to the completion of the work by the Contractor. Dispose of waste materials in an approved solid-waste facility or other approved facilities.

B. It is the responsibility of the Contractor to make any necessary arrangements with private parties and with County officials pertinent to locations and regulations of area landfills. Any fees or charges required to be paid for disposal of materials shall be paid by the Contractor.

C. In the event that certain materials cannot be disposed of in the local waste disposal facility, the Contractor shall identify a suitable alternative approved waste disposal facility and shall dispose of the material at such facility at no additional cost to the Owner.

3.2 ON-SITE DISPOSAL OF EXCAVATED WASTE MATERIALS

A. Onsite disposal area must be approved by the Owner.

B. Clear, grub, and strip approved onsite spoils disposal area in accordance with Section 02230: Clearing and Grubbing, and Section 02235: Stripping and Stockpiling Topsoil.

C. Excavated waste materials may be disposed of in approved spoils disposal areas provided placement methods comply with the provisions specified herein.

D. Reduce excavated waste rock material with an average dimension greater than 3 feet in diameter to a maximum average dimension of 3 feet in diameter.

E. Spread excavated rock material evenly over the disposal area in approximately 3 foot lifts and in a manner that does not create nesting rocks or void areas that would cause post construction settlement as approved by the Engineer.

F. Grade and shape the placement area to match surrounding grade and such that existing drainage patterns are maintained and there are no areas that would pond water.

END OF SECTION

SECTION 01720
LAYOUT OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section covers layout requirements.

1.2 GENERAL

A. The Work is to be executed in relation to the existing structures as shown on the Drawings.

B. Contractor shall keep neat and legible notes of measurements and calculations made in connection with the layout of the Work and measurement and payment. Copies of such data shall be furnished to the Engineer for use in checking Contractor's layout and measurement and payment.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Submit measurements and field notes to the Engineer. If electronic data (drawings in AutoCAD-compatible .DWG format and data in ASCII format) are generated, they also shall be submitted.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 REQUIRED MEASUREMENTS

A. As-constructed measurements of new construction, including, but not limited to:

1. Thrust block overlay dimensions;
2. Intermediate support overlay dimensions and bearing height changes.

END OF SECTION

SECTION 01770
CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SUMMARY

A. This section covers contract closeout items including closeout procedures, final cleaning, and project record documents.

1.2 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's and Owner’s review.

B. Provide submittals to Engineer that are required by the Contract Documents, and governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final inspection.

B. Clean debris from the site.

C. Sweep paved areas, rake clean landscaped surfaces.

D. Disconnect all temporary utilities to the site, and temporary site facilities and utilities.

E. Remove all Contractor-constructed staging/parking areas.

F. Clear, grade, and seed as required.

G. Remove waste and surplus construction materials, rubbish, wood, bituminous concrete, concrete debris, demolished materials, other foreign material, and construction facilities from the site.

1.4 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other Modifications to the Contract.
5. Reviewed submittals including shop drawings, product data, and samples.
6. Requests for information, field directives and project correspondence.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and Modifications.

E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to completed construction and the project datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements or benchmarks.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract Drawings.

F. Submit closeout documents to Engineer with request for final Application for Payment.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 02220
SELECTIVE DEMOLITION AND SALVAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selective demolition and salvage of existing features and items designated for removal and disposal.

B. Protection of existing items and features not identified for demolition, removal or dismantling.

1.2 DEFINITIONS

A. Demolish, Demolition, or Remove: Remove and dispose of designated existing equipment, materials, and ancillary features and components.

B. Remove and Salvage: Remove and deliver existing equipment, materials, and ancillary features and components to Owner at location as directed.

C. Remove and Relocate: Remove and relocate equipment, materials, and ancillary features and components.

D. Reinstall: Make service connections, and provide functional equipment at designated new location.

E. Retain or Protect: Leave designated existing equipment, materials, and ancillary features and components in place and protect from damage.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Demolition Plan including:

1. Schedule of demolition, including removals, salvage and replacement in conjunction with Progress Schedule.
2. Proposed methods of demolition including removals, salvage and replacement and equipment to be used.

C. Permits: Copies of current valid permits required by state and local regulations all State and local licenses and permits necessary to carry out the work.

D. After demolition is complete, if requested by the Engineer, submit reports describing quantities and type of demolition materials, and the locations, quantity, and method of disposal.

1.4 EXISTING CONDITIONS

A. Information contained in Contract Documents indicating the general scope of demolition is based on available historic drawings. The Design Drawings show major features and not details for each item.

B. The Demolition Schedule included in this Section is a general summary solely for convenience of Contractor; inspect facilities and verify nature and location of work.

PART 2 PRODUCTS

2.1 NOT USED.

PART 3 EXECUTION

3.1 PREPARATION

A. The extent of demolition work shown on the Drawings is based on site observations. The specific extent of demolition for the various items will be determined by the Engineer in the field.

B. Notify Owner and Engineer minimum 7 days prior to beginning demolition work.

C. Protect existing vegetation, facilities, equipment, and fixtures to remain, including the siphon pipe and embedded anchor bolts.

D. Provide temporary barricades and other protection as required.

E. Erect and maintain dustproof and weatherproof partitions and closures as required.

F. Provide required shoring, bracing, and supports.

G. Equipment and Materials Designated for Salvage:

1. Do not remove and salvage features and materials without approval of Engineer.
2. Store and maintain salvaged equipment and materials in same condition as when removed.

H. Contractor and Engineer will document and record the condition of features and materials prior to removal.

3.2 DEMOLITION

A. Conduct demolition operations in a manner ensuring minimum interference with roads, structures, and other adjacent features and facilities.

B. Drawings define extent of demolition. Immediately notify the Engineer of damage to structures and features not identified for demolition or beyond the limits of demolition as shown or as determined by the Engineer.

C. Damage beyond the limits of demolition will be repaired or replaced using materials and methods appropriate for the particular location, as determined by the Engineer.

D. Remove materials to conform to new elevations, profiles, and sizes. Comply with specified tolerances and finishes.

E. Saw cut or otherwise isolate materials to be removed to minimize damage to adjacent surfaces.

F. Protect materials and equipment designated for reuse.

G. Remove items to be demolished to limits noted on Drawings.

H. Protect existing structures and surfaces from damage.

I. Use water sprinkling, temporary enclosures, and other methods to limit dust.

J. Comply with provisions of Section 01575: Disposal of Waste Materials for disposal of removed items, demolished materials, and debris.

K. Blasting is not allowed for demolition.

L. Where demolished surfaces will receive new concrete, surfaces shall be roughened to a minimum 1/4 inch amplitude.

3.3 SALVAGE

A. Transport the following items identified for salvage to a location acceptable to Owner:

1. Demolished concrete shall be broken into pieces not greater than 12-inches in any dimension, reinforcement trimmed off and disposed of at the direction of the Owner.

3.4 DEMOLITION SCHEDULE

A. Existing Concrete Thrust Blocks: Demolish only the deteriorated exposed concrete on the existing thrust blocks as indicated on the Drawings unless otherwise directed by the Engineer. Protect adjacent siphon pipe and thrust rings. Expose intact, undeteriorated concrete as determined by the Engineer. Except for rebar used as ladder access, reinforcing bars shall not be cut without approval from the Engineer.

B. Existing Concrete Intermediate Supports: Demolish only the deteriorated exposed concrete on the existing intermediate supports as indicated on the Drawings unless otherwise directed by the Engineer. Protect adjacent siphon pipe and footing concrete. Expose intact, undeteriorated concrete as determined by the Engineer. Fully-exposed reinforcing bars (completely exposed on all sides) may be cut where necessary.

END OF SECTION

SECTION 02230
CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Removal of all surface debris, grass, trees, and shrubs within limits of disturbance as required to perform the work.

B. The general work areas which require site clearing include, but are not limited to:

1. Contractor staging/parking and stockpile areas.
2. Excavation areas.
3. Spoils disposal area.
4. Access roads.

1.2 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Clearing and Grubbing Plan:

1. Describe method for vegetation removal and disposal.
2. Describe temporary barriers and methods to protect existing structures and property, existing plant life and features designated to remain, and areas beyond limits of disturbance.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 PROTECTION

A. Verify the area to be cleared and existing plant life and features designated to remain with the Engineer before initiating any clearing operations in that area. Unauthorized clearing will not be approved for payment, and the Contractor is responsible for replacement of damaged existing plant life and features designated to remain.

B. Flag barricade and clearly mark existing plant life and features designated to remain.

C. Protect any trees, plant growth, and site features not designated for removal or designated for protection. Remove only those trees and plant growth required for the Work.

D. Do not disturb trees or shrubbery in public right-of-way or on property outside of the limits of disturbance.

3.2 CLEARING AND GRUBBING

A. Remove all trees, shrubs, undergrowth, deadwood, and other surface debris as required to perform the Work, within the limits of disturbance shown on the Drawings, except for those trees and shrubs designated to be protected.

B. Remove all trees, stumps, branches, brush and other material from clearing and grubbing activities. Cut tree trunks and branches into 10-foot maximum lengths and stockpile in staging and stockpile areas designated by the Owner.

C. Do not leave logs, stumps, rocks, etc., lying in the public right-of-way or on adjacent property without written approval by the Engineer.

3.3 DAMAGED VEGETATION

A. Contractor is responsible for injuries to vegetation caused by Contractor operations, personnel, or equipment. Remove and replace damaged vegetation designated for protection with vegetation of same type and size at no additional cost to the Owner.

3.4 PLACEMENT AND DISPOSAL

A. Dispose of excess vegetative materials and debris materials in accordance with all applicable rules and laws and in accordance with the requirements of Section 01575: Disposal of Waste Materials.

3.5 MAINTENANCE OF CLEARED AREAS

A. Maintain cleared work areas in a condition free from additional vegetation growth for the duration of the project.

B. Compensation for clearing each area will occur only one time. If weeds and brush growth require additional clearing, it shall be performed solely at the Contractor expense.

END OF SECTION

SECTION 02315
EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Required loose rock removal as shown on the Drawings.

1.2 WORK NOT INCLUDED IN THIS SECTION

A. Work associated with clearing and grubbing or stripping and stockpiling topsoil and are not considered as excavation and shall be performed in accordance with Section 02230: Clearing and Grubbing.

B. Excavation by blasting is not allowed.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Proposed excavation plan at least 14 calendar days prior to performing any excavations. Include: Proposed excavation method(s) to be used; proposed excavation slopes, trench shields, bracing or other methods of construction to complete the construction safely; proposed excavation equipment; and proposed excavation sequence.

1.4 EXCAVATED MATERIALS CLASSIFICATION

A. Make provisions and plan for potential winter operations. This shall be documented in Contractor's method submissions and accommodated in their schedule.

B. Excavated materials are classified as follows:

1. Loose Rock Removal – Includes all earth materials ranging from loose gravels and stones to larger rocks and boulders to be removed.

1.5 PROTECTION

A. Comply with all safety requirements of OSHA.

B. Protect existing structures and facilities to remain. Damage to existing structures and facilities by the Contractor shall be repaired by the Contractor at no cost to the Owner and to the satisfaction of the Engineer

1.6 EXISTING SITE CONDITIONS

A. Use equipment and methods appropriate for site conditions.

B. Exploratory investigations cannot be relied on to accurately characterize all conditions that may exist in the foundations and that may be encountered during construction. Therefore, final excavated lines and grades will be determined in the field by the Engineer.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 GENERAL EXCAVATION REQUIREMENTS

A. Identify required excavation lines, levels, contours, and datum, as shown on the Drawings.

B. Verify locations of buried underground utilities and pipes and overhead utilities prior to excavations. Immediately notify the Engineer if underground utilities or other unexpected underground structures are encountered. Repair any utilities or pipes damaged during construction at no cost to the Owner.

C. Excavate to the lines and grades as shown on the Drawings.

D. Repair damage to the work caused by the Contractor operations including disturbance of the material beyond the required excavation at no additional cost to the Owner. Make repairs in accordance with this section as directed by the Engineer, and at no additional cost to the Owner.

E. Assume all responsibility for determinations as to the nature of the materials to be excavated and the difficulties of making and maintaining the required excavations.

F. The Engineer reserves the right, during the progress of the Work, to vary the slopes, grades, or the dimensions of the excavations from those specified herein. Where the Engineer determines that foundation material is unsuitable through no fault of the Contractor, additional excavation will be ordered in writing and payment will be made in accordance with Section 01200: Price and Payment Procedures.

G. Take all necessary precautions to preserve the material below and beyond the established lines of all excavation. Repair any damage to the Work or the foundations as a result of the Contractor operations as directed by the Engineer at the expense of and by the Contractor. In no case should excavation near foundations extend below the foundation elevation.

H. Do not excavate in frozen materials, except with written approval of the Engineer.

I. Side slopes of all earth excavations shall be no steeper than that shown on the drawings. In all cases, excavations shall conform with all safety requirements of OSHA

J. Notify the Engineer as soon as possible of any unusual soil conditions, or soils of questionable stability or bearing capacity.

K. Dispose of excavated materials which are excess or deemed unsuitable. Dispose of unsuitable/excess excavated materials in accordance with Section 01575: Disposal of Waste Materials.

L. Do not waste any excavated material without the approval of the Engineer.

M. If slumping, heaving, or any other evidence of instability is observed during excavation, immediately report evidence of instability to the Engineer, whether it is observed during working or non-working hours.

N. Be prepared to temporarily backfill any unstable excavation to stabilize the area, if directed to do so by the Engineer.

3.2 FIELD QUALITY CONTROL

A. The Engineer will conduct visual inspections of excavations. Soft or yielding areas, indurated materials, gravel with large cobbles, or elsewhere, as determined by the Engineer, shall be excavated and backfilled as determined by the Engineer.

END OF SECTION

SECTION 03100
CONCRETE FORMWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in place concrete with shoring, bracing, and anchorage, openings for other work, form accessories, and form stripping.

1.2 REFERENCES AND DEFINITIONS

A. American Concrete Institute (ACI)

1.	ACI 117	Standard Specifications for Tolerances for Concrete Construction and Materials.
2.	ACI 301	Specifications for Structural Concrete for Buildings
3.	ACI 318	Building Code Requirements for Structural Concrete
4.	ACI 347	Guide to Formwork for Concrete.
5.	ACI SP-4	Formwork for Concrete

B. American Plywood Association

1.	APA PS-1	Construction and Industrial Plywood.

1.3 SUBMITTALS

A. Submit the following in accordance with Section 01330: Submittals.

B. Shop Drawings:

1. Drawings for all formwork shall be submitted to the Engineer for approval at least 30 days prior to the commencement of the Work.
2. Include type, size, quantity, and strength of all form materials, plan for jointing of facing panels, and details affecting the appearance.

C. Product Data:

1. Manufacturer’s literature for form materials, form accessories, prefabricated forms, and form coating materials shall be submitted to the Engineer for approval at least 30 days prior to the commencement of the work.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Include Work required in Contractor Quality Control plan submitted under Section 01450: Quality Control.

B. Perform Work in accordance with ACI 301, ACI 318 and ACI 347. Tolerance shall be as necessary to provide completed concrete structure within the tolerance specified in ACI 117.

C. Supply all labor, tools, equipment and materials to set forms so that resultant concrete conforms to required shapes, lines, and dimensions of the design, as well as the necessary code requirements. It is the Contractor's responsibility to design and build adequate

forms and to leave them in-place until the forms can be safely removed. The Contractor is responsible for damage and injury caused by removing forms carelessly or before the concrete has gained sufficient strength.

D. Inspect erected formwork, shoring, and bracing to ensure that Work is in accordance with formwork design and that supports, fastenings, wedges, ties, and items are secure.

E. Monitor forms during concrete placement and correct deficiencies.

PART 2 PRODUCTS

2.1 FORM MATERIALS

A. Plywood: Concrete form plywood, exterior grade, mill-oiled and edge-sealed as specified herein and in accordance with APA PS-1. High-density overlaid, or provided with an equivalent smooth form liner as the minimum form material for surfaces indicated to receive smooth form finish or any rubbed finish.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.

C. Lumber: Fir species; No. 2 grade or better; with grade stamp clearly visible.

D. Steel: Minimum 16 gauge sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished surfaces.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Removable snap-off type, galvanized metal, ¾-inch break back dimension, fixed length, cone type, neoprene rubber washer for water seal, free of defects that could leave holes larger than 1-1/4 inch in concrete surface.

B. Form Release Agent: Standard manufactured product specifically formulated for form release. Colorless material that will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete. Provide NSF 61 certified product where in contact with potable water.

C. Corners: Chamfered, rigid plastic or wood strip, 3/4 x 3/4 inch size, maximum practical lengths.

D. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

E. Joint Filler: A dense, closed-cell, foam rubber approved by the Engineer.

PART 3 EXECUTION

3.1 GENERAL

A. Construct formwork for cast-in place concrete with shoring, bracing, and anchorage. The formwork shall include the openings for other work, form accessories, and form stripping.

3.2 INSPECTION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with the Drawings.

3.3 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil and gravel prior to placing concrete.

B. Do not use rock cuts for forms except where specifically indicated on the Drawings or approved by the Engineer in writing.

C. When rock form is indicated or allowed, the rock face shall be sound.

3.4 DESIGN

A. Design, engineering, and construction of formwork shall be the responsibility of the Contractor.

B. Design, support, brace, and maintain formwork to safely support vertical and lateral loads that might be applied until such loads can be supported by the concrete structure. Vertical and lateral loads shall be carried to the ground by the formwork system until the in-place concrete has attained adequate strength.

C. Design formwork for anticipated live and dead loads.

D. Comply with tolerances specified in Section 03300: Cast-In-Place Concrete

E. Design as a complete system with consideration given to the effects of cementitious materials and mixture additives such as fly ash, cement type, plasticizers, accelerators, retarders, air entrainment, and others.

F. Monitor adequacy of formwork design and construction prior to and during concrete placement.

3.5 ERECTION - FORMWORK

A. Erect formwork, shoring, and bracing to achieve design requirements in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shoring.

D. Align joints and make watertight to prevent leakage of mortar. Keep form joints to a minimum.

E. Provide chamfer strips on all external corners, unless indicated otherwise.

3.6 APPLICATION - FORM RELEASE AGENT

A. Clean form surfaces of encrustations of mortar, grout, or other foreign material.

B. Apply form release agent on formwork in accordance with manufacturer's recommendations.

C. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.

D. After form release agent is applied to form, the concrete shall be placed within 14 calendar days. If concrete is not placed within 14 calendar days, the forms shall be removed and form release agent reapplied.

E. Do not apply form release agent where concrete surfaces are scheduled to receive special finishes which may be affected by the agent such as crystal forming waterproofing. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.7 INSERTS, EMBEDDED PARTS AND OPENINGS

A. Provide formed openings where required for items to be embedded in or pass through concrete work.

B. Locate and set in place items which will be cast directly into concrete.

C. Coordinate Work of other Sections in forming and placing openings, sleeves, bolts, anchors and other inserts.

D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Secure all embedded items before placing concrete. Ensure that items are not disturbed during concrete placement. Fill voids with readily removable material to prevent entry of concrete.

E. Provide blockouts for mechanical and electrical Work wherever necessary, and as shown on the Drawings.

F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

G. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.8 FORM CLEANING

A. Clean and remove foreign matter within forms as erection proceeds.

B. Clean formed cavities of debris prior to placing concrete.

C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heat enclosure. Use compressed air or other means to remove foreign matter.

3.9 FORM REMOVAL

A. Notify the Engineer prior to removal of forms.

B. Remove forms in a manner, which will not damage concrete.

C. Do not wedge pry bars, hammers or tools against finish concrete surfaces scheduled for exposure to view.

D. Forms may be removed no less than one day after concrete placement.

E. It shall be the Contractor responsibility to limit construction loads at all times to those which can be carried safely by the developed strength of the structure at time of loading, and by formwork and shoring in-place at time of loading.

F. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION

SECTION 03150
CONCRETE JOINTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparing construction joints in concrete between existing and new concrete overlays.

1.2 REFERENCES

A. American Concrete Institute (ACI)

1.	ACI 224.3R	Joints in Concrete Construction.
2.	ACI 318-05	Building Code Requirements for Structural Concrete

B. International Concrete Repair Institute (ICRI)

1.	ICRI 0372	Selecting and Specifying Concrete Surface Preparation for Sealing, Coatings, and Polymer Overlays

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.
B. Joint preparation equipment, materials and methods.

1.4 CONTRACTOR QUALITY CONTROL

A. Perform concrete work in accordance with ACI 318 and ACI 224.

1.5 DEFINITIONS (Note: The following language regarding concrete joints takes precedence over the language in the referenced American Concrete Institute Document entitled “Joints in Concrete Construction.”)

A. Construction Joints (CJ):

1. Construction joints are joints which are purposely placed in concrete to facilitate construction; to reduce initial shrinkage stresses and cracks; to allow time for the installation of embedded metalwork; or to allow for subsequent placing of other concrete.
2. Bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.

B. Contraction Joints (CRJ):

1. Contraction joints are joints placed in concrete to provide for volumetric shrinkage of a monolithic unit or movement between monolithic units.
2. Contraction joints are constructed so no bond exists between concrete surfaces forming the joint
3. Except as provided for dowels, reinforcement is never continuous across a contraction joint.

C. Control Joints (CTJ):

1. Control joints are joints placed in concrete to provide for control of initial shrinkage stresses and cracks of monolithic units.
2. Control joints are constructed the same as contraction joints, with the exception that reinforcement is continuous across control joints.

D. Expansion Joints (EJ):

1. Expansion joints are joints provided to allow for expansion and contraction between two adjacent concrete members.
2. Joints are filled with sponge rubber joint filler.

E. Tooled Edges: Tool permanently exposed edges of slabs to a radius of ¼ inch.

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 CONCRETE JOINTS

A. Construction Joints:

1. Locate construction joints where shown on Drawings or approved by the Engineer in writing. Show proposed locations of construction joints on the placement Drawings submitted under Section 03300: Cast-In-Place Concrete. Relocation, addition, or elimination of construction joints is subject to approval by the Engineer.
2. Locate horizontal joints in walls at the tops of footings or grade slabs. Place haunches at the same time as slabs.
3. Prepare construction joint surfaces for bonding by sandblasting, steel shot blasting, or high-pressure water jetting (6,000 psi minimum), or other method approved by the Engineer to thoroughly clean the surface. Remove all laitance, loose or defective concrete, coatings, sand, curing compound, and other foreign material to expose coarse aggregate uniformly, free of laitance, loose aggregate, or damaged concrete. Roughen concrete to produce minimum roughness profile of 1/4 inch. Surface preparation shall be conducted in a manner sufficient to keep from undercutting the edges of the larger particles of aggregate
4. Thoroughly moisten surfaces of construction joints to be covered with fresh concrete to surface saturated dry condition and remove standing water leaving the surface damp just before concrete placement.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars and accessories for cast-in-place concrete, and adhesive dowels.

1.2 REFERENCES

A. American Society of Testing and Materials International (ASTM)

1.	ASTM A 615	Standard Specification for Deformed and Plain Billet - Steel Bars for Concrete Reinforcement.

B. American Concrete Institute (ACI)

1.	ACI 301	Standard Specifications for Structural Concrete for Buildings.
2.	ACI 315	Details and Detailing of Concrete Reinforcement.
3.	ACI 318	Building Code Requirements for Structural Concrete.

C. Concrete Reinforcing Steel Institute (CRSI)

1.	CRSI	Manual of Standard Practice.
2.	CRSI 63	Recommended Practice for Placing Reinforcing Bars.
3.	CRSI 65	Recommended Practice for Placing Bar Supports, Specifications, and Nomenclature.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Reinforcement Placement Drawings:

1. Indicate bar sizes; spacings; locations and quantities of reinforcing steel; bending and cutting schedules; and supporting and spacing devices.
2. Show locations of splices. Proposed reinforcing splices not indicated on the Drawings will require written approval by the Engineer.

C. Mill Test Reports:

1. Submit certified copies of mill test reports of reinforcement material analyses.

D. Smooth dowel coating.

E. Manufacturer's installation instruction for adhesive dowels.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Perform concrete reinforced work in accordance with the CRSI Manual of Standard Practice and Document 63 and 65.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid rusting.

B. Protect from contaminants such as grease, oil, and dirt.

C. Provide identification after bundles are broken and tags removed.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Steel and Foundation Anchors: ASTM A 615; billet steel deformed bars; uncoated finish; Grade 60.

B. Steel Dowels

1. Dowels: ASTM A615, Grade 60 steel bars, size as shown on the Drawings.
2. Bond Breaking Compound: Use a bond-breaking compound approved by the Engineer.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type.

B. Chairs, Bolsters, Bar Supports, and Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions, in accordance with CRSI Manual of Standard Practice. Use of concrete block, rocks, or other items for reinforcement support will not be allowed.

C. Dowel Adhesive: Hilti, Inc., Tulsa, OK; HIT Doweling Anchor System (HIT HY-150), or approved equal.

2.3 FABRICATION

A. Fabricate concrete reinforcing in accordance with ACI 315.

B. Reinforcing splices have been located on the Drawings. Additional splices must be reviewed and approved in writing by the Engineer.

C. Welding reinforcing bars is not permitted.

PART 3 EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of loose rust, loose mill scale, dirt, grease, and other substances, which would impair bond with concrete. Remove rust by vigorous rubbing with burlap cloth or wire brushing.

B. Accommodate formed openings.

C. Place, support, and secure reinforcement against displacement. Do not deviate from required position.

D. Place reinforcement in accordance with the Drawings, Contractor reinforcing steel placement submittals and CRSI 65.

E. See Drawings for structural notes, and for reinforcement cover requirements.

F. Splice reinforcing bars by lapping and securely wiring together. Splices at locations other than those indicated are subject to written approval by the Engineer and shall conform, to the requirements of ACI 318. Do not use mechanical splices. Do not weld or tack weld reinforcing bars.

G. Place and secure embedded metalwork and conduit so as to not interfere with reinforcement installation.

H. Field bending of reinforcement is not allowed unless approved by the Engineer in writing.

I. Place reinforcement with clear distance of 1-inch, minimum, between reinforcement and anchor bolts, form ties, or other embedded metalwork unless otherwise shown on Drawings.

J. Tolerances:

1. Maintain concrete cover over reinforcement within 1/4 inch of specified cover.
2. Maintain spacing of reinforcing bars within 1 inch of required spacing.

3.2 ADHESIVE DOWEL INSTALLATION

A. Install adhesive dowels only where shown on the Drawings or otherwise approved by the Engineer.

B. Install adhesive dowels in strict accordance with the manufacturers written instructions, including hole drilling and hole size, hole cleaning and preparation, adhesive injection, dowel placement, and cure times.

3.3 INSPECTION

A. Notify the Engineer at least 24-hours in advance of a requested concrete reinforcement inspection. Provide sufficient time in the schedule for the Engineer to inspect the reinforcing steel prior to placement of concrete. Concrete placed without inspection and approval by the Engineer may be subject to rejection and removal at no additional cost to the Owner.

B. Engineer inspection of steel reinforcing prior to concrete placement will not relieve the Contractor from responsibility to conform to the Drawings and Specifications.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete for new concrete overlays.

1.2 REFERENCES AND DEFINITIONS

A. American Concrete Institute (ACI)

1.	ACI 117	Standard Tolerances for Concrete Construction and Materials (ACI 117) and Commentary (ACI 117R-06)
2.	ACI 301	Specification for Structural Concrete.
3.	ACI 302.1R	Guide for Concrete Floor and Slab Construction.
4.	ACI 304.2R	Placing Concrete by Pumping Methods.
5.	ACI 305R	Hot Weather Concreting.
6.	ACI 306.1	Standard Specification for Cold Weather Concreting.
7.	ACI 306R	Cold Weather Concreting.
8.	ACI 308.1	Standard Specification for Curing Concrete.
9.	ACI 308R	Guide to Curing Concrete.
10.	ACI 309R	Guide for Consolidation of Concrete
11.	ACI 309.2R	Identification and Control of Consolidation-Related Surface Defects in Formed Concrete.
12.	ACI 318	Building Code Requirements for Structural Concrete.

B. American Society for Testing and Materials International (ASTM)

1.	ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
2.	ASTM C 33	Standard Specifications for Concrete Aggregates.
3.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
4.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
5.	ASTM C 94	Standard Specifications for Ready-Mixed Concrete
6.	ASTM C 114	Standard Test Methods for Chemical Analysis of Hydraulic Cements
7.	ASTM C 138	Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
8.	ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
9.	ASTM C 150	Standard Specifications for Portland Cement.
10.	ASTM C 171	Standard Specification for Sheet Materials for Curing Concrete.
11.	ASTM C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
12.	ASTM C 260	Standard Specification for Air Entraining Admixtures for Concrete.
13.	ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

14. ASTM C 441 Standard Test Method for Effectiveness of Pozzolans or Ground Blast-Furnace Slag in Preventing Excessive Expansion of Concrete Due to the Alkali-Silica Reaction
15. ASTM C 494 Standard Specification for Chemical Admixtures for Concrete.
16. ASTM C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
17. ASTM C 1017 Standard Specification for Chemical for Use in Producing Flowing Concrete
18. ASTM C 1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
19. ASTM C 1602 Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

C. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M182 Burlap Cloth Made from Jute or Kenaf.

D. American National Standards Institute (ANSI)

1. ANSI/NSF 61 Drinking Water System Components–Health Effects

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Material Approval Data

1. Mix Design: For each concrete mix design submit proposed mix designs in accordance with ACI 301 for review and approval.
2. Name and manufacturer of each cementitious material, aggregate source, admixture, and curing compound.

a. The Engineer reserves the right to require submission of manufacturer's test data and certification of compliance with specification.
b. The Engineer reserves the right to require submission of samples of concrete materials for testing before or during use in concrete.

3. Cementitious materials certifications and test reports:

a. Manufacturer's certification and test reports for each lot from which shipments are drawn.

1) Certify materials were tested during production or transfer in accordance with specified reference specification.
2) Submittal of certification and test reports shall not relieve Contractor of responsibility for furnishing materials meeting specified requirement.

C. Concrete Placement Drawings:

1. Drawings for each individual concrete placement. An individual concrete placement is defined as a portion of concrete Work placed in one continuous operation between specified lines or joints.

2. Show locations, dimensions, blockouts, openings, recesses, waterstops, and finishes. Identify construction joints, control joints, contraction joints, and expansion joints.
3. Show details of items embedded in or associated with placement except reinforcing steel.
4. Include a separate drawing showing placement sequence.
5. Place a title block with Contractor's name, contract title and number, placement identification, and identifying drawing number in lower right hand corner of each drawing.
6. List reference drawings from which details shown on placement drawing were obtained on each drawing.
7. Reference related steel reinforcement drawings associated with placement on each drawing.

D. Concrete Placement Schedule

1. Complete, detailed concrete placement schedule showing the Contractor's plan for placement of individual features, units, and other elements of concrete work.
2. Detail as necessary to show location, sequence, and date of concrete placements scheduled for each item of concrete work.
3. Show submittal of detail drawings and placement of reinforcement and embedded items.

1.4 QUALITY ASSURANCE AND QUALITY CONTROL

A. Include quality control required for Section 03100: Concrete Formwork in Contractor Quality Control Plan.

B. Include provisions for hot or cold weather concrete in Contractor Quality Control plan.

C. Perform Work in accordance with provisions of all applicable ACI standards.

D. Obtain materials from same source throughout the Work.

E. Project Record Documents

1. Accurately record as-built concrete dimensions and tolerances and locations of embedded utilities and components on placement drawings.

F. Sequencing and Scheduling

1. Notify the Engineer at least 48 hours prior to commencing concrete Work.
2. Allow the Engineer to perform an immediate inspection of concrete surfaces upon removal of forms.
3. Notify the Engineer upon discovery of any honeycombing, foreign-embedded items, and/or defective concrete.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement: ASTM C 150 Portland Cement, Type I/II;

1. Meet equivalent alkalies requirements of ASTM C 150 – Table 2.

2. Meet false-set requirement of ASTM C 150 – Table 4.

B. Pozzolan: ASTM C 618, Class F, Except,

1. Sulfur trioxide, maximum: 4.0 percent.
2. Loss on ignition, maximum: 2.5 percent.
3. Test for effectiveness in controlling alkali-silica reaction under optional physical requirements in Table 2 of ASTM C 618. Use low-alkali cement for test.
4. Does not decrease sulfate resistance of concrete by use of pozzolan.
5. Demonstrate pozzolan will have an "R" factor less than 2.5.

    a. R = (C-5)/F
    b. C: Calcium oxide content of pozzolan in percent determined in accordance with ASTM C 114.
    c. F: Ferric oxide content of pozzolan in percent determined in accordance with ASTM C 114.

6. Pozzolan when tested in accordance with ASTM C 441, shall conform to the following: 65 percent minimum reduction in mortar expansion at 14 days, and 0.02 percent maximum mortar expansion at 14 days. Expansion shall be less than control sample expansion.
7. Pozzolan content shall be 20 percent plus or minus 5 percent by weight of the total cementitious materials.
8. Pozzolan and cement shall be stored and batched separately.

C. Aggregates:

1. Fine aggregate: ASTM C 33.
2. Coarse aggregate ASTM C 33, Size No. 67
3. Fine and coarse aggregate shall not be of a carbonate-based rock. Coarse and fine aggregates shall not contain any materials that are deleteriously reactive with the alkalis in the cement in an amount sufficient to cause excessive expansion of mortar or concrete. The amount of coal and lignite in the fine aggregate shall be less than 0.5 percent.

D. Water: Water for concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement in accordance with ASTM C 1602, including optional requirements of Table 2.

2.2 ADMIXTURES

A. Air Entraining Admixture:

1. ASTM C 260.
2. Use a neutralized vinsol resin formulation for air-entraining admixture used with ASTM C 494, Type F or G; and ASTM C 1017, Type I or II chemical admixtures.

B. Other Admixtures: Use only when approved and at no additional cost to the Owner. Conform to ASTM C 494:

1. Accelerators: Approval does not relax cold-weather placement requirements. Calcium chloride is prohibited.

2. Set-retarders or stabilizers: Approval does not relax hot-weather placement requirements.
3. Water reducers: Type A, D, E, F or G, to achieve workability without exceeding specified water/cement ratio and slump.
4. Mineral admixtures to be used or furnished under this Specification shall be certified to comply with this Specification by the supplier. Certification shall include test results on Specifications, source, and location.

2.3 FIBER REINFORCEMENT

A. Fiber reinforcement shall conform to ASTM. C 1116 Type III (Synthetic Fiber).

B. Synthetic fibers shall be commercially available polypropylene fibers or chemically inert equivalent. Fiber content in concrete shall be between 0.1 and 0.2 percent by volume to produce a mix designed to control plastic shrinkage.

2.4 CURING MATERIALS

A. Water: ASTM C 1602, including optional requirements of Table 2.

B. Curing Compound: ASTM C 309

C. Polyethylene Film: ASTM C171.

2.5 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C 94.

B. Select proportions for normal weight concrete in accordance with ACI 301 and ACI 318.

C. Provide concrete to the following criteria:

1. Compressive Strength (28 days): 4500 psi minimum concrete for all structures.
2. Slump: In accordance with ASTM C 143, and with ASTM C 1017, Type I or II chemical admixtures, use slump appropriate for placing conditions, with a maximum slump of 8 inches.
3. Entrained Air: 4% to 7% at point of placement in accordance with ASTM C 231.
4. Maximum water/cementitious material ratio: 0.45.
5. Concrete temperature at placing: 50 to 80 degrees F.

D. Use accelerating admixtures in cold weather only when approved by the Engineer in writing. Use of admixtures will not relax cold weather placement requirements.

E. Use of calcium chloride is not permitted.

F. Use set retarding admixtures during hot weather only when approved by the Engineer.

G. Use set-controlling admixtures to increase allowable concrete delivery and placement restrictions in accordance with applicable provisions of this Section only when approved by the Engineer.

H. Add other approved admixtures (water reducer/superplasticizer, etc.) in accordance with the manufacturer’s recommendations.

I. Superplasticizer shall be added to the concrete trucks at the site and the following requirements shall be followed:

1. The manufacturer's recommendations for dosage, mixing, and use.
2. A calibrated field dispenser shall be used. Records of dosage for each concrete truck shall be recorded by the Contractor and provided to the Engineer.
3. Each truck shall be mixed after dosing with the minimum number of drum rotations in accordance with the requirements of ACI and the admixture manufacturer.
4. Field concrete tests (air content, temperature, and slump) shall be performed on each truck before and after adding the admixture.

J. Concrete mix shall meet all specified requirements. Failure to meet any one specified requirement shall be sufficient cause for rejection.

K. Concrete shall be able to flow completely around and below siphon pipe, leaving no voids or gaps.

2.6 CONCRETE CONSOLIDATION EQUIPMENT

A. Consolidation equipment shall be flexible, electric or pneumatic-drive immersion-type vibrators with an operating speed of 7000 rpm when immersed in concrete.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joint preparation conforms to these Specifications.

B. Verify requirements for concrete cover over reinforcement.

C. Verify that anchors, seats, plates, reinforcement, embeds, openings, water stops, and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

A. Remove standing water, ice, mud, and debris from foundation surfaces to be covered by concrete.

B. Prepare rock surfaces free from oil, objectionable coatings, and loose, semi-detached, and unsound fragments. Immediately before placement of concrete, wash rock surfaces with an air-water jet and dry to a uniform surface-dry condition.

C. Prepare earth foundations free from frost or ice.

D. Thoroughly moisten surfaces of absorptive foundations to be covered with concrete so that moisture will not be drawn from fresh concrete.

E. Remove hardened concrete, wood chips, ice, and other debris from the interior of forms.

F. Place form release agent or wet forms just prior to placing concrete. Form release agent or any other deleterious material is not acceptable on concrete surfaces.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 304, ACI 309 and ACI 318.

B. Notify the Engineer a minimum of 48 hours prior to commencement of operations. The Engineer shall inspect all surfaces on which concrete is to be placed.

C. No concrete shall be placed until all formwork, installation of items to be embedded, and preparation of surfaces involved in the placement have been approved. Formwork and foundation surfaces on which cast-in-place concrete is placed shall be moistened and kept moist until overlying concrete is placed.

D. Place concrete in as nearly a continuous operation as practical and in a manner to produce a concrete mass with sufficient continuity and continuance so that it shall harden and act as a monolithic mass with no discontinuous joints or potential places of separation or weakness.

E. Concrete shall be placed in near horizontal layers; the depth of each layer shall not exceed 20 inches. Place mixture on prepared foundation or previously completed concrete materials with spreading equipment that prevents segregation and that produces layers of widths and thicknesses as necessary for compaction to the required dimensions. Place each successive layer as soon as practicable after the preceding layer is completed.

F. Ensure reinforcement, inserts, embedded parts, and waterstops are not disturbed during concrete placement.

G. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

H. Deposit concrete as close as practicable to its final position. Concrete shall be placed by methods that do not cause segregation. Do not drop concrete more than 3 feet.

I. Do not re-temper concrete.

1. Provide sufficient concrete placing capacity and equipment to deliver and place concrete without undue delay; do not permit cold joints to occur. Discharge concrete into forms within 90 minutes following the first introduction of water and cement or cement and aggregates, whichever occurs first. If the air temperature is 85° F or higher, the time limit specified above shall be reduced to 60 minutes unless the Engineer's approval has been obtained for means to maintain acceptable concrete quality without such time reduction. The Engineer may approve longer placement times provided no water is added after the specified time period above, and the approved concrete mix contains a water reducing and retarding admixture.

J. Cast-in-place concrete shall not be placed during heavy rain (more than 0.3 inch per hour or 0.03 inch in 6 minutes as defined by the Weather Bureau Glossary of Meteorology). If unusual adverse weather such as heavy rain, severe cold, heavy snow, high wind, or other adverse weather occurs, or is forecast to occur during placement, an interruption in placing operations may be approved or directed. All placed concrete materials shall be fully compacted before stopping Work. Allow for construction schedule risk and added expense that could occur as a result of adverse weather. Weather delays shall not be cause to receive additional compensation. Conform to ACI 306R for additional cold weather placement requirements.

K. Consolidate concrete in accordance with ACI 309. Do not place vibrator against reinforcing or forms or use vibrator to transport concrete within forms. Have one extra

vibrator and one extra generator on site at all times during placement of concrete to be used in the event of breakdown of primary equipment.

L. Do not use concrete which has been subjected to more than 250 total revolutions of any combination of mixing and agitating equipment following the first introduction of aggregates to the mixer.

M. Contractor may place concrete by pumping, at Contractor's option. Appropriate mix design provisions must be included in Contractor's approved concrete submittal before any concrete is placed by pumping methods. Concrete placement by pumping methods shall be performed in accordance with applicable provisions of ACI 304.2R.

N. Maintain concrete cover around reinforcement as indicated on the Drawings and in accordance with ACI 318.

O. Place concrete continuously between predetermined construction, contraction, control and expansion joints. Do not break or interrupt successive pours such that cold joints occur.

3.4 CONCRETE FINISHING

A. Finish all exposed concrete as follows:

1. All exterior slab surfaces shall be sloped a minimum of 1/8 inch in 1 foot or as indicated on the drawings. All exterior slab surfaces shall have a floated finish as defined in ACI 301.
2. All smooth, exposed, exterior vertical surfaces shall have a smooth form finish as defined in ACI 301 unless otherwise approved by the Engineer.
3. All interior formed surfaces shall have a smooth form finish as defined in ACI 301.
4. Edges:

    a. Chamfer edges of permanently exposed concrete, except slabs and top edges of walls, with a 45 degree bevel ¾ inch by ¾ inch unless otherwise shown on the drawings.
    b. Tool exposed edges of slabs and top edges of walls to a radius of ¼ inch unless shown otherwise on the drawings.

B. All other exposed concrete surfaces on the project shall be as follows:

1. Formed surfaces shall be smooth form surfaces as defined in ACI 301.
2. All unformed surfaces shall have a floated finish as defined in ACI 301.

C. Tolerances for Concrete Construction:

1. Tolerances are defined as allowable variations from specified lines and grades, and dimensions and as the allowable magnitude of the surface irregularities. Allowable variations from specified lines, grades, and dimension shall be in accordance with ACI 301 and ACI 117.

3.5 CURING AND PROTECTION

A. Cure fresh unformed concrete surfaces immediately, and formed surfaces following the removal of forms, for a minimum of 7 days, and as described in ACI 308.1 using one of the following methods as approved by the Engineer:

1. Using an approved clear membrane compound.
2. Other methods specified in ACI 308.1 submitted and approved by the Engineer.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

3.6 FIELD QUALITY CONTROL

A. Furnish a batch ticket (delivery ticket) with each load of concrete. Concrete delivered without a batch ticket containing complete information as specified shall be rejected. Collect and complete the batch ticket at the placement site and deliver all batch tickets to the Engineer on a daily basis. The Engineer shall have access to the batch tickets at any time during the placement. The following information shall be provided on each batch ticket:

1. Supplier's name and date
2. Truck number
3. Project number and location
4. Concrete class designation and item number
5. Cubic yards batched
6. Time batched
7. Mix design number
8. Type, brand, and amount of each admixture
9. Type, brand, and amount of cement and pozzolan
10. Mass (weights) of fine and coarse aggregates
11. Moisture of fine and coarse aggregate
12. Gallons of batch water (including ice)

B. Add the following information to the batch ticket at the placement site:

1. Gallons of water added by truck operator plus quantity of concrete in the truck each time water is added
2. Number of revolutions of drum at mixing speed (for truck mixed concrete)
3. Discharge time
4. Location of batch in placement
5. Water cement ratio

C. The Contractor will be allowed to add water to the batched concrete once at the site, based upon concrete supplier approval and direction and provided that the specified water to cement ratio is not exceeded and the amount of water withheld at the batch plant is on the delivery ticket.

D. Maintain records of placed concrete items. Record truck number, date, start and stop times, location of placed concrete, quantity, air temperature, concrete placement temperature, slump, air content, admixture quantities, test samples collected and times, and cast test cylinder numbers.

E. Perform Work in accordance with ACI 301.

F. Maintain one copy of each document on site.

G. Acquire cement from same source for all Work.

H. Acquire aggregate from same source for all Work.

I. Conform to ACI 305R when concreting during hot weather.

J. Conform to ACI 306R when concreting during cold weather.

K. Concrete to be placed directly on earth or bedrock will not be placed without written approval by the Engineer that the earth or bedrock foundation has been prepared suitably for concrete placement.

L. Perform quality assurance inspection and testing using the contractors approved independent testing firm. Provide access and samples as required by the Engineer.

M. The Contractor's independent testing agency shall prepare 5 concrete test cylinders for each 50 or less cubic yards or at least once each day of concrete placement.

1. Test cylinders shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.
2. Note on Record Drawings placement location represented by cylinders.
3. Test 2 cylinders from each set at 7 days, and 2 from each set at 28 days. Maintain the last cylinder from each set for testing in the event the 28-day tests fall below the required strength.

N. One additional test cylinder will be taken during cold weather concreting and cured on jobsite under the same conditions as the concrete it represents.

O. One slump test will be taken for each truck and for each set of test cylinders taken. Slump of concrete shall be determined at point of discharge from the mixer in accordance with ASTM C 143.

P. Air content (ASTM C 231), Unit Weight (ASTM C 138), and temperature (ASTM C 1064) shall be taken for each set of test cylinders taken.

3.7 PATCHING

A. Allow the Engineer to inspect concrete surfaces immediately upon removal of forms.

B. Honeycombing or embedded debris in concrete is not acceptable. Notify the Engineer upon discovery, and repair as determined by the Engineer.

C. Patch imperfections if approved by the Engineer:

1. Place repair materials to the full depth of repair and such that the repaired surface matches the original structure dimensions.
2. Prepare surfaces to receive repair materials by wetting to a surface saturated dry condition and remove standing water.
3. Finish and cure repair materials in accordance with the manufacturer's instructions and as determined by the Engineer.

3.8 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required lines, levels, details, elevations, dimensions, tolerances or specified requirements.

B. Defective concrete will be determined by the Engineer and repaired or replaced at no additional cost to the Owner.

C. Repair of Hardened Concrete Not Within Specified Tolerances: Hardened concrete that is not within specified tolerances shall be repaired to bring it within those tolerances. Such repair shall be accomplished in a manner approved by the Engineer. Concrete repair to bring concrete within tolerances shall be done only after consultation with the Engineer regarding the repair method. The Engineer shall be notified as to the time when repair shall be performed.

D. Concrete that shall be exposed to public view shall be repaired in a manner that shall result in a concrete surface with a uniform appearance. Grinding of concrete surfaces exposed to view shall be limited in depth such that no aggregate particles are exposed more than 1/6 inch in cross section at the finished surface. Where grinding has caused or shall cause exposure of aggregate particles greater than 1/6 inch in cross section at the finished surface, concrete shall be repaired by excavating and replacing the concrete at no additional cost to the Owner.

E. Prevention of Repeated Failure to Meet Tolerances: When concrete placements result in hardened concrete that does not meet specified tolerances, the Contractor shall, upon request, submit to the Engineer an outline of all preventative actions, such as modifications to forms, modified procedure for setting screeds, and different finishing techniques, to be implemented by the Contractor to avoid repeated failures. The Engineer reserves the right to delay concrete placements until the Contractor implements such preventative actions that are approved by the Engineer.

F. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

G. Repair or replace concrete not properly placed or not of the specified type.

3.9 PROTECTION

A. Protect finished Work under provisions of ACI 301.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical damage in accordance with the applicable provisions of ACI.

C. Unless otherwise approved by the Engineer, protect curing concrete from freeze-thaw cycles until concrete has attained a compressive strength of 2500 psi. Control rate of temperature drop per day in accordance with ACI 306.1 and 306R and as required to prevent temperature cracking.

D. Maintain concrete with minimal moisture loss at relatively constant temperature for the period necessary for hydration of cement and hardening of concrete.

E. Removal of formwork shall conform to requirements of Section 03100: Concrete Formwork.

END OF SECTION

SECTION 05500
METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Providing all labor, materials, equipment, tools, and services necessary to fabricate, deliver, and install miscellaneous metal work as shown on the Drawings or specified herein; including but not limited to embedded bearing plate assemblies.

1.2 REFERENCES

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

1.	ASTM A 6-05a	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
2.	ASTM A 36-05	Standard Specification for Carbon Structural Steel
3.	ASTM A 123-02	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
4.	ASTM A 153-05	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
5.	ASTM A 167-99 (2004)	Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
6.	ASTM A 276-06	Standard Specification for Stainless Steel Bars and Shapes
7.	ASTM A 307-04	Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
8.	ASTM A 312-05a	Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
9.	ASTM A 314-97 (2002)	Standard Specification for Stainless Steel Billets and Bars for Forging
10.	ASTM A 325-06	Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
11.	ASTM A 490-06	Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
12.	ASTM A 500-03a	Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

13.	ASTM A 501-01 (2005)	Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
14.	ASTM A 563-04a	Standard Specification for Carbon and Alloy Steel Nuts
15.	ASTM A 572-06	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
16.	ASTM A 588-05	Standard Specification for High-Strength Low-Alloy Structural Steel 50 ksi Minimum Yield Point to 4-in. Thick
17.	ASTM A 759-00 (2005)	Standard Specification for Carbon Steel Crane Rails
18.	ASTM A 780-01	Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
19.	ASTM B 366-04b	Standard Specification for Factory-Made Wrought Nickel and Nickel Alloy Fittings
20.	ASTM F 436-04	Standard Specification for Hardened Steel Washers
21.	ASTM F 593-02e2	Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
22.	ASTM F 594-02	Standard Specification for Stainless Steel Nuts
23.	ASTM F 959-06	Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners
24.	ASTM F1554-04e1	Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

B. American Institute of Steel Construction (AISC), Steel Construction Manual, 13th Edition.

C. American National Standards Institute (ANSI).

1.	ANSI Z49.1	Safety in Welding and Cutting.

D. American Welding Society (AWS).

1.	AWS B2.1-05	Welding Procedure and Performance Qualification.
2.	AWS D1.1-06	Structural Welding Code.

E. Occupational Safety and Health Administration (OSHA).

F. National Association of Architectural Metal Manufacturers (NAAMM).

1. NAAMM MBG 531-00 Metal Bar Grating Manual

G. Research Council on Structural Connections (RCSC):

1. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts, 2004.

1.3 SUBMITTALS

A. Submit in accordance with Section 01330: Submittals.

B. Shop Drawings and product data for all fabricated items.

1. Indicate materials, profiles, sizes, connection attachments, reinforcing, anchorage, hardware, size and type of fasteners and accessories.

2. Indicate welded connections using standard AWS welding symbols; indicate net weld lengths and proposed field welds.

C. Submit welder certifications of qualification showing date of qualification; qualification grade and rating; and notarized signature of inspector.

D. Submit fabricator's quality control plan meeting the requirements of Section 1704.2 of International Building Code 2006.

E. Before delivery of materials, provide certified laboratory test reports of materials.

PART 2 PRODUCTS

2.1 GENERAL

A. To ensure proper fitting of the work, field verify critical dimensions at the jobsite prior to preparation of Shop Drawings and before product fabrication begins. Field fabrication will not be permitted.

2.2 MATERIALS

A. Basic Ferrous Metal – All steel shall be hot dip galvanized except as noted in item 6 below.

1. Steel Plates: Carbon steel, ASTM A 36.

2. Headed Anchors: H4L Headed Concrete Anchors (HCA) by Nelson Stud Welding, or approved equal.

2.3 FABRICATED ITEMS

A. Bearing Plate Assemblies

1. Bearing Plate Assemblies shall be fabricated and installed at the intermediate supports, as shown on the Drawings. Fabrication details are provided for fabrication from carbon steel, ASTM A 36 and welded headed studs.

2.4 FABRICATION

A. Fabricate items of the material specified and with joints tightly fitted and secured.

B. Remove burrs from all exposed cut edges, remove spatter and grind exposed welds to match adjacent surface.

PART 3 EXECUTION

3.1 PREPARATION

A. Examine surfaces for defects that would impair installation.

B. Obtain Engineer's approval before site cutting, field welding, or making non-scheduled adjustments.

C. Prepare for erection loads with temporary bracing; keep work in alignment.

D. Supply setting templates for items required to be cast into concrete.

E. Unless otherwise specified, use only metal braces, supports, and other items to position and align embedded metalwork, which will be embedded in concrete. Do not use wooden braces, supports, or other items to position and align embedded metalwork if they will also be embedded in concrete.

3.2 INSTALLATION

A. Install items plumb and level, accurately fitted, and free from distortion or defects.

END OF SECTION

CHARLES SPIELMAN **Consulting Geological Engineer**
200 Truman Ave. Monte Vista, CO 81144 719-852-2546 cogspiel@msn.com

November 12, 2012

Ron Peterson, President
Santa Maria Reservoir Company
P. O. Box 288
Monte Vista, CO 81144

Subject: Letter Report -
Preliminary Assessment of the Likelihood
of the Presence Of a Fen In a Conceptual Flood Zone
Immediately Upstream of the Continental Reservoir,
Hinsdale County, Colorado

Dear Ron:

As you requested, I have made the subject assessment. This report describes the results of my assessment, as well as the basis, assumptions, literature review, and fieldwork on which the assessment is based.

Basis and Assumptions

As I have indicated, I am not an expert in the practice of identifying wetlands, bogs, or fens. I have, however, gained some experience, by observation, of the process and practice of identifying wetlands on a number of projects I've been involved with, and I have some acquaintance with the fens of Park County, where I work as a geological consultant.

You have explained your need to obtain, in the brief period available before the onset of winter, an indication of the likelihood that a fen, or fens, may be present in the area immediately upstream of the present Continental Reservoir high water line. This is an area that would be flooded by an increase in the maximum allowed capacity of the reservoir.

By examining the subject area from a geological perspective, by briefly reviewing selected literature regarding the definition of a fen, and by assessing the geologic, topographic, and moisture conditions relative to the formation of fens, it is feasible, I believe, to arrive quickly at a valid preliminary assessment of the likelihood of the existence of a fen in the area.

That is the basis for, and the assumptions used in, formulating this assessment.

Literature Review

As an informational resource on fens, Santa Maria personnel provided a copy of the Introduction to *The Calcareous Fens of Park County, Colorado: Their Vegetation, Environmental Functioning, and the Effects of Disturbance*, a 1998 study by J. Bradley Johnson. This study sets forth the defining characteristics of fens and describes some of the physical and chemical conditions leading to the formation of fens. We agreed that this work would provide an adequate basis for the field examination we undertook.

Some photos are included here from a review of the botanical characteristics of fens in *Extreme Rich Fens of South Park, Colorado: Their Distribution, Identification, and Natural Heritage Significance,* a 1996 study funded by the Colorado Natural Heritage Program, Colorado State University, authored by John Sanderson and Margaret March.

Fieldwork

The conceptual flood area which is the subject of this assessment is shown on the attached map. In the company of, and assisted by, several members of the Santa Maria staff, I spent three hours on the afternoon of November 8, 2012, engaged in a field examination and limited testing of the area.

We traversed parts of the area and obtained topsoil and subsoil samples at six locations using hand-held soil augers. The approximate locations of these sample points are shown on the attached map. The auger holes were about 2.0 – 2.5 feet deep. We tested each sample with a Ferry-Morse electronic soil tester consisting of a pH meter that also gave an indication of the sample nutrient richness.

The sample pH readings were as follows:

1.	7.1	3.	6.1	5.	7.0
2.	5.2	4.	6.9	6.	5.6

The nutrient value of all of the samples ranged between “ideal” and “high ideal,” according to the readings of our instrument. This appeared to be related to the presence of some organic material in the samples we tested.

We also took numerous photos of the area to demonstrate pertinent features we observed which were significant in forming the basis for my assessment.

Assessment

Geologic History: The large, broad, u-shaped valley in which Continental Reservoir is located is a typical alpine glacial feature. As the glacier eventually melted and retreated at the end of the glacial period, it is likely that the flat valley floor was covered with one or several meandering streams that left alluvial deposits of sand, gravel, cobbles, and boulders that may have been, in total, perhaps 5-50 feet thick. Since the end of the glaciation, conditions have been relatively cold and harsh at the elevation of the valley floor. Streams have continued to erode and rework the unconsolidated sediments. Freezing, thawing, and weathering of exposed alluvium have formed bands of weathered volcanic rock fragments, in slightly acidic ground conditions, as indicated by our auger samples and photographs.

I surmise that, with this geologic history, it is likely that only thin intervals of topsoil or organic-rich material were formed, and that most of the deeper parts of the valley fill are predominantly sand, gravel, cobbles, and boulders.

Comparative Analysis: Current and historic geologic conditions in this study area are quite different from those found in the calcareous fens of South Park. As our photos and samples indicate, several characteristics which typify the presence of fens were not observed in the wetlands above Continental Reservoir. The pH readings did not correspond to the typical basic conditions leading to the formation of a fen. There was no evidence of the biodiversity characteristic of fens. Further, the soil samples and the banks of streams cutting the area showed no evidence of the peat beds which are a requisite for determining that the area contains a fen.

Observed conditions in the subject area would almost certainly lead to its classification as a perennial wetland. However, given the aforementioned geologic history, and based on our limited field examination, I conclude that it is very unlikely that a fen, or fens, exist in the subject area.

Sincerely,

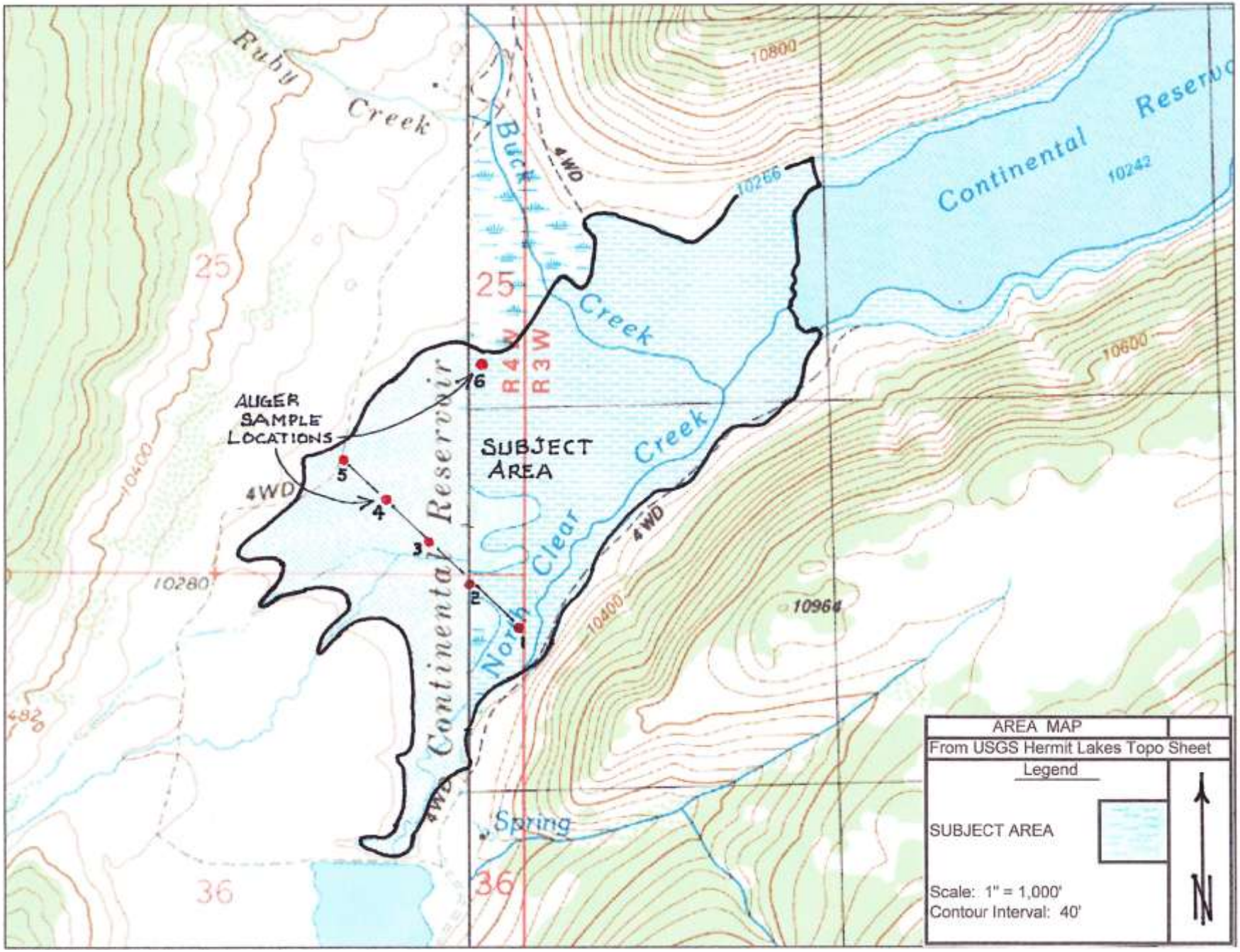
Charles Spielman

Attachments:

1. Area Map

2. Photos

3. Introduction to report: *The Calcareous Fens of Park County, Colorado: Their Vegetation, Environmental Functioning, and the Effects of Disturbance,* a 1998 study by J. Bradley Johnson


Ruby Creek
Buck Creek
4WD
10800
Continental Reservoir
10243
10256
25
R4W
R3W
16
AUGER SAMPLE LOCATIONS
SUBJECT AREA
5
4
3
2
1
4WD
10400
10280
10600
Clear Creek
North Clear Creek
10964
Continental Reservoir
Spring
36
AREA MAP
From USGS Hermit Lakes Topo Sheet
Legend
SUBJECT AREA
Scale: 1" = 1,000'
Contour Interval: 40'
N

1. Looking northeast across subject area, showing vegetation & upper end of present Continental Reservoir

2. One of several streams cutting the Subject area, showing typical stream bank material

3. Stream bank showing irregular thin alternating bands of sediment and sparse organic material

4. Since the end of the glaciation, streams have continued to erode and rework the unconsolidated sediments. Freezing, thawing, and weathering of exposed alluvium have formed bands of weathered volcanic rock fragments in slightly acidic ground conditions.

5. Weathered windblown material and stream sediments exposed sporadically across subject area

6. Dense and diverse vegetation of a typical fen. In this fen the list of species includes the following:

Antennaria umbrinella
Psychrophila leptosepala
Cardamine cordifolia
Carex aquatilis
Carex capillaris
Carex microglochin
Carex saxatilis
Carex utriculata
Deschampsia cespitosa
Eriophorum angustifolium
Geum macrophyllum
Habenaria hyperborea
Parnassia fimbriata
Pedicularis groenlandica
Potentilla fruticosa
Salix planifolia
Senecio dimorphophyllus
Senecio triangularis
Swertia perennis

Contrasting subject area and a typical fen with respect to vegetation, moisture, and plant diversity.

Fen Botanical Survey
San Juan National Forest
District: Columbine
Fen number: C0291 near Little Molas Road
Examples of fen vegetation

Contrasting subject area and a typical fen with respect to topography, vegetation, acidity, and plant diversity.

(included for reference use only)

INTRODUCTION

The calcareous fens of South Park, are one of the most important wetland resources in Colorado. These wetlands contain some fifteen state rare or endemic plant species, eleven rare invertebrate species and three regionally endemic vegetation types (Sanderson and March 1996). The fens form rich islands of biodiversity and unique habitat in the short grass steppe that surrounds them and perform important environmental functions such as water quality improvement and water storage. Fens take centuries to form and their losses are essentially irreparable. In recognition of these facts, the US Fish and Wildlife Service has elevated fens to a the most protected “Resource Category 1" and the US Army Corps of Engineers has exempted fens from the Nation Wide 26 permit coverage. Our knowledge of these systems is significantly disproportionate to their important in the ecosystem. This is primarily due to our recent discovery of the significant role that fens play on the landscape.

Fens are a type of peatland; that is, a wetland which accumulates undecomposed organic matter, called peat. Peat accumulates due to anaerobic conditions brought about by a high water table. There are two types of peatlands, bogs and fens. Bogs only receive moisture and nutrients from precipitation and dust. They are therefore termed ombrotrophic (“rain-fed”). Due to their ombrotrophy, they are extremely nutrient poor. Bogs are also highly acidic because of the chemical processes of the Sphagnum mosses which dominated their biota. Bogs have a low species richness resulting from these [sic] unamenable combination of factors. Although poor in species, bogs are rich in coverage, blanketing more of the world’s surface than any other ecosystem type except steppe. Most of these bogs occur in the boreal and arctic regions of the world where countries, such as Norway, can be more than 50% covered by these peatlands (Gore 1983).

Fens are peatlands whose vegetation is in contact with groundwater. The term for this condition is minerotrophic. Fens in the semi-arid west are further dependent on ground water as their primary water source. In South Park, without significant ground water inputs, fens could not exist.

Colorado’s peatlands have been referred to using a number of different terms such as bogs, swamps, marshes. Technically speaking all of Colorado’s peatlands are “fens”; therefore “fen” and “peatland” are often times used interchangeably in our region. No extensive bogs have ever been found in Colorado due to insufficient precipitation, but it has been proposed that large peat hummocks can form areas environmentally equivalent to miniature bogs in peatlands which are otherwise fens (Johnson 1996).

In Colorado, fens are found above about 2600 m (8500 ft.), but are most common in the subalpine zone and above (> 2750 m). Subalpine fens are generally found in valley bottoms and mountain parks. They may also be associated with river systems, usually occurring at slope breaks such as where valley sides or terrace shoulders intersect relict floodplains. In general, fens can occur anywhere in the subalpine zone where enough ground water emerges to perennially saturate the soil. A shallow grade also helps to increase the residence time of the discharged water and aids in soil saturation. Many such locations occur in the mountains of Colorado, and fens are not uncommon. Subalpine fens are generally small and easily damaged, however. The exact extent of fens in Colorado is not known precisely, but it seems to certainly be less than one percent of the total land area.

The character of ground water entering a fen is heavily influenced by the regional geology. Ground water flowing though granitic parent material is very nutrient poor and slightly acidic (pH ~ 6.5). Ground water flowing through calcareous or dolomitic parent material on the other hand tends to be rich in nutrients, especially calcium and magnesium, and is basic (pH>7.5). The nutrient concentration of groundwater is a major determinant of fen vegetation. As such, fens have been classified according to their nutrient richness, which is in turn reflected in the species composition present. The most common fen divisions are poor, moderate, rich, and extremely-rich fens (Du Rietz 1949).

The calcareous fens of South Park are classified as rich to extremely-rich fens. These fen types are the most uncommon in North America, and maybe the world. In North America, extremely-rich fens have been found in only three or four areas besides South Park and near Hudson Bay in Canada (Sjõrs 1961, Lesica 1986, Fertig & Jones 1992). Elsewhere in the world, extremely-rich fens are found in the British Isles and Scandinavia (Wheeler 1980, Sjõrs 1948).

While scientists have only recently discovered the peatlands of South Park, these sites have been of interest to ranchers and developers since the 1800's. Historically, these wetlands were ditched and drained so they could be converted to “productive land” and to prevent cattle from becoming bogged down in their soft soils. More recently, miners have discovered the value of peatlands as a source of horticultural “peat moss”. Compared to other peatlands in the state, those of South Park readily lend themselves to peat mining, since they are relatively expansive, flat and have easy access. Due to such land use practices, a large percentage of South Park’s fens have been negatively impacted – many have been completely obliterated.

The uniqueness and fragility of these fens is in direct conflict with such practices. Mining strips away the peat, leaving a foreign substrate with new chemical and hydrological properties. The environment created in the wake of mining is so dissimilar to that of the native fen, sites mined several years in the past remain

nearly devoid of vegetation (Johnson, pers. obs.). Dewatering a fen through ditching changes the fundamental hydrologic properties of the wetland, impacting every facet of the wetland's ecology. Even more threatening to these systems is the prospect of ground water development projects. Such projects have the potential to usurp the ground water flow into the wetlands – a situation which would utterly and irrevocably destroy these sites.

This project was initiated to study the ecology and environmental functions performed by the calcareous fens of South Park, CO. It is an extension of a pilot study carried out in 1995, by this author working in conjunction with the Park County Department of Environmental Health. Due to the initial success and compelling results of that study, the current project was designed to expand and complement it. Three calcareous fens were used as study sites. Each site had both intact sections as well as areas that had been impacted by peat mining or ditching.

This project had the goal of investigating the environmental functions performed by fens in South Park, CO. It accomplished this goal by: (1) Characterizing fen vegetation and the most important factors influencing plant species composition; (2) Describing their hydrology; (3) Characterizing the fens' water and soil chemistry: and (4) Evaluating the impact that land use practices such as peat mining or ditching have on wetland functionality. All of this information is placed in the context of developing a reference data set for use in the Hydrogeomorphic (HGM) Approach to wetland functional evaluation. It is intended that this information be used towards development of a regional slope wetland HGM guidebook.

This study [was] primarily funded by the U.S. Environmental Protection Agency through its State Wetlands Grant Program [104(b)(3)]. The Park County Department of Environmental Health and Colorado State University provided the matching funds to this Federal Grant. Additional in-kind support was afforded by the Denver Water Board. Although the grant period for this project only covered the 1996 and 1997 field seasons, data from 1995 and 1998 were also included. These data resulted from studies funded by a State Wetlands grant to Brad Johnson and Park County Department of Environmental Health and funds from Park County Government.

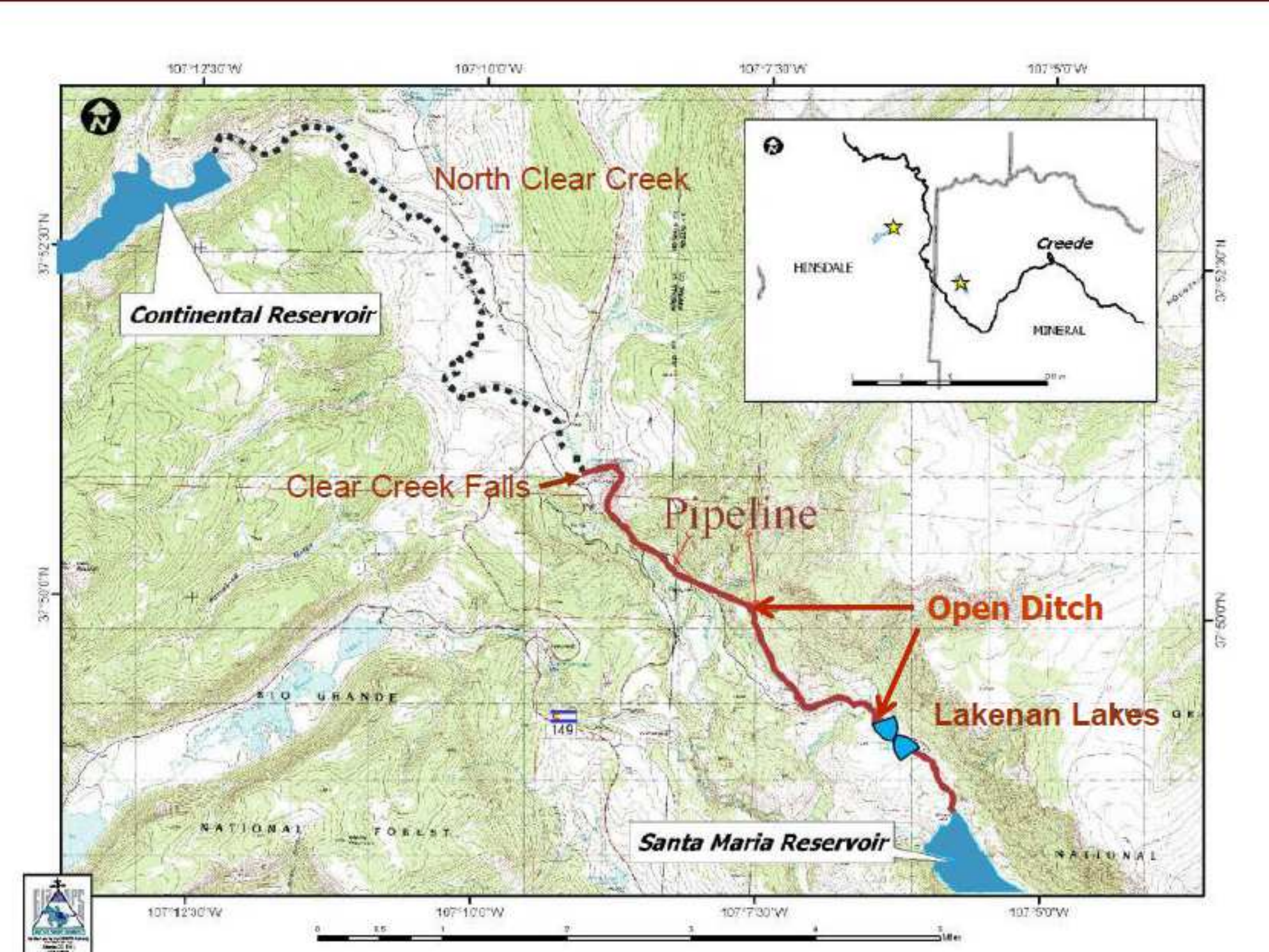
References:

1. Geologic Map of the Bristol Head Quadrangle. Thomas A. Steven. 1967

2. *The Calcareous Fens of Park County, Colorado: Their Vegetation, Environmental Functioning, and the Effects of Disturbance,* 1998, a study by J. Bradley Johnson funded primarily by the U.S. Environmental Protection Agency through its State Wetlands Grant Program.

3. *San Juan National Forest Botanical Survey of Fens, p*repared for the San Juan National Forest by Peggy Lyon, Marian Rohman and Julie Crawford, a study funded by the Colorado Natural Heritage Program and conducted by Colorado State University. February 2007.

* * * * *


North Clear Creek
Continental Reservoir
Clear Creek Falls
Pipeline
Open Ditch
Lakenan Lakes
Santa Maria Reservoir
Creede
HINSDALE
MINERAL
RIO GRANDE
NATIONAL FOREST
149
107°12'30"W
107°10'0"W
107°7'30"W
107°5'0"W
37°52'30"N
37°50'0"N


Open Ditch - about one mile long
Lakenan Lakes
Santa Maria Dam
Outlet from Santa Maria to Clear Creek
Conveyance System

Exhibit C

Photos

Letters of Support

Santa Maria Siphon Photographs

1. Cross valley view of the upper portion of the siphon from the river intake to where the siphon goes under ground. The slide area can be observed upslope from the siphon pipe.

2. Cross valley view of the river intake along upper portion of the above ground siphon.

3. Lower portion of the above ground siphon where the siphon goes underground. The metal structure stores the original narrow gauge train that was used to construct the present siphon.

4. Looking downstream along the siphon to where the siphon goes underground.

5. Next pipe segment upstream of last photo looking downstream along the siphon from the second of six thrust blocks.

6. Looking downstream along the siphon, just upstream of the second thrust block. First pier support in foreground.

7. Looking downstream along the siphon, just upstream of the second thrust block. First pier support in foreground.

8. Looking downstream along the siphon, just upstream of the second thrust block. Second pier support in foreground.

9. Looking downstream along the siphon, just upstream of the second thrust block. First pier support in foreground.

10. Looking downstream along the siphon, just upstream of the second thrust block. Second pier support in foreground.

11. Looking downstream along the siphon, just upstream of the second thrust block. Third pier support in foreground. Rocker pad is lifted above pier due to foundation slide area.

12. Looking downstream along the siphon, just upstream of the second thrust block. Forth pier support in foreground. Rocker pad is lifted above pier due to foundation slide.

13. Looking downstream along the siphon, just upstream of the second thrust block. Fifth pier support in foreground. Rocker pad is lifted above pier due to foundation slide.

14. Looking downstream along the siphon, just upstream of the second thrust block. Sixth pier support in foreground. Rocker pad is lifted above pier due to foundation slide.

15. Looking downstream along the siphon, just upstream of the second thrust block. Seven pier support in foreground. The pier is outside of the slide area.

16. Looking downstream along the siphon through the slide area that is impacted the peirs.

17. Looking upstream along the siphon up to the intake structure. The siphon supports are not impacted by the slide area. The supports were modified in the past.

Santa Maria Canal Photographs

1. Siphon outlet into canal.

2. Inside of the discharge side of the siphon pipe.

3. Inlet, from the siphon, into the pipe under the canal invert to convey winter flows between Continental Reservoir to Santa Maria Reservoir.

4. Looking upstream along the canal towards the siphon outlet into the canal.

5. Control structure just downstream of the siphon outlet structure.

6. Looking downstream, along the canal, from the siphon outlet – control structure is shown which connects round pipe to box culvert under canal section.

7. Typical canal section – natural ground along left side (looking downstream) with placed fill along right side of canal. Photo taken during winter.

8. Canal section looking downstream of the siphon outlet with the round pipe that discharges into the box culvert under the canal invert. Photo taken in during summer.

9. Top of box culvert located along the canal invert. Bridge section defines downstream project limits for the canal improvements.

10. Looking upstream along the canal section with the box culvert that conveys winter flow. Slide area in background has caused high seepage rates through the canal section.

11. Looking upstream along the canal with the slide area in background. The canal was construction on top of the slide area. The canal is seeping along this area.

Rio Grande Water Conservation District
10900 Highway 160 East • Alamosa, Colorado 81101
Phone: (719) 589-6301 • Fax: (719) 589-4331
Protecting & Conserving San Luis Valley Water

December 21, 2012

Mike Gibson, Chairman
Rio Grande Basin Roundtable
623 4th Street
Alamosa, CO 81101

Re: Support for the Santa Maria Project

Dear Mr. Gibson,

The objective of the Santa Maria Reservoir Siphon & Canal System Rehabilitation Project (this Project) is to improve the capability of SMRC to continue providing irrigation water to shareholders. This will be accomplished by rehabilitating and making critical repairs to the Santa Maria Siphon and the Santa Maria Canal, which constitute the main structural elements of the conveyance system between the Continental Reservoir and the Santa Maria Reservoir. The goals of this Project are to mitigate current water-management inefficiencies, reduce high maintenance, prevent the continued deterioration, and avoid the potential failure of this delivery system.

This Project constitutes the first phase of SMRC's multi-phase Santa Maria Rehabilitation Initiative (referred to here as the SMRC Rehab Initiative), implementing recommendations made in recently completed studies by URS Corporation (URS). This Project and all future phases of the SMRC Rehab Initiative have the ultimate objective of lifting the State-imposed storage limitations at Continental Reservoir and mitigating or eliminating the many problems created by the deterioration of a century-old system which will otherwise soon reach the end of its useful life.

WSRA grant funding for this Project represents 25% of total project cost, with the remaining costs funded through a CWCB Water Projects Loan and matching funds from SMRC. All funds will be used to rehabilitate and reinforce the existing supports of the siphon and to improve the flow hydraulics of the conveyance system by upgrading and improving the canal. The preferred alternative for the canal requires removing the existing drop structures and upgrading the canal's concrete lining, thus enabling the system to convey additional flow once the storage limitation on

Continental is lifted.

This Project will complete the first phase of the SMRC Rehab Initiative, improving and increasing the capacity of the conveyance system between Continental Reservoir and Santa Maria Reservoir and putting in place the critical elements required to proceed with future improvements at Continental Reservoir. By implementing the preferred alternatives established in the URS Studies, this Project will accomplish multiple consumptive and non-consumptive purposes, greatly improving SMR's ability to (1) meet the agricultural needs of irrigators in 65,000 acres of the San Luis Valley and (2) establishing significant improvements in the efficient management of Colorado's Rio Grande Compact water.

The Board of Directors of the Rio Grande Conservation District supports this project and encourages the Rio Grande Basin Roundtable and the Colorado Water Conservation District to sponsor the project.

If you should need anything further please do not hesitate to contact me.

Sincerely,

Steve E. Vandiver
District Manager

SEV/maa

THE RIO GRANDE WATER USERS ASSOCIATION

P.O. Box 288
147 Washington Street
Monte Vista, Colorado 81144
Phone: (719) 852-3556 - Fax: (719) 852-5958

January 4, 2013

Mr. Mike Gibson, Chairman
Rio Grande Basin Roundtable
623 Fourth Street
Alamosa, CO 81101

Re: Santa Maria Reservoir Siphon & Canal System Rehabilitation Project

Dear Mike:

I am writing to you on behalf of the Rio Grande Water Users Association to express its strong support for the Santa Maria Reservoir Company's funding request to the Rio Grande Roundtable for the repair and rehabilitation of the delivery pipeline support system, delivery ditch and the related facilities for the diversion and delivery of water for storage in Santa Maria Reservoir. This request is based on a study by URS Corporation of dam safety and operational issues at Santa Maria Reservoir and Continental Reservoir, two large pre-compact reservoirs. The Santa Maria Reservoir Siphon & Canal System Rehabilitation Project is the first phase of a multiphase effort to implement the recommendations of that study to improve the safety, reliability, and usefulness of Santa Maria and Continental Reservoirs.

As you know, the top priorities identified by the Rio Grande Basin Roundtable were to repair the basin's pre-compact reservoirs. The Santa Maria Reservoir Siphon and Canal System Rehabilitation Project is one of these top priorities, and is very important to both the Santa Maria Reservoir Company shareholders and water users on the Rio Grande. This project will protect invaluable pre-compact storage, and will help with water conservation, compact compliance, river administration, pre-compact reservoir operations, and the replacement of stream depletions by wells.

This water supply reserve account funding request represents 25% of the total project cost, with the remaining cost to be funded by a CWCB loan, and funds to be provided by the Santa Maria Reservoir Company. The Rio Grande Water Users Association requests that both the Rio Grande Basin Roundtable and the Colorado Water Conservation Board approve this funding request for this very important project.

Sincerely,

Greg Higel

Greg Higel, President

Copy: Santa Maria Reservoir Company

THE MONTE VISTA WATER USERS ASSOCIATION

P.O. Box 288
147 Washington Street
Monte Vista, Colorado 81144
Phone: (719) 852-3556 – Fax: (719) 852-5958
January 4, 2013

Mr. Mike Gibson, Chairman
Rio Grande Basin Roundtable
623 Fourth Street
Alamosa, CO 81101

Re: Santa Maria Reservoir Siphon & Canal System Rehabilitation Project

Dear Mike:

The Monte Vista Canal Water Users Association is writing to express its strong support for the Santa Maria Reservoir Company's funding request to the Rio Grande Roundtable for the repair and rehabilitation of the delivery pipeline support system, delivery ditch and the related facilities for the diversion and delivery of water for storage in Santa Maria Reservoir. Shareholders in the Monte Vista Canal own 10% of the Santa Maria Reservoir Company, and are very committed to the success of this project. This funding request is based on a study by URS Corporation of dam safety and operational issues at Santa Maria Reservoir and Continental Reservoir, two of the three large pre-compact reservoirs on the Rio Grande. The Santa Maria Reservoir Siphon & Canal System Rehabilitation Project is the first phase of a multiphase effort to improve the safety, reliability, and usefulness of Santa Maria and Continental Reservoirs.

As you know, the top priorities identified by the Rio Grande Basin Roundtable were to repair the basin's invaluable pre-compact reservoirs. The Santa Maria Reservoir Siphon and Canal System Rehabilitation Project is one of these top priorities, and is very important to both the Santa Maria Reservoir Company shareholders and to all of the water users on the Rio Grande. The project will help the conservation of water through storage in a pre-compact reservoir, and will help with water management, river operations, compact administration, exchanges between pre-compact reservoirs, and the replacement of stream depletions by wells.

The Monte Vista Water Users Association requests that both the Rio Grande Basin Roundtable and the Colorado Water Conservation Board approve this funding request. Thank you for your consideration on this very important project.

Sincerely,

Mark Haugen, Secretary

Copy: Santa Maria Reservoir Company

COLORADO POTATOES

QUALITY AT ITS PEAK

January 4, 2013

Mike Gibson

Rio Grande Basin Roundtable

Dear Mike Gibson,

I am writing on behalf of the Colorado Potato Administrative Committee to encourage the Rio Grande Roundtable to support the water supply reserve account grant application of the Santa Maria Reservoir Company. This project will upgrade the deteriorating conveyance systems of Continental and Santa Maria Reservoirs. This project is needed to maximize the potential uses of these two critical storage reservoirs in the Rio Grande basin.

This project will eventually allow more water to be stored in Continental reservoir and will allow increased water management efficiency and flexibility for water users within the Rio Grande Basin. The conveyance system from Continental reservoir to Santa Maria reservoir is aging and badly in need of these upgrades. These improvements will increase the total capacity of the ditch and pipeline of the conveyance system when water is available for storage.

These reservoirs supply water to 70,000 acres of irrigated land through the Rio Grande Canal and Monte Vista Canal so this project has the capability to impact many producers within four counties of the San Luis valley. In addition these improvements will increase the flexibility needed to manage this stored water for the DOW and their mission of maintaining favorable wildlife habitat and recreational opportunities, and the needs of San Luis valley water sub-districts to meet depletion water needs.

In our minds this project is crucial for the future of San Luis valley agriculture and we urge you to support it.

Sincerely,

Jim Ehrlich

Jim Ehrlich

Executive Director

Colorado Potato Administrative Committee

THE RIO GRANDE CANAL WATER USERS ASSOCIATION

P.O. Box 288
147 Washington Street
Monte Vista, Colorado 81144
Phone: (719) 852-3556 – Fax: (719) 852-5958

January 4, 2013

Mr. Mike Gibson, Chairman
Rio Grande Basin Roundtable
623 Fourth Street
Alamosa, CO 81101

Re: Santa Maria Reservoir Siphon & Canal System Rehabilitation Project

Dear Mike:

The Rio Grande Canal Water Users Association wishes to express its strong support for the Santa Maria Reservoir Company's funding request to the Rio Grande Roundtable for the repair and rehabilitation of the delivery pipeline support system, delivery ditch and the related facilities for the diversion and delivery of water for storage in Santa Maria Reservoir. Shareholders in the Rio Grande Canal own 90% of the Santa Maria Reservoir Company, and are very committed to the success of this project. This funding request arises out of a comprehensive engineering study of dam safety and operational issues at Santa Maria Reservoir and Continental Reservoir, two of the three large pre-compact reservoirs on the Rio Grande. The Santa Maria Reservoir Siphon & Canal System Rehabilitation Project is the first phase of a multiphase effort to improve the safety, reliability, and usefulness of Santa Maria and Continental Reservoirs.

As you know, the top priorities identified by the Rio Grande Basin Roundtable were to repair the basin's invaluable pre-compact reservoirs. The Santa Maria Reservoir Siphon and Canal System Rehabilitation Project is one of these top priorities, and is very important to both the Santa Maria Reservoir Company shareholders and to all of the water users on the Rio Grande. The project will help with the conservation of water through storage in a pre-compact reservoir, and will help with water management, river operations, compact administration, exchanges between pre-compact reservoirs, and the replacement of stream depletions by wells.

The Rio Grande Canal Water Users Association requests that both the Rio Grande Basin Roundtable and the Colorado Water Conservation Board approve this funding request. Thank you for your consideration on this very important project.

Sincerely,

Glen McCoy, Secretary

Copy: Santa Maria Reservoir Company

SAN LUIS VALLEY IRRIGATION DISTRICT

P. O. Box 637 296 Miles Street
Center, Colorado 81125-0637

719-754-2254

January 2, 2013

To: Mr. Mike Gibson, Chairman
Rio Grande Interbasin Roundtable
623 Fourth Street
Alamosa, CO 81101

Re: Santa Maria Reservoir Siphon & Canal System
Rehabilitation Project (SMR Project)

Dear Mike,

The San Luis Valley Irrigation District supports the funding request of the Santa Maria Reservoir Company to the Rio Grande Roundtable for the "SMR Project" to repair and rehabilitate the important conveyance system that provides inflows to Santa Maria Reservoir. This request is Phase I of a multiphase effort to implement recommendations made by Santa Maria Reservoir Company's engineers URS Corporation.

As you know, URS Corporation recently completed its study of the Santa Maria Reservoir and Continental Reservoir dam safety issues. This water supply reserve account request represents 25% of the total project costs, with the remaining cost to be funded by a CWCB loan, and matching funds to be provided by the Santa Maria Reservoir Company.

The top priorities identified by the Rio Grande Roundtable were to repair the basin's 100 year old reservoirs. The Santa Maria Reservoir Siphon and Canal System Rehabilitation Project is very important not only to the Santa Maria Reservoir Stakeholders, but to all of the water users on the Rio Grande for compact compliance, river administration, and reservoir operations between all pre compact reservoirs to meet the growing demand for wet water, including the environmental needs of the basin.

The Board of Directors of the San Luis Valley Irrigation District recommends approval of this funding request by the Rio Grande Roundtable and the Colorado Water Conservation Board.

Thank you for your consideration on this very important request.

Sincerely, Randall K. Palmgren

Randall Palmgren
President, San Luis Valley Irrigation District

Rio Grande Water Conservation District
10900 Highway 160 East • Alamosa, Colorado 81101
Phone: (719) 589-6301 • Fax: (719) 589-4331
Protecting & Conserving San Luis Valley Water

December 21, 2012

Mike Gibson, Chairman
Rio Grande Basin Roundtable
623 4th Street
Alamosa, CO 81101

Re: Support for the Santa Maria Project

Dear Mr. Gibson,

The objective of the Santa Maria Reservoir Siphon & Canal System Rehabilitation Project (this Project) is to improve the capability of SMRC to continue providing irrigation water to shareholders. This will be accomplished by rehabilitating and making critical repairs to the Santa Maria Siphon and the Santa Maria Canal, which constitute the main structural elements of the conveyance system between the Continental Reservoir and the Santa Maria Reservoir. The goals of this Project are to mitigate current water-management inefficiencies, reduce high maintenance, prevent the continued deterioration, and avoid the potential failure of this delivery system.

This Project constitutes the first phase of SMRC's multi-phase Santa Maria Rehabilitation Initiative (referred to here as the SMRC Rehab Initiative), implementing recommendations made in recently completed studies by URS Corporation (URS). This Project and all future phases of the SMRC Rehab Initiative have the ultimate objective of lifting the State-imposed storage limitations at Continental Reservoir and mitigating or eliminating the many problems created by the deterioration of a century-old system which will otherwise soon reach the end of its useful life.

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Continental is lifted.

This Project will complete the first phase of the SMRC Rehab Initiative, improving and increasing the capacity of the conveyance system between Continental Reservoir and Santa Maria Reservoir and putting in place the critical elements required to proceed with future improvements at Continental Reservoir. By implementing the preferred alternatives established in the URS Studies, this Project will accomplish multiple consumptive and non-consumptive purposes, greatly improving SMR's ability to (1) meet the agricultural needs of irrigators in 65,000 acres of the San Luis Valley and (2) establishing significant improvements in the efficient management of Colorado's Rio Grande Compact water.

The Board of Managers of the Special Subdistrict No. 1 of the Rio Grande Water Conservation District support this project and encourages the Rio Grande Basin Roundtable and the Colorado Water Conservation District to sponsor the project.

If you should need anything further please do not hesitate to contact me.

Sincerely,

Robert Phillips
Program Manager

RP/maa

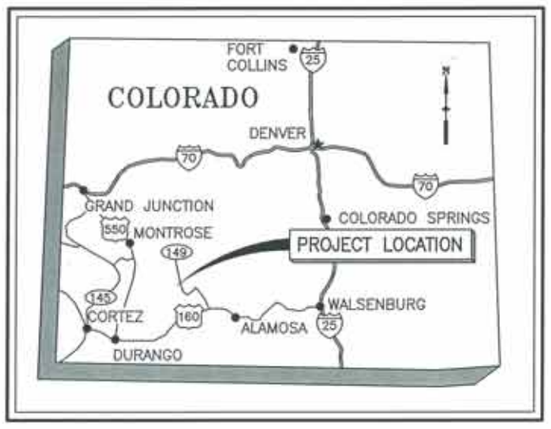
DESIGN DRAWINGS

FOR

SANTA MARIA SIPHON SUPPORT SYSTEM STABILIZATION PROJECT

PREPARED FOR

SANTA MARIA RESERVOIR COMPANY
MINERAL COUNTY, COLORADO



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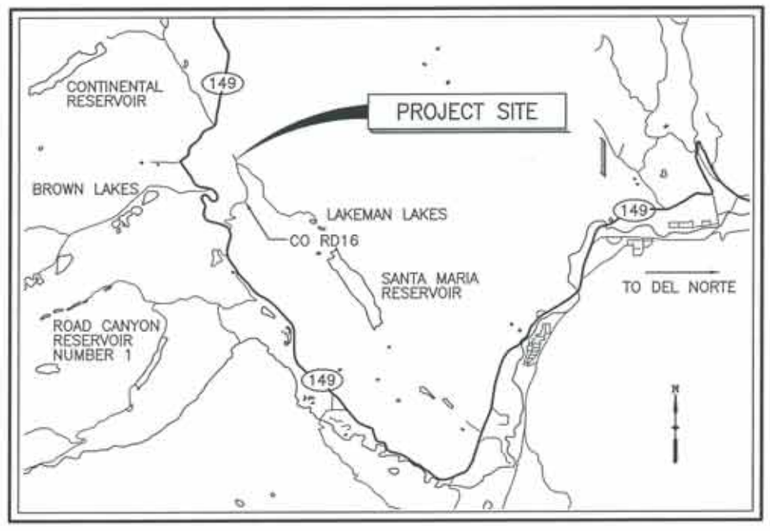

VICINITY MAP
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SHEET INDEX		
SHEET NO.	DRAWING NO.	DRAWING TITLE
		GENERAL
1	G-1	COVER SHEET, LOCATION MAPS AND SHEET INDEX
		STRUCTURAL
2	S-1	SIPHON PLAN AND PROFILE
3	S-2	SIPHON SUPPORT SYSTEM DEMOLITION
4	S-3	INTERMEDIATE SUPPORT MODIFICATIONS
5	S-4	THRUST BLOCK MODIFICATIONS
6	S-5	STRUCTURAL NOTES, STANDARD DETAILS, AND SEQUENCE OF WORK

URS
URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

SANTA MARIA RESERVOIR COMPANY

SANTA MARIA SIPHON SUPPORT SYSTEM STABILIZATION PROJECT

FINAL DESIGN

COLORADO REGISTERED MICHAEL S. LEDESMA 36589 6/27/12 PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	6/27/12	MSL
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

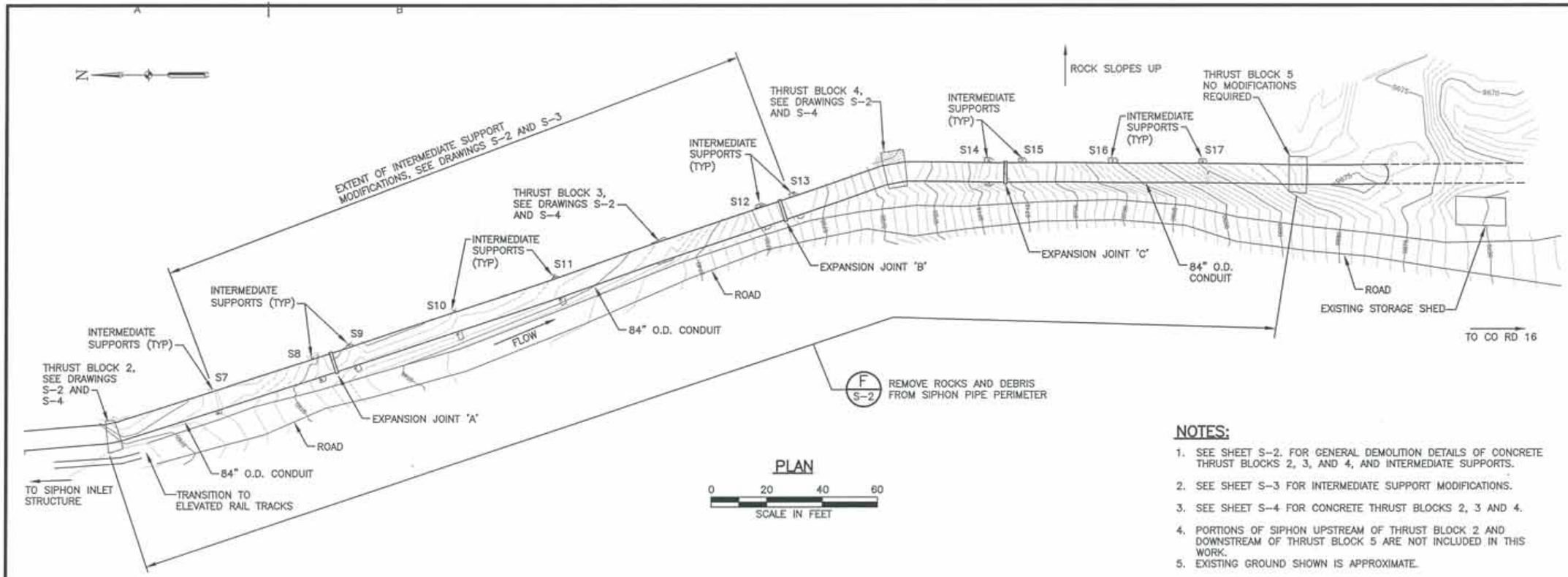
NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12

URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

COVER SHEET, LOCATION MAPS AND SHEET INDEX

G-1
SHEET 1 OF 6



PLAN

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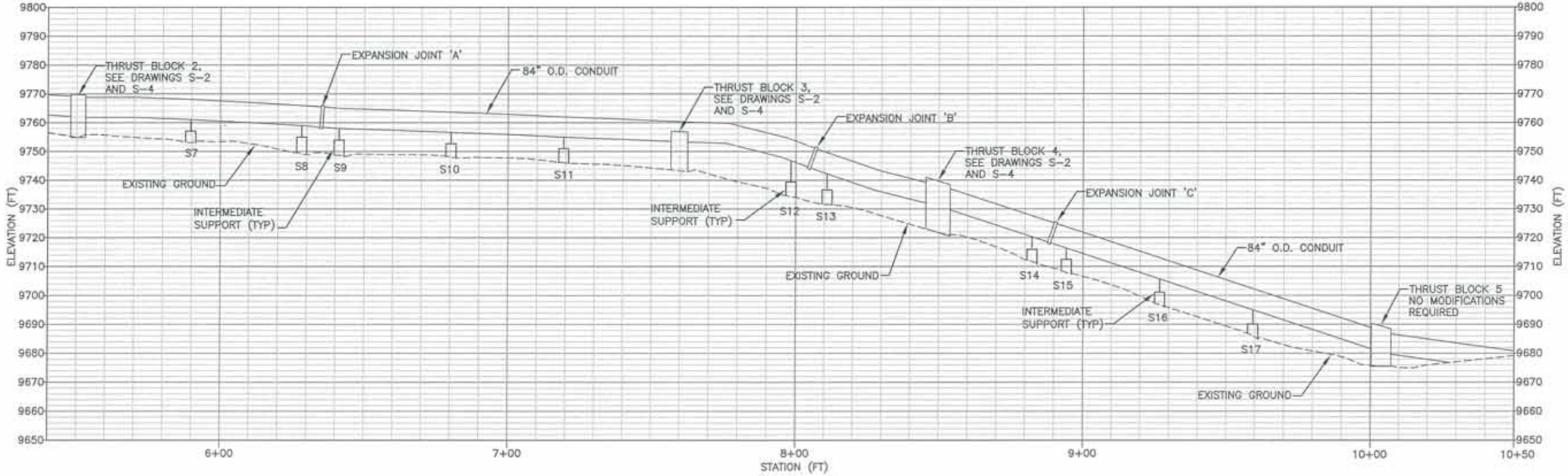

PROFILE

0 20 40 60

SCALE IN FEET

URS

URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

SANTA MARIA RESERVOIR COMPANY

SANTA MARIA
SIPHON SUPPORT SYSTEM
STABILIZATION PROJECT

FINAL DESIGN

COLORADO REGISTERED MICHAEL S. LEDESMA 36589 PROFESSIONAL ENGINEER 6/27/12

ISSUED FOR BIDDING	6/27/12	MSL
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
0	ISSUED FOR BID	6/27/12
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URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

SIPHON
PLAN AND PROFILE

S-1

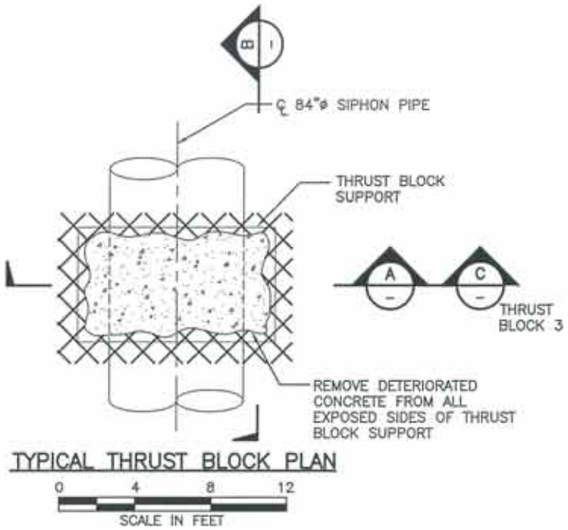
SHEET 2 OF 6

D-4

NOTES:

1. SEE SHEET S-2. FOR GENERAL DEMOLITION DETAILS OF CONCRETE THRUST BLOCKS 2, 3, AND 4, AND INTERMEDIATE SUPPORTS.
2. SEE SHEET S-3 FOR INTERMEDIATE SUPPORT MODIFICATIONS.
3. SEE SHEET S-4 FOR CONCRETE THRUST BLOCKS 2, 3 AND 4.
4. PORTIONS OF SIPHON UPSTREAM OF THRUST BLOCK 2 AND DOWNSTREAM OF THRUST BLOCK 5 ARE NOT INCLUDED IN THIS WORK.
5. EXISTING GROUND SHOWN IS APPROXIMATE.

URS DRAWING PATH: N:\Projects\22241248_Santa Maria_Confined\Sub_0039.0_Constr_Design\Santa Maria Siphon\CIVIL_SIPHON PRP.dwg



TYPICAL THRUST BLOCK PLAN

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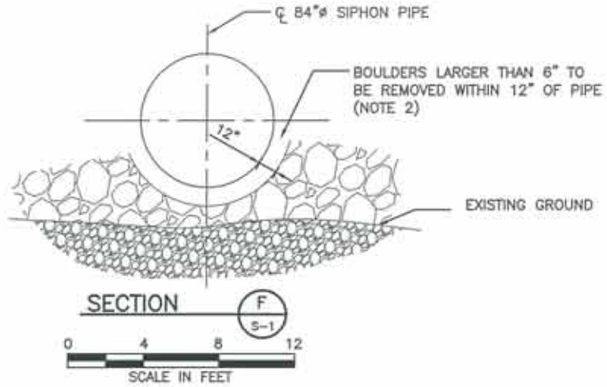
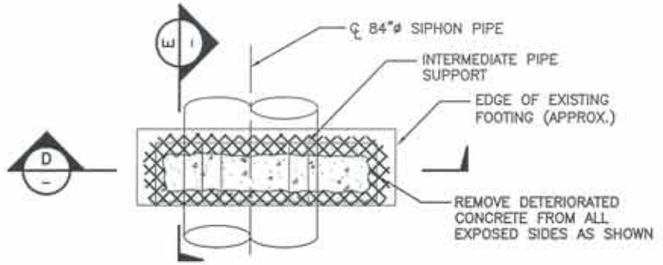
SCALE IN FEET



SECTION F S-1

0 4 8 12

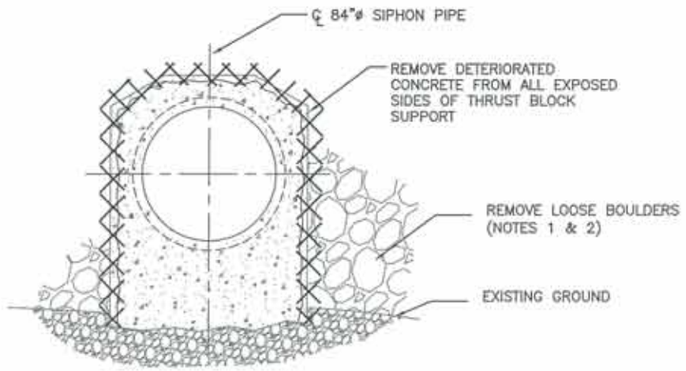
SCALE IN FEET



TYPICAL INTERMEDIATE SUPPORT PLAN

0 4 8 12

SCALE IN FEET

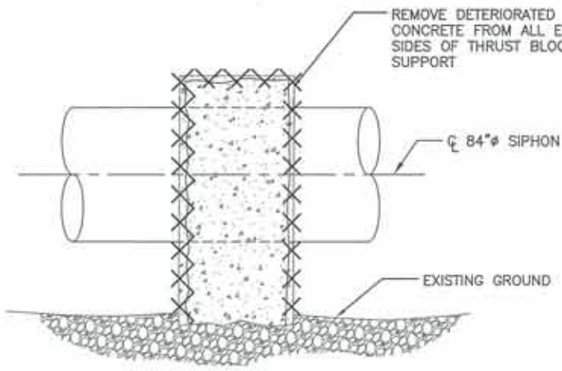


SECTION A

THRUST BLOCKS 2 & 4

0 4 8 12

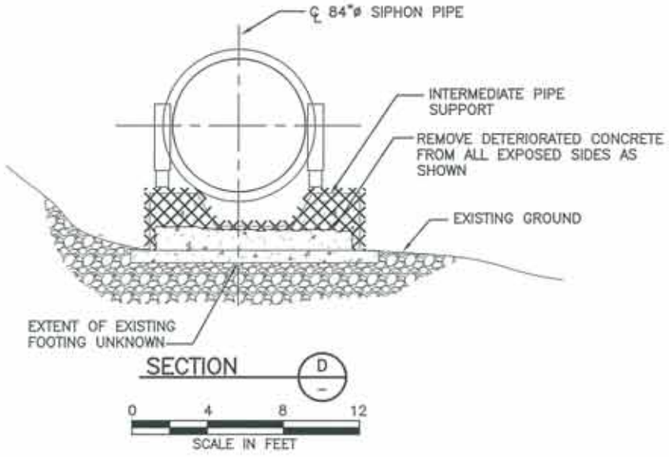
SCALE IN FEET



SECTION B THRUST BLOCK 3 SIMILAR

0 4 8 12

SCALE IN FEET



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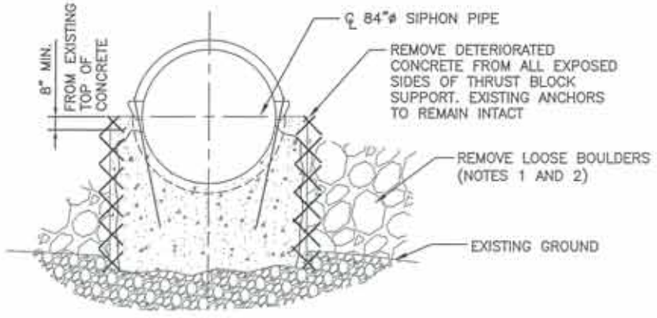
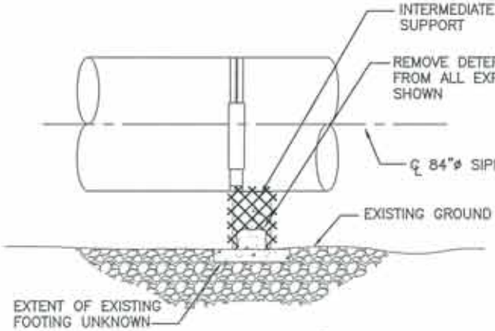


SECTION C

THRUST BLOCK 3

0 4 8 12

SCALE IN FEET



SECTION E

0 4 8 12

SCALE IN FEET

NOTES:

1. REMOVE ROCKS AND BOULDERS AS REQUIRED TO COMPLETE WORK.
2. CONTRACTOR SHALL NOT DESTABILIZE ROCK SLOPE WHEN REMOVING BOULDERS.
3. INTERMEDIATE SUPPORTS S7 THROUGH S11 EACH CONTAIN TWO EMBEDDED STEEL PLATES THAT SHALL BE REMOVED AS PART OF DEMOLITION. INTERMEDIATE SUPPORTS S12 AND S13 EACH CONTAIN TWO STEEL PLATES THAT SHALL BE REMOVED AND REINSTALLED. SEE APPENDIX A OF THE TECHNICAL SPECIFICATIONS FOR HISTORICAL DRAWINGS OF THE EXISTING HARDWARE.

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA
SIPHON SUPPORT SYSTEM
STABILIZATION PROJECT

FINAL DESIGN

ISSUED FOR BIDDING	6/27/12	MSL
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12
△		
△		
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URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

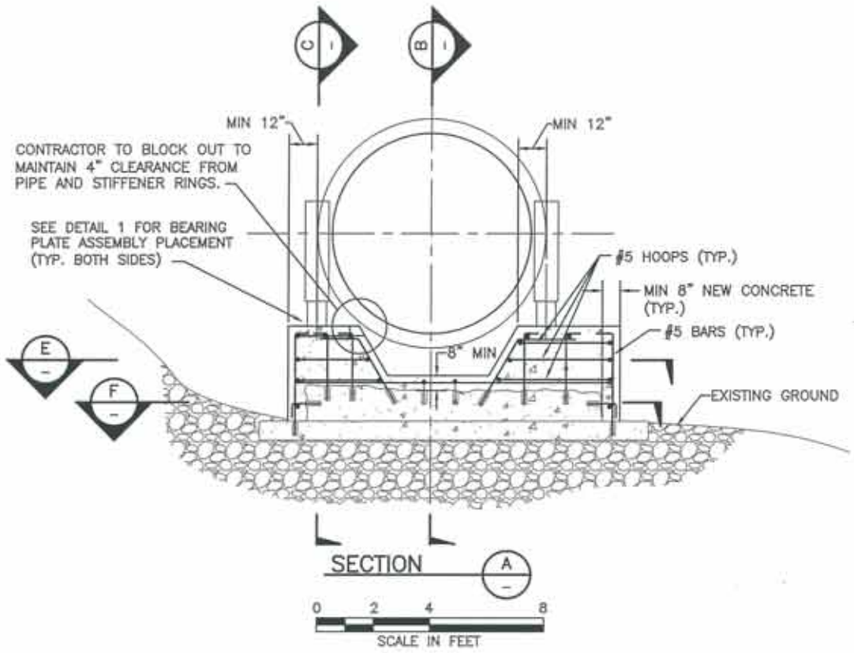
SHEET TITLE

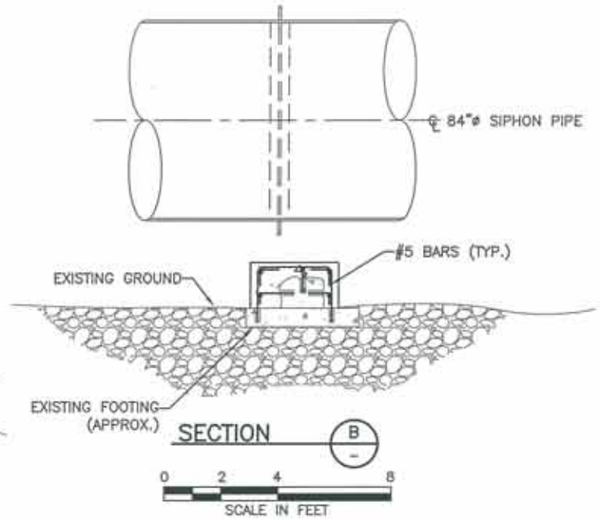
SIPHON SUPPORT SYSTEM DEMOLITION

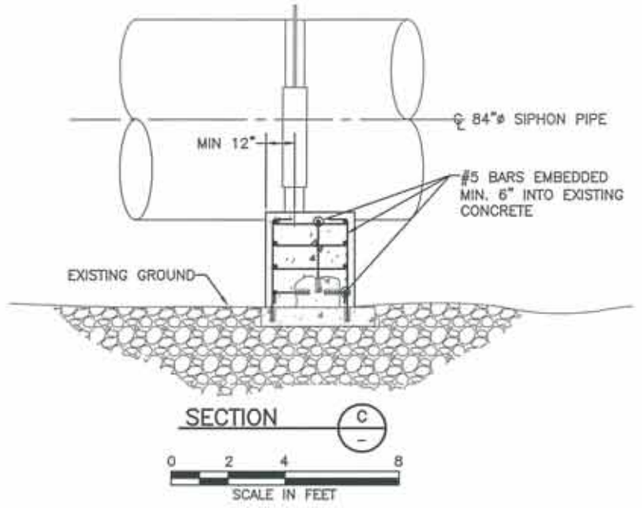
S-2

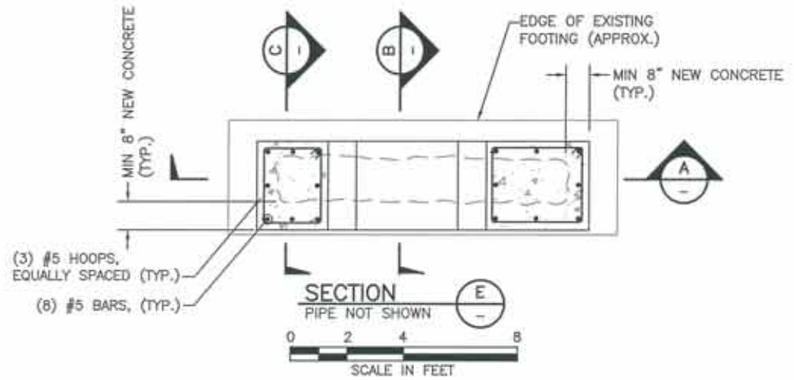
SHEET 3 OF 6

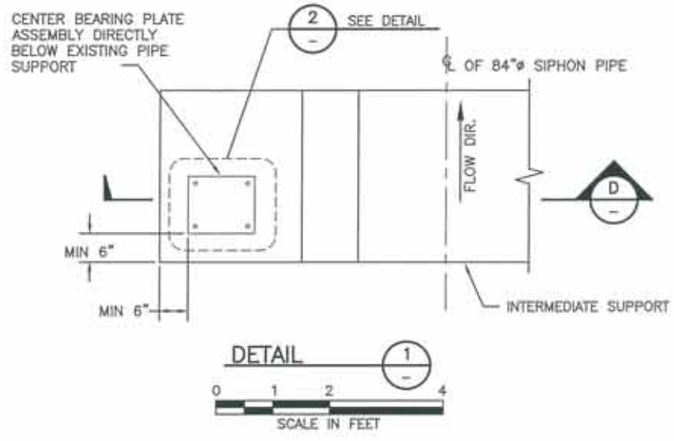
D-5

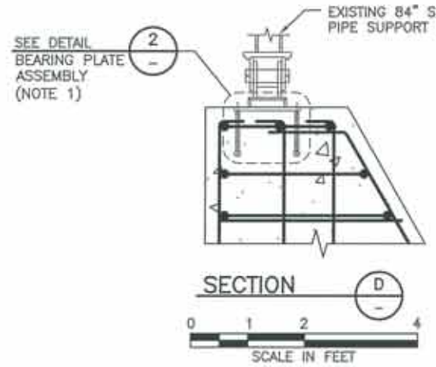


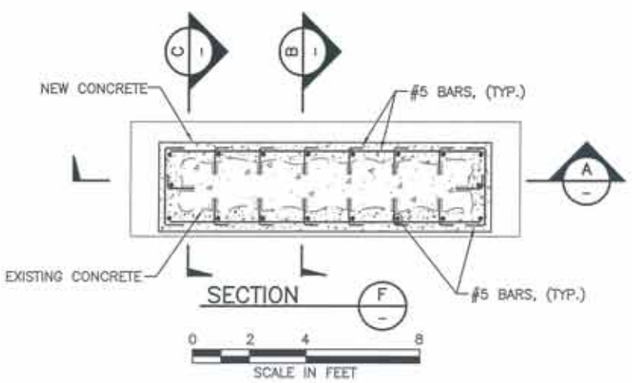


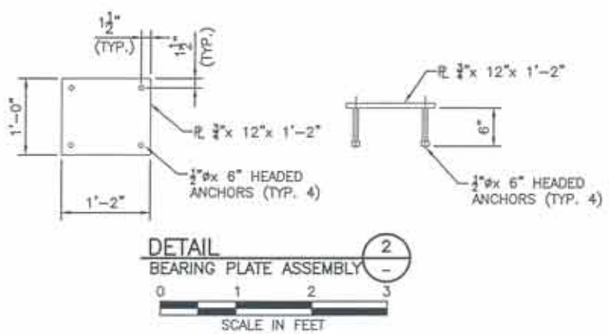












NOTES:

1. AT INTERMEDIATE SUPPORTS S12 AND S13, REINSTALL EXISTING ROLLER SUPPORT PLATES. SEE APPENDIX A OF THE TECHNICAL SPECIFICATIONS FOR HISTORICAL DRAWINGS OF THE EXISTING HARDWARE.

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA
SIPHON SUPPORT SYSTEM
STABILIZATION PROJECT

FINAL DESIGN

COLORADO REGISTERED MICHAEL S. LEDESMA 36589 6/27/12 PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	6/27/12	MSL
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12

URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

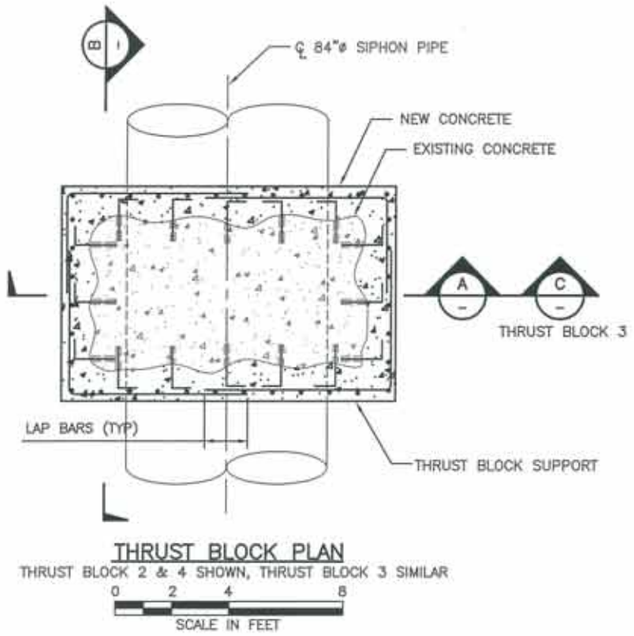
INTERMEDIATE SUPPORT MODIFICATIONS

S-3

SHEET 4 OF 6

D-6

URS DRAWING PATH: N:\Projects\22241248_Santa_Maria_Continue\Sub_0008.0_Constr_Design\Santa Maria Siphon\Siphon Support Repair.dwg

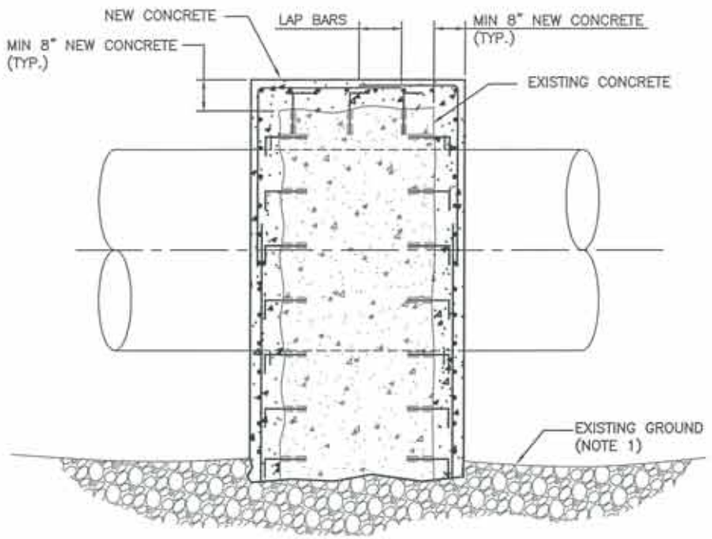


THRUST BLOCK PLAN

THRUST BLOCK 2 & 4 SHOWN, THRUST BLOCK 3 SIMILAR

0 2 4 8

SCALE IN FEET



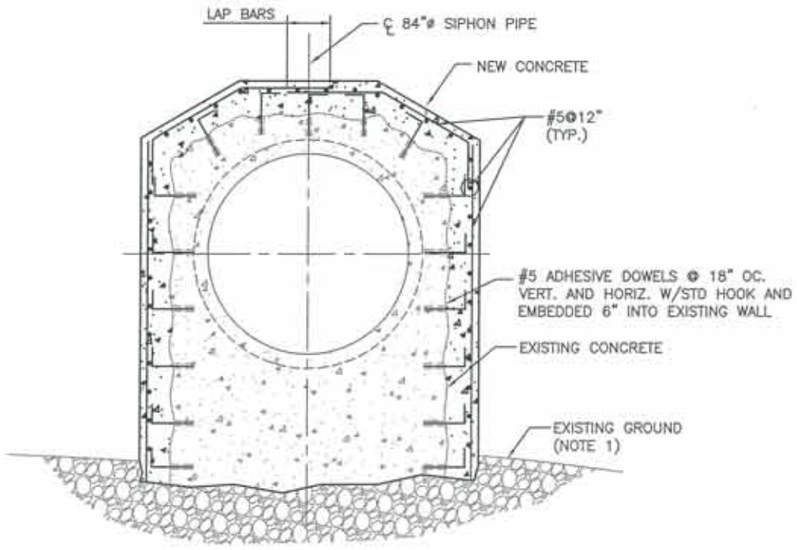
SECTION B (THRUST BLOCK 3 SIMILAR)

0 2 4 8

SCALE IN FEET

NOTES

1. DO NOT EXCAVATE BELOW EXISTING CONCRETE OR OTHERWISE UNDERMINE THE THRUST BLOCKS.

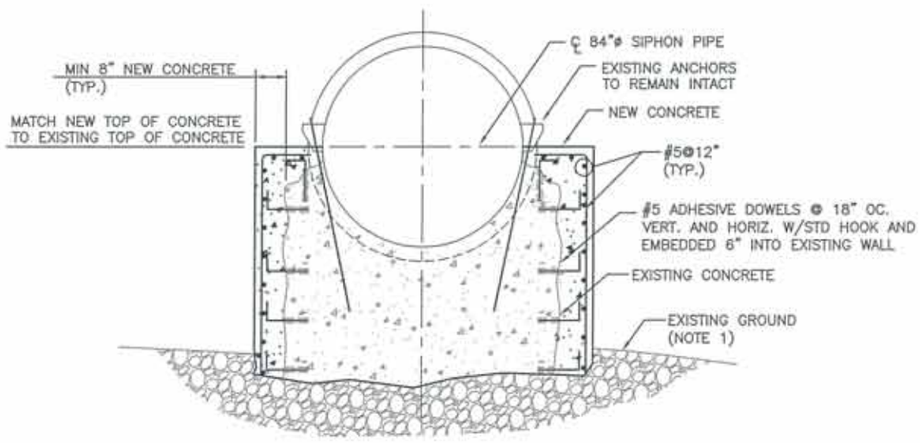


SECTION A

THRUST BLOCKS 2 & 4

0 2 4 8

SCALE IN FEET



SECTION C

THRUST BLOCK 3

0 2 4 8

SCALE IN FEET

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA
SIPHON SUPPORT SYSTEM
STABILIZATION PROJECT

FINAL DESIGN

REGISTERED PROFESSIONAL ENGINEER
MICHAEL S. LEDESMA
36589
6/27/12

ISSUED FOR BIDDING	6/27/12	MSL
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12

URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

THRUST BLOCK MODIFICATIONS

S-4

SHEET 5 OF 6

D-7

DRAWING PATH: N:\Projects\22241248_Santa_Maria_Conf\eWSub_009.0_Constr_Design\Santa Maria Siphon\Siphon Support Repair.dwg

GENERAL NOTES

UNLESS OTHERWISE SHOWN ON THE REINFORCEMENT DESIGN DRAWINGS, THE DETAILS AND NOTES SHOWN ARE TYPICAL FOR ALL REINFORCEMENT DRAWINGS.

ABBREVIATIONS

BF = BOTTOM FACE
TF = TOP FACE
NF = NEAR FACE
FF = FAR FACE
EF = EACH FACE
IF = INSIDE FACE
OF = OUTSIDE FACE
CJ = CONSTRUCTION JOINT
OCJ = OPTIONAL CONSTRUCTION JOINT
CTJ = CONTROL JOINT

CRJ = CONTRACTION JOINT
EJ = EXPANSION JOINT
BR = BOTTOM ROW
TR = TOP ROW
NR = NEAR ROW
FR = FAR ROW
ER = EACH ROW
IR = INSIDE ROW
OR = OUTSIDE ROW
MR = MIDDLE ROW

BL = BOTTOM LAYER
TL = TOP LAYER
ML = MIDDLE LAYER
NS = NEAR SIDE
FS = FAR SIDE
ES = EACH SIDE
EW = EACH WAY
EC = EACH CORNER
L_d = DEVELOPMENT LENGTH
d_b = NOMINAL DIAMETER OF REINFORCING BAR

SPC. = SPACE OR SPACES
EQ. SPC. = EQUALLY SPACED, EQUAL SPACES
UV = UNIFORMLY VARYING LENGTHS OF BARS BETWEEN LENGTHS SHOWN
CL. = CLEAR
CTR. = CENTER OR CENTERS

SYMBOLS

○—— AN OPEN CIRCLE AT THE END OF A BAR INDICATES A BEND WITH THE BAR TURNED AWAY FROM THE OBSERVER.

●—— A CLOSED CIRCLE AT THE END OF A BAR INDICATES A BEND WITH THE BAR TURNED TOWARDS THE OBSERVER.

SPLICES SHOWN THUS =\—— INDICATE A LAPPED SPLICE, NOT A BEND IN THE BAR.

DIMENSIONS

DIMENSIONS BETWEEN BARS ARE TO THE CENTERLINE OF THE BARS UNLESS OTHERWISE SHOWN. CLEAR COVER DIMENSIONS ARE MARKED "CL".

COVER

PLACE THE REINFORCEMENT SO THAT THE CLEAR DISTANCE BETWEEN FACE OF CONCRETE AND NEAREST REINFORCEMENT IS 1 1/2" FOR #5 BARS AND SMALLER, PROVIDE 3" CLEAR DISTANCE FROM FACE OF CONCRETE FOR ALL BARS WHEN THE CONCRETE IS PLACED AGAINST EARTH OR ROCK. CLEAR DISTANCE IS THE DESIGN DIMENSION LINE. REINFORCEMENT PARALLELING CONSTRUCTION JOINTS SHALL HAVE A MINIMUM OF 2" CLEAR COVER.

BENT BARS:

UNLESS OTHER RADIUS BENDS ARE INDICATED ON THE DRAWINGS, ALL REINFORCEMENT REQUIRING BENDING SHALL BE BENT AROUND A PIN HAVING THE FOLLOWING DIAMETER:

TABLE 1

PIN DIAMETER IN INCHES

BAR NO.	3	4	5	6	7	8	9	10	11
STANDARD BENDS	2 1/4	3	3 3/4	4 1/2	5 1/4	6	9 1/2	10 3/4	12
STIRRUP AND TIE BENDS	1 1/2	2	2 1/2	4 1/2	5 1/4	6	–	–	–

REINFORCEMENT TABLE

f'_c=4000 psi f_y=60,000 psi

BAR SIZE #	DEVELOPMENT LENGTH (Ld) (INCHES)		LENGTH OF LAPPED SPLICE (INCHES)	
	OTHER BARS	TOP BARS*	OTHER BARS	TOP BARS*
3	12	12	16	16
4	12	15	16	20
5	14	18	18	23
6	17	22	22	29
7	25	33	33	42
8	28	36	36	48
9	32	42	42	55
10	38	49	49	65
11	47	61	61	79

*TOP BARS ARE HORIZONTAL BARS IN BEAMS AND SLABS SO PLACED THAT MORE THAN 12" OF CONCRETE IS CAST IN THE MEMBER BELOW THE BAR.

REINFORCEMENT DOWELS:

DOWELS INDICATED ON THE DRAWING, SUCH AS #8 (d), SHALL BE EMBEDDED A LENGTH EQUAL TO L_d AND SHALL HAVE A PROJECTION EQUAL TO THAT REQUIRED FOR TOP SPLICING TO A BAR OF THE SAME DIAMETER.

ACCESSORIES:

BAR SUPPORTS, SPACERS, AND OTHER ACCESSORIES ARE NOT SHOWN ON THE DRAWINGS. THE RECOMMENDATIONS OF THE ACI DETAILING MANUAL--1988, OR OTHER APPROVED SUPPORTING SYSTEM MAY BE USED.

REFERENCE CODE:

UNLESS OTHERWISE SHOWN, FOLLOW THE RECOMMENDATIONS ESTABLISHED BY THE AMERICAN CONCRETE INSTITUTE'S "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES, ACI 315".

NOTES TO DETAILERS:

SPLICE LENGTHS SHOWN ON THE TABLE ON THIS DRAWING ARE FOR CLASS B SPLICES IN ACCORDANCE WITH ACI 318-08. SPLICES OR DEVELOPMENT LENGTHS OTHER THAN THOSE SHOWN IN THE TABLES MUST BE DETAILED ON THE REINFORCEMENT DESIGN DRAWINGS.

SPLICES:

THE MINIMUM LENGTH OF LAP FOR SPLICING PARALLEL BARS SHALL BE GIVEN IN THE APPLICABLE TABLE (REINFORCEMENT TABLE). SPLICES SHALL BE STAGGERED TO GIVE 24 INCHES CLEAR BETWEEN ENDS OF ADJACENT SPLICES. BARS SPLICED BY NONCONTACT LAP SPLICES SHALL NOT BE SPACED TRANSVERSELY FARTHER APART THAN ONE--FIFTH THE REQUIRED LAP SPLICE LENGTH, NOR 6 IN. WHEN REINFORCING BARS OF DIFFERENT SIZE ARE TO BE SPLICED, THE LENGTHS OF LAP SHALL BE GOVERNED BY THE SMALLER DIAMETER BAR. SPLICES ARE TO BE MADE SO THAT THE REQUIRED CLEAR DISTANCES TO FACE OF CONCRETE WILL BE MAINTAINED.

PLACING:

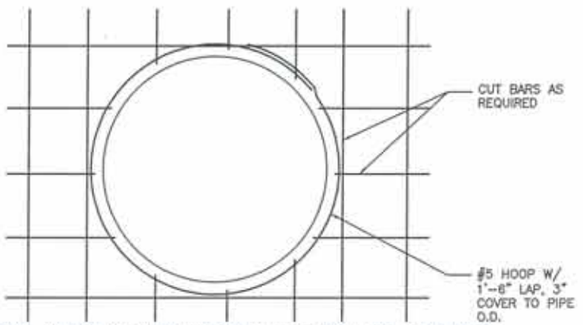
REINFORCEMENT AT SMALL OPENINGS (MAX. 1'-5") IN WALLS AND SLABS MAY BE SPREAD APART NOT MORE THAN 1.5 TIMES THE BAR SPACING. REINFORCEMENT MAY BE ADJUSTED LATERALLY TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1" BETWEEN THE REINFORCEMENT AND KEYS, WATERSTOPS, ANCHOR BOLTS, FORM TIES, CONDUITS AND OTHER EMBEDDED MATERIALS. IN HEAVILY REINFORCED AREAS, RELOCATION OF THE EMBEDDED MATERIAL MUST BE CONSIDERED. WHEN BARS ARE BENT DUE TO OFFSETS LESS THAN 3" DEEP, THE SLOPE OF THE INCLINED PORTION MUST NOT EXCEED 6 TO 1. REINFORCEMENT PARALLEL TO ANCHOR BOLTS OR OTHER EMBEDDED MATERIAL SHALL BE PLACED TO MAINTAIN A CLEAR DISTANCE OF AT LEAST 1.33 TIMES THE MAXIMUM SIZE AGGREGATES.

SPACING:

THE FIRST AND LAST BARS IN WALLS AND SLABS, STIRRUPS IN BEAMS, AND TIES IN COLUMNS ARE TO START AND END AT A MAXIMUM OF ONE HALF OF THE ADJACENT BAR SPACING. A MINIMUM OF $2.5d_b$ CLEAR FROM THE EDGE IS REQUIRED FOR #9, #10, AND #11 BARS IF SPLICE LENGTHS OR REDUCED DEVELOPMENT LENGTHS GIVEN IN TABLES 3-60 AND 4-60 ARE TO BE USED.

STANDARD HOOKS:

HOOKS SHALL HAVE 180° BENDS AND EXTENSIONS OF 4-BAR DIAMETERS BUT NOT LESS THAN 2-1/2" PARALLEL TO THE MAIN LEG OF THE BAR, OR 90° BENDS AND EXTENSIONS OF AT LEAST 12-BAR DIAMETERS. HOOKS FOR STIRRUP AND TIE ANCHORAGE ONLY SHALL HAVE EITHER A 90° OR 135° BEND PLUS AN EXTENSION OF AT LEAST 6-BAR DIAMETERS BUT NOT LESS THAN 2-1/2" AT THE FREE END OF THE BAR. RADIUS OF BEND TO BE AS SPECIFIED IN THE TABLE OF PIN DIAMETERS.



TYPICAL OVERLAY REINFORCING AT CIRCULAR OPENINGS

LEGEND:

DEMOLITION
NEW/EXISTING CONCRETE
EXISTING GROUND
BOULDERS, ROCK, ETC.
CENTERLINE
BURIED SIPHON
9450 CONTOUR WITH ELEVATION IN FEET
DIRECTION OF FLOW
X / XX INDICATES SECTION
X / XX INDICATES DETAIL LOCATION

SEQUENCE OF WORK

1. TEMPORARILY SUPPORT BOTH SIDES OF EXPANSION JOINTS 'A' AND 'B'. THE SUPPORTS SHALL BE SNUG-FIT AND AVOID CONCENTRATED FORCES ON THE WALL OF THE SIPHON PIPE. WEIGHT OF EMPTY PIPE IS APPROXIMATELY 230 LBS/FT.
2. PERFORM DEMOLITION WORK SHOWN ON DRAWING S-2. NOTE THAT INTERMEDIATE SUPPORTS S12 AND S13 ARE DIRECTLY CONNECTED TO THE SIPHON VIA ROLLER BEARING ASSEMBLIES AND THEREFORE COULD HAVE LOCKED IN STRESSES DUE TO SLIDING FOUNDATIONS. CARE SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF THESE SUPPORTS.
3. CONSTRUCT CONCRETE OVERLAYS SHOWN ON DRAWINGS S-3 AND S-4.
4. REMOVE TEMPORARY SUPPORTS INSTALLED IN STEP 1 AFTER CONCRETE HAS ACHIEVED STRENGTH.

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA
SIPHON SUPPORT SYSTEM
STABILIZATION PROJECT

FINAL DESIGN

COLORADO REGISTERED MICHAEL S. LEDESMA 36589 6/27/12 PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	6/27/12 DATE	MSL BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	6/27/12
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△		
△		
△		

URS PROJECT NO:	22241248
DRAWN BY:	DWG
DESIGNED BY:	JMC
CHECKED BY:	MSL
DATE CREATED:	-
PLOT DATE:	-
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

STRUCTURAL NOTES, STANDARD DETAILS, AND SEQUENCE OF WORK

S-5

SHEET 6 OF 6

D-8

URS DRAWING PATH: N:\Projects\22241248_Santa_Maria_Contract\Sub_009.0_Constr_Design\Santa Maria Siphon\STANDARD.dwg

Santa Maria Canal Cost Estimate and Drawings

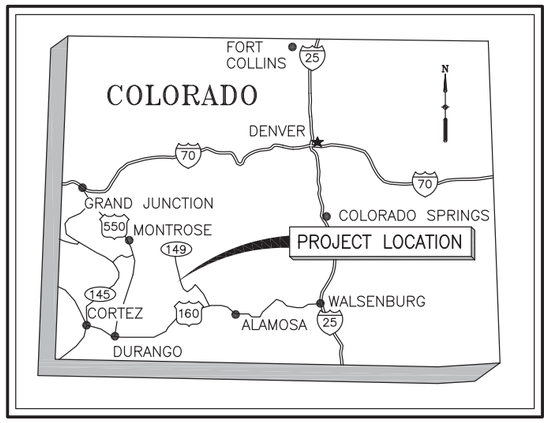
DESIGN DRAWINGS

FOR

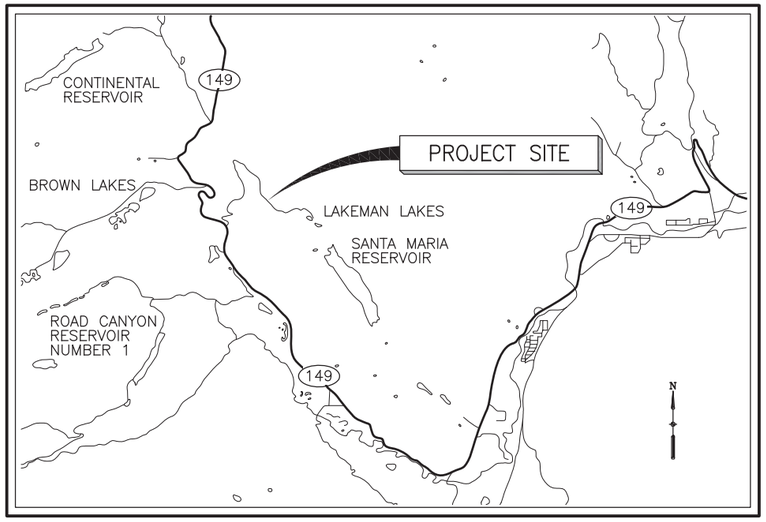
SANTA MARIA CANAL IMPROVEMENTS

PREPARED FOR

SANTA MARIA RESERVOIR COMPANY
MINERAL COUNTY, COLORADO



STATE MAP
NOT TO SCALE



VICINITY MAP
NOT TO SCALE

SHEET INDEX

SHEET NO.	DRAWING NO.	DRAWING TITLE
GENERAL		
1	G–1	COVER SHEET, LOCATION MAPS AND SHEET INDEX
CIVIL		
2	C–1	SITE PLAN, SURVEY CONTROL AND LEGEND
3	C–2	GENERAL PLAN OF MODIFICATIONS AND DEMOLITION PLAN
4	C–3	NEW 42" BYPASS PIPE PLAN AND PROFILE STA 100+00 THRU 113+00
5	C–4	NEW 42" BYPASS PIPE PLAN AND PROFILE STA 113+00 THRU 124+04
6	C–5	NEW 42" BYPASS PIPE DETAILS
7	C–6	CANAL LINER PLAN & PROFILE STA 35+50 TO 46+50
8	C–7	CANAL LINER PLAN & PROFILE STA 46+50 TO 59+00
9	C–8	CANAL LINER DETAILS
10	C–9	CROSS SECTIONS STA 36+00 TO 47+50
11	C–10	CROSS SECTIONS STA 47+50 TO 58+00
12	C–11	CANAL CHECK STRUCTURES

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA CANAL IMPROVEMENTS

FINAL DESIGN

COLORADO LICENSED
JOSEPH PATRICK DONNELLY
40212
5/18/12
PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	5/18/12 (DATE)	JPD (BY)
ISSUED FOR CONSTRUCTION	(DATE)	(BY)

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	5/18/12

URS PROJECT NO:	22241248
DRAWN BY:	BB
DESIGNED BY:	JD
CHECKED BY:	TM
DATE CREATED:	4/1/2012
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SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

COVER SHEET, LOCATION MAPS AND SHEET INDEX

G-1

SHEET 1 OF 12 D-11

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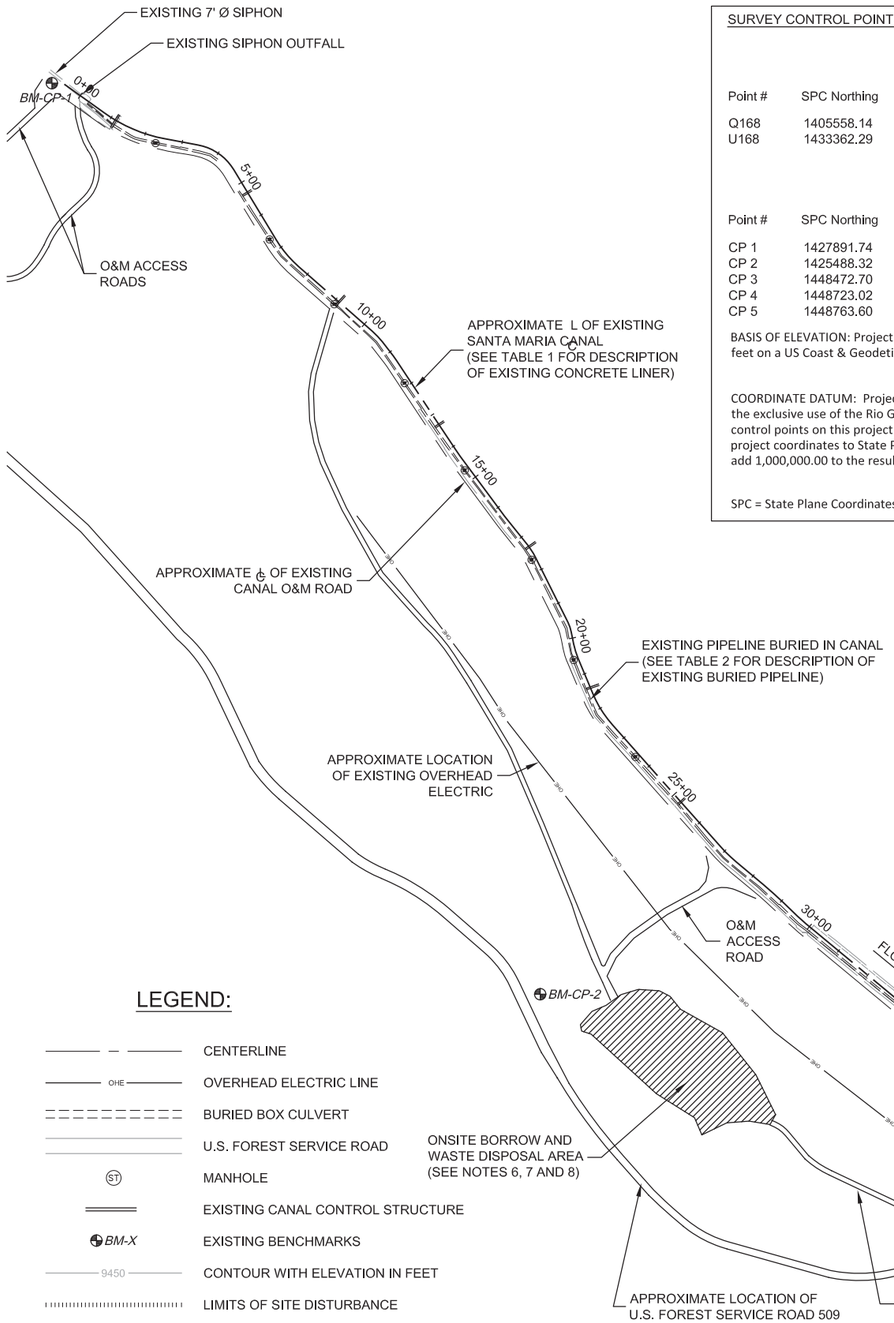

LEGEND:

- CENTERLINE
- OHE — OVERHEAD ELECTRIC LINE
- BURIED BOX CULVERT
- U.S. FOREST SERVICE ROAD
- (ST) MANHOLE
- EXISTING CANAL CONTROL STRUCTURE
- BM-X EXISTING BENCHMARKS
- 9450 CONTOUR WITH ELEVATION IN FEET
- LIMITS OF SITE DISTURBANCE
- DIRECTION OF FLOW
- X / XX INDICATES SECTION
- X / XX INDICATES DETAIL LOCATION

SURVEY CONTROL POINTS AND DESCRIPTION

Point #	SPC Northing	SPC Easting	Project Coordinate Northing	Project Coordinate Easting	NAVD88 Elevation	Latitude	Longitude	Height	Description
Q168	1405558.14	2532944.55	405772.31	533225.98	9005.24	37ø46'09.75942"N	107ø06'57.31268"W	8954.70	Found USC&GS Brass Cap set in top of concrete monument
U168	1433362.29	2523378.55	433591.14	523654.93	9970.01	37ø50'42.95235"N	107ø09'02.55468"W	9919.72	Found USC&GS Brass Cap set in top of concrete monument

Point #	SPC Northing	SPC Easting	Project Coordinate Northing	Project Coordinate Easting	NAVD88 Elevation	Latitude	Longitude	Height	Description
CP 1	1427891.74	2529642.77	428117.69	529922.46	9717.98	37ø49'49.96284"N	107ø07'43.27871"W	9667.61	Set 18" #5 Rebar with a 1.5" Aluminum Cap stamped "CONTROL POINT CP-1"
CP 2	1425488.32	2530931.16	425713.01	531211.53	9664.85	37ø49'26.42666"N	107ø07'26.70053"W	9614.45	Set 18" #5 Rebar with a 1.5" Aluminum Cap stamped "CONTROL POINT CP-2"
CP 3	1448472.70	2507737.58	448709.53	508005.70	10308.60	37ø53'09.53924"N	107ø12'20.96506"W	10258.78	Set 18" #5 Rebar with a 1.5" Aluminum Cap stamped "CONTROL POINT CP-3"
CP 4	1448723.02	2507534.83	448959.98	507802.84	10291.05	37ø53'11.97704"N	107ø12'23.55080"W	10241.23	Set 18" #5 Rebar with a 1.5" Aluminum Cap stamped "CONTROL POINT CP-4"
CP 5	1448763.60	2507257.02	449000.58	507524.89	10346.88	37ø53'12.32792"N	107ø12'27.02498"W	10297.06	Set 18" #5 Rebar with a 1.5" Aluminum Cap stamped "CONTROL POINT CP-5"

BASIS OF ELEVATION: Project elevations are derived from GPS observations, using GEOID09, based on a NAVD88 elevation of 9970.01 feet on a US Coast & Geodetic Survey Benchmark disk U 168 (Brass Cap set in concrete). No differential levels were performed.

COORDINATE DATUM: Project coordinates are modified Colorado State Plane South Zone (0503) NAD 83(2007) coordinates, and are for the exclusive use of the Rio Grande Reservoir and Ditch Company, and are considered project coordinates only. Coordinates for the control points on this project were brought to ground using the inverse of the Combined Scale factor (1/0.999472205). To convert project coordinates to State Plane, multiply the Project Northing and Easting values by the Combined Scale Factor (0.999472205), then add 1,000,000.00 to the resultant Northing value, and 2,000,000.00 to the resultant Easting value.

SPC = State Plane Coordinates

TABLE 1 - EXISTING CANAL DESCRIPTION

STA	DESCRIPTION OF CONCRETE LINER
0+00 TO 0+25	ENTIRE CANAL
0+25 TO 1+20	RIGHT BANK
1+20 TO 12+60	NO LINER
12+60 TO 16+80	RIGHT BANK
16+80 TO 20+50	NO LINER
20+50 TO 30+08	RIGHT BANK
30+08 TO 34+78	ENTIRE CANAL
34+78 TO 53+00	RIGHT BANK
53+00 TO 55+60	NO LINER
55+60 TO 72+00	RIGHT BANK

TABLE 2 - EXISTING BYPASS DESCRIPTION

STA	DESCRIPTION
0+00 TO 30+08	4' CMP ENCASED IN CONCRETE
30+08 TO 44+50	4' x 5' CONCRETE BOX CULVERT (INSIDE DIMENSIONS)
44+50 TO 47+90	4' CMP ENCASED IN CONCRETE
47+90 TO 72+00	4' x 5' CONCRETE BOX CULVERT (INSIDE DIMENSIONS)

NOTES:

1. EXISTING FEATURES ARE BASED ON SURVEY CONDUCTED BY URS ON AUGUST 20, 2011 THROUGH AUGUST 15, 2011.
2. CONTRACTOR TO VERIFY COORDINATES AND ELEVATIONS OF EXISTING MONUMENTS PRIOR TO USE.
3. PERFORM UNDERGROUND UTILITY LOCATES PRIOR TO START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE TO RESTORE THE U.S. FOREST SERVICE ROAD AND BRIDGE TO PRE-CONSTRUCTION CONDITIONS AT THE END OF CONSTRUCTION.
5. UNLINED AREAS OF THE CANAL MAY BE USED FOR CONSTRUCTION ACCESS. NO EQUIPMENT SHALL BE ALLOWED TO OPERATE ON THE EXISTING BOX CULVERT, EXISTING LINED CANAL SECTIONS, OR NEW LINED CANAL SECTIONS.
6. STRIPPING AND CLEARING OF THE CONSTRUCTION STAGING AND STOCKPILE AREAS AND DISTURBED PORTIONS OF THE ONSITE BORROW AND WASTE DISPOSAL AREAS IS REQUIRED.
7. DISPOSAL OF EXCAVATED WASTE SHALL BE PLACED WITHIN A 0.5 ACRE FOOTPRINT WITHIN THE ONSITE WASTE DISPOSAL AREA AT DIRECTION OF THE OWNER.
8. CONTRACTOR TO PROVIDE POSITIVE DRAINAGE IN FINAL GRADES.

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA CANAL IMPROVEMENTS

FINAL DESIGN

COLORADO LICENSED JOSEPH PATRICK DONNELLY 40212 5/18/12 PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	5/18/12 DATE	JPD BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	5/18/12

URS PROJECT NO:	22241248
DRAWN BY:	BB/PRH
DESIGNED BY:	
CHECKED BY:	
DATE CREATED:	4/1/2012
PLOT DATE:	
SCALE:	AS SHOWN
ACAD VER:	2012

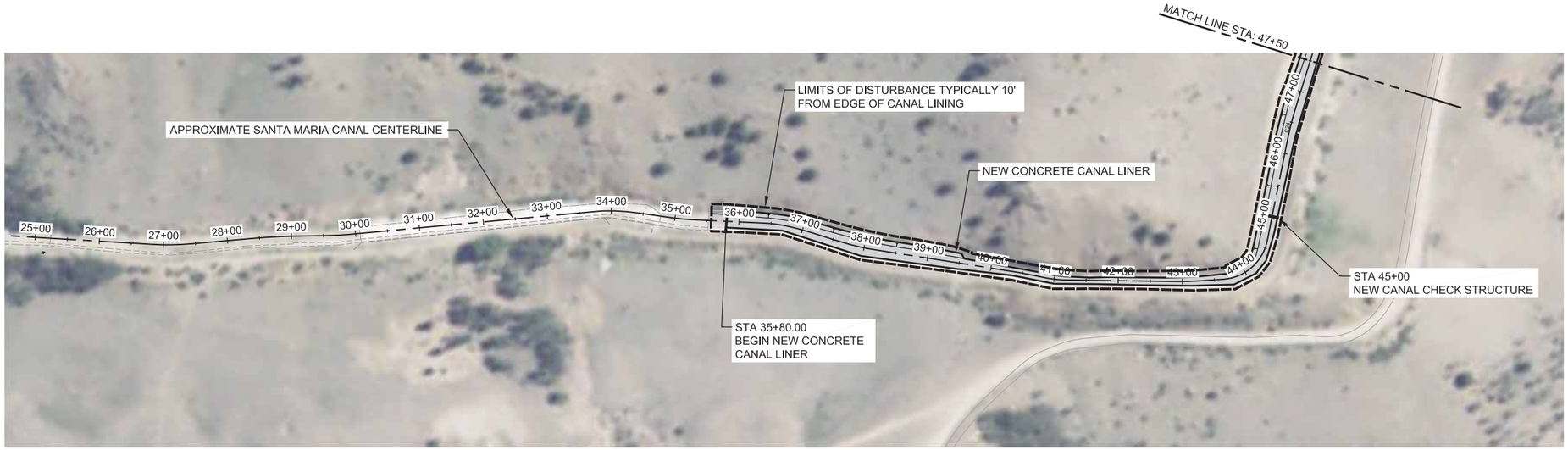
SHEET TITLE

SITE PLAN, SURVEY CONTROL AND LEGEND

C-1

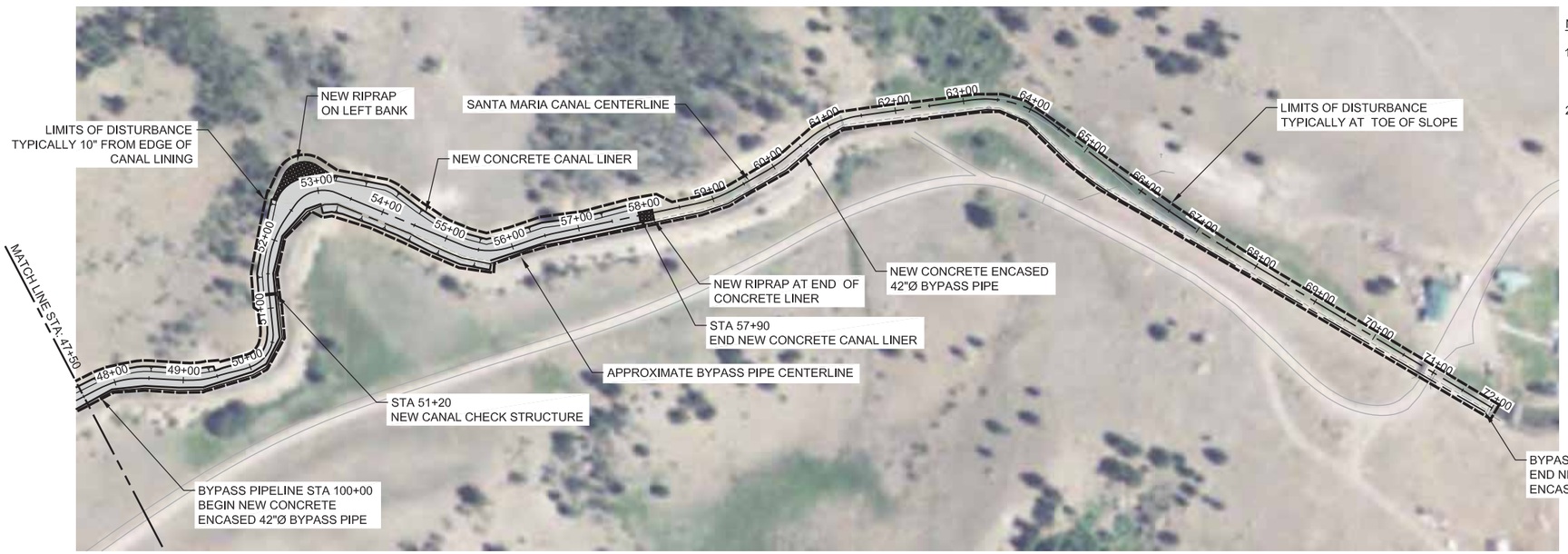
SHEET 2 OF 12 D-12

URS DRAWING PATH: N:\Projects\22241248_Santa_Maria_Contline\Sub_009\0_Constr_Design\Santa Maria Canal\Plan_Sheets\Survey Control.dwg



GENERAL PLAN OF MODIFICATIONS

DEMOLITION PLAN	
STATION	DESCRIPTION
BYPASS PIPE STA 100+00 TO 124+04	DEMOLISH AND REMOVE TOP SLAB OF EXISTING BOX CULVERT (SEE DETAIL1/C-5) (SEE NOTE 2)
46+85	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
49+28	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
50+24	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
51+05	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
52+10	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
56+12	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)
57+85	DEMOLISH AND REMOVE CANAL CONTROL STRUCTURE (SEE NOTES 1 AND 2)



GENERAL PLAN OF MODIFICATIONS

NOTES

1. EXISTING CANAL CONTROL STRUCTURES SHALL BE DEMOLISHED AND REMOVED TO 3-INCHES (MIN.) BELOW GRADE OF NEW CONCRETE LINER.
2. ALL DEMOLISHED MATERIALS FROM EXISTING CONCRETE STRUCTURES SHALL BE HAULED AND DISPOSED OF OFFSITE.

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FINAL DESIGN

COLORADO LICENSED
JOSEPH PATRICK DONNELLY
40212
5/18/12
PROFESSIONAL ENGINEER

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ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

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DESIGNED BY:	
CHECKED BY:	
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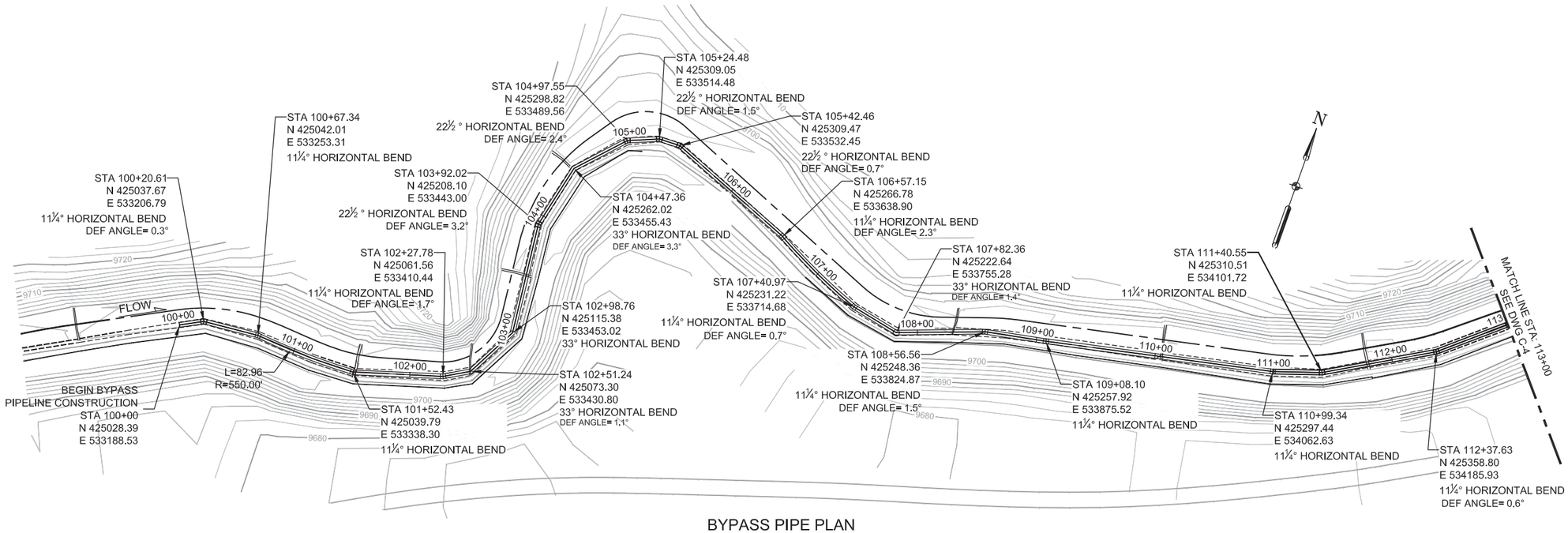
PLOT DATE:	
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

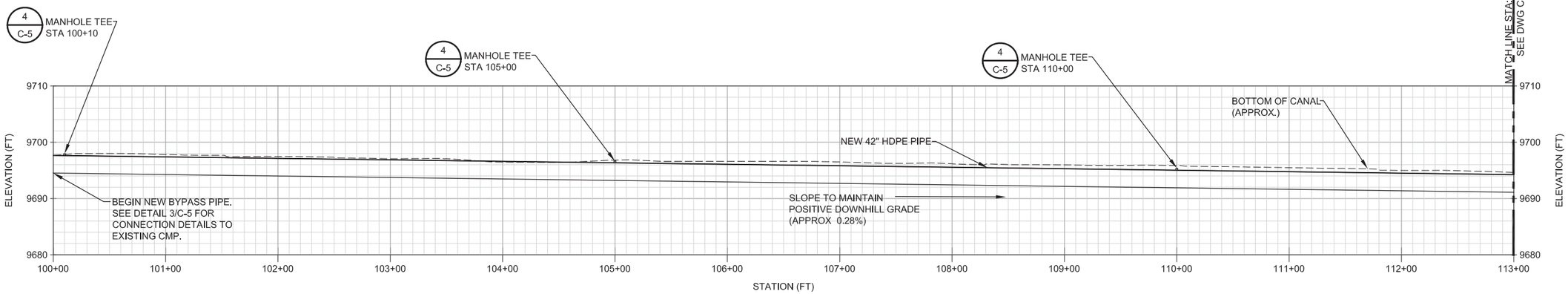
GENERAL PLAN OF MODIFICATIONS AND DEMOLITION PLAN

C-2
SHEET 3 OF 12 D-13

DRAWING PATH: N:\Projects\22241248_Santa_Maria_Conf\e\Sub_000\0_Constr_Design\Santa Maria Canal\Plan_Sheets\Plan of Modifications.dwg



BYPASS PIPE PLAN



BYPASS PIPE PROFILE

NOTES

1. NEW BYPASS PIPE TO BE INSTALLED INSIDE EXISTING BOX CULVERT. SEE SHEET C-5 FOR INSTALLATION DETAILS.
2. NEW BYPASS PIPE SHALL FOLLOW ALIGNMENT AND GRADE OF EXISTING BOX CULVERT, FITTINGS AND PIPE LENGTHS SHOWN HERE ARE TO BE CONFIRMED IN THE FIELD.
3. CONCRETE CANAL LINER NOT SHOWN FOR CLARITY.

0 10 20 30
VERTICAL SCALE IN FEET

0 50 100 150
HORIZONTAL SCALE IN FEET

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CHECKED BY:	
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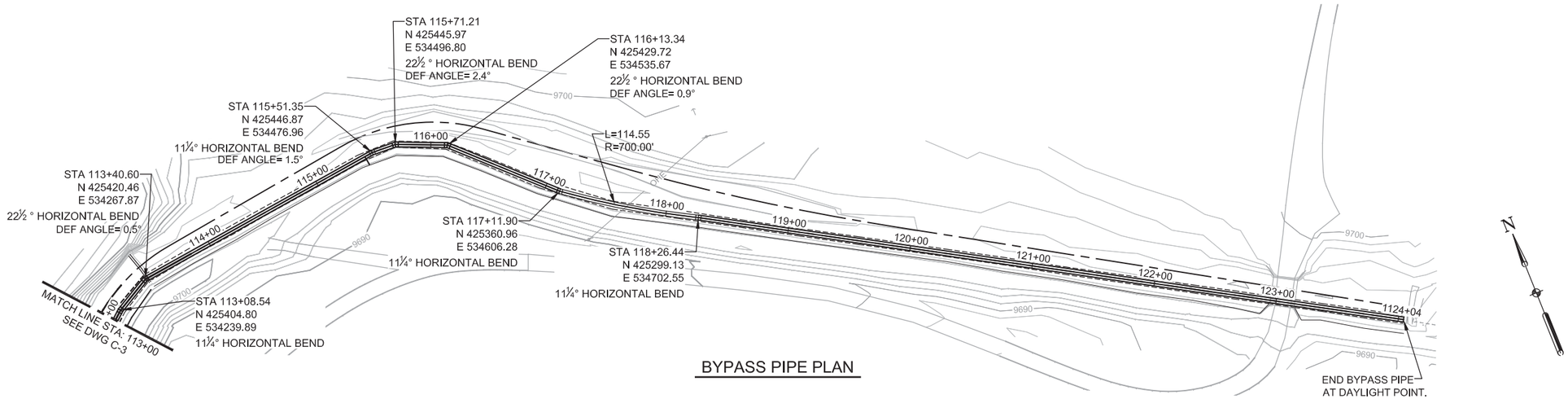
ACAD VER:	2012

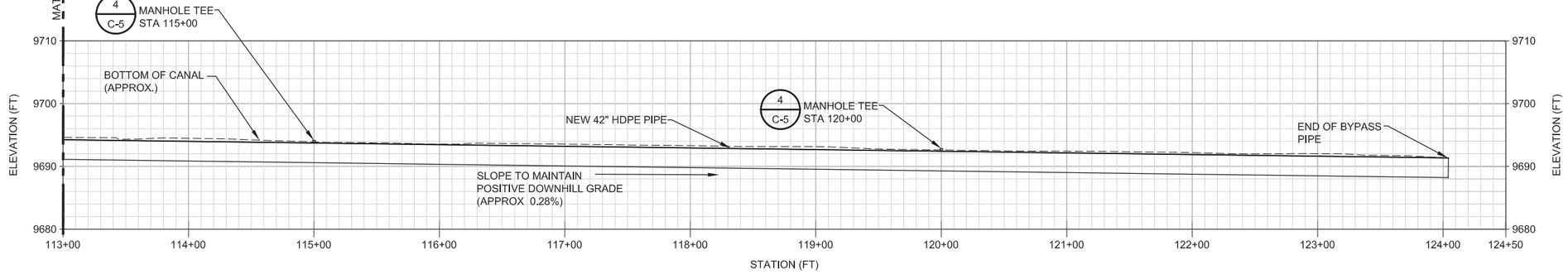
SHEET TITLE

NEW 42" BYPASS PIPE
PLAN AND PROFILE
STA 100+00 TO 113+00

C-3
SHEET 4 OF 12 D-14



BYPASS PIPE PLAN



BYPASS PIPE PROFILE

NOTES

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2. NEW BYPASS PIPE SHALL FOLLOW ALIGNMENT AND GRADE OF EXISTING BOX CULVERT, FITTINGS AND PIPE LENGTHS SHOWN HERE ARE TO BE CONFIRMED IN THE FIELD.
3. CONCRETE CANAL LINER NOT SHOWN FOR CLARITY.

0 10 20 30
VERTICAL SCALE IN FEET

0 50 100 150
HORIZONTAL SCALE IN FEET

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5/18/12
PROFESSIONAL ENGINEER

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ISSUED FOR CONSTRUCTION	(DATE)	(BY)

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CHECKED BY:	
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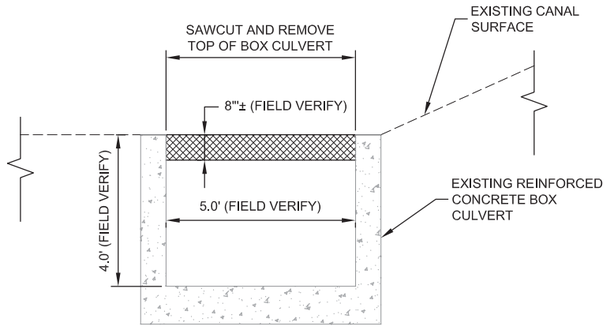
ACAD VER:	2012

SHEET TITLE

NEW 42" BYPASS PIPE PLAN AND PROFILE STA 113+00 TO 124+04

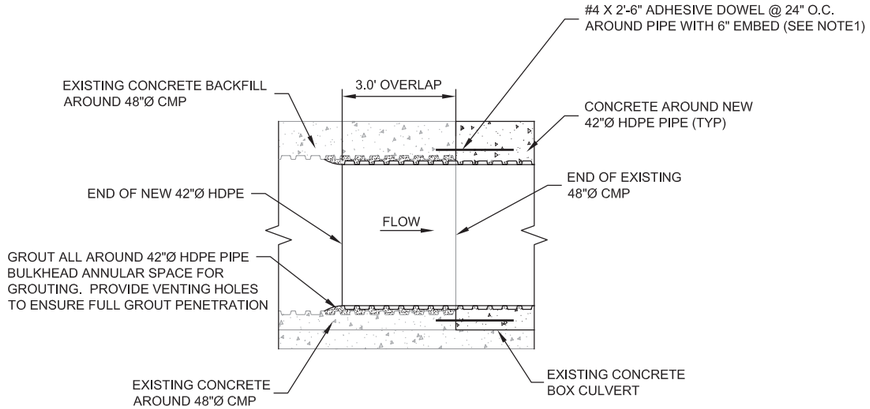
C-4
SHEET 5 OF 12 D-15

DRAWING PATH: N:\Projects\22241248_Santa_Maria_Contline\Sub_0093.0_Constr_Design\Santa Maria Canal\Plan_Sheets\CULVERT Plan and Profile.dwg



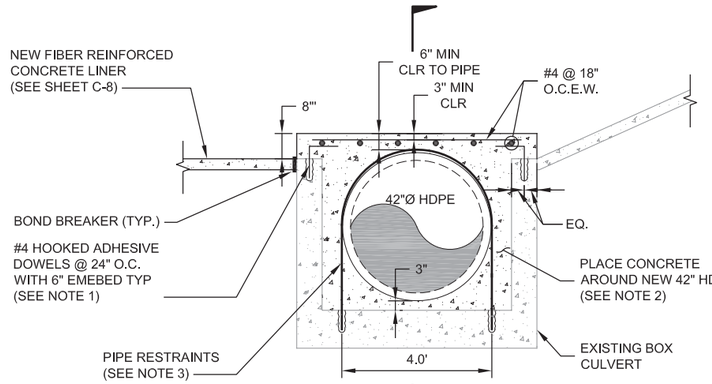
1 C-3/C-4 DEMOLITION SECTION

1" = 2'



A C-3 CONNECTION TO EXISTING 48"Ø CMP SECTION

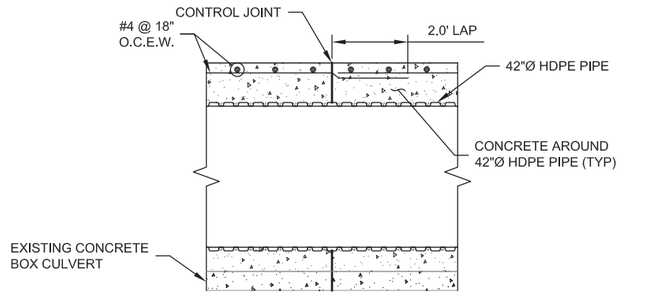
1" = 2'



A - SEE DETAIL FOR CONNECTION TO EXISTING 48"Ø CMP (A C-5)

2 C-3/C-4 MODIFICATION SECTION

1" = 2'

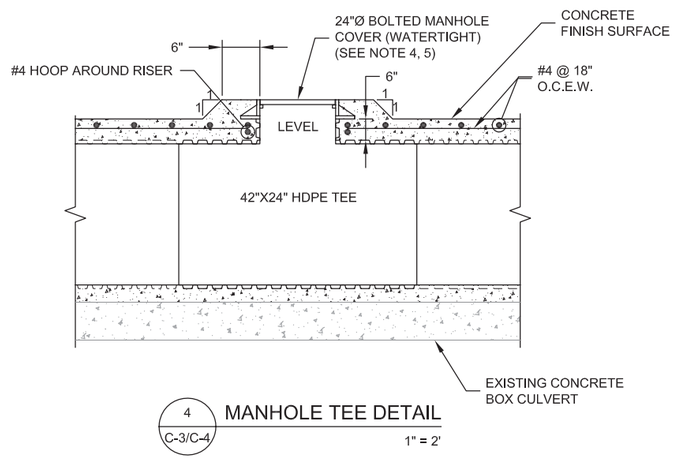


B C-3/C-4 CONCRETE ENCASEMENT CONTROL JOINT SECTION

1" = 2'

NOTES

1. USE HILTI HY 150 EPOXY, OR APPROVED EQUAL. INSTALL PER MANUFACTURER'S RECOMMENDATION.
2. CONCRETE ENCASEMENT CONTROL JOINTS TO BE SPACED AT 20' O.C. MAXIMUM, AND AT EXISTING JOINTS IN BOX CULVERT.
3. PIPE RESTRAINT SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DESIGNING AND IMPLEMENTING THE PIPE RESTRAINTS. PIPE RESTRAINTS TO BE SPACED A MAXIMUM OF 10' O.C.
4. TRIM 24" RISER 6" (LEVEL) FROM O.D. OF 42" SECTION OF TEE TO ACCOMMODATE MANHOLE COVER.
5. USE NEENAH R-1916 WATERTIGHT MANHOLE FRAME AND BOLTED LID, OR APPROVED EQUAL.



4 C-3/C-4 MANHOLE TEE DETAIL

1" = 2'

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SANTA MARIA RESERVOIR COMPANY

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FINAL DESIGN

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5/18/12
PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	5/18/12	JPD
	DATE	BY
ISSUED FOR CONSTRUCTION	DATE	BY

REVISIONS

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ACAD VER:	2012

SHEET TITLE

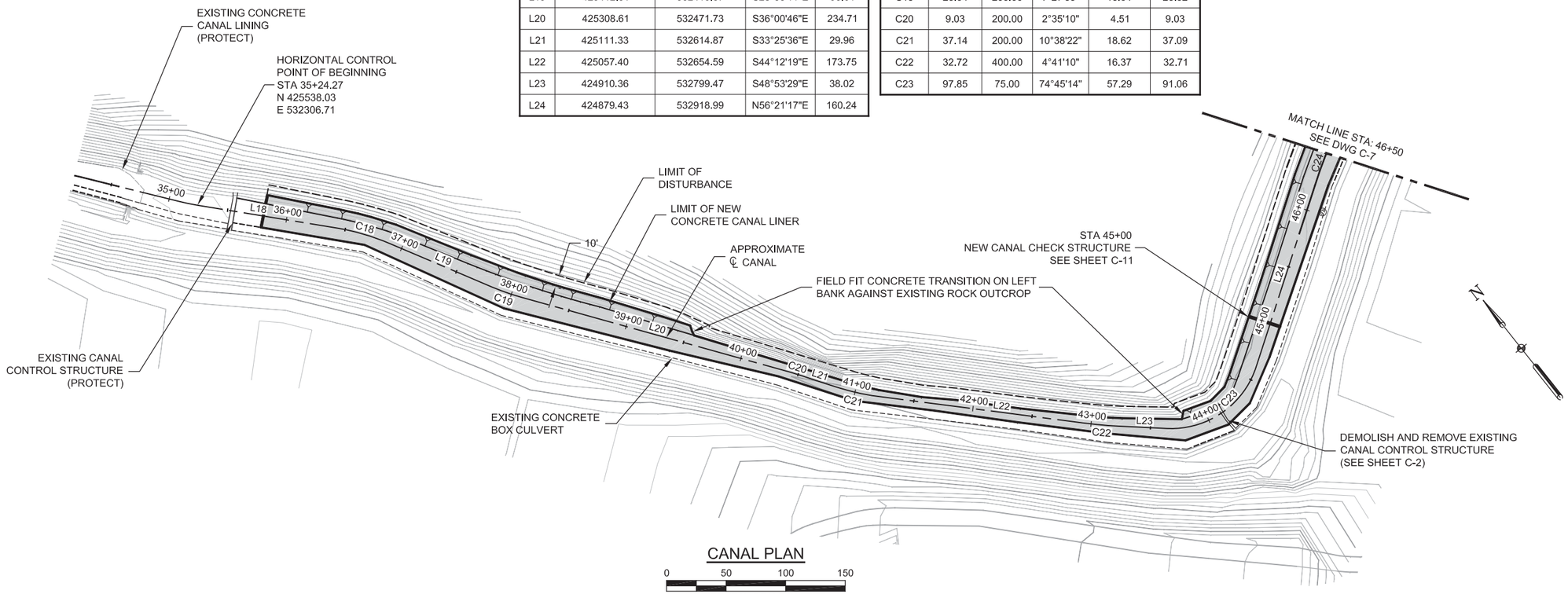
NEW 42" BYPASS PIPE DETAILS

C-5

SHEET 6 OF 12 D-16

LINE TABLE				
LINE	BEGIN NORTHING	BEGIN EASTING	BEARING	LENGTH
L18	425538.03	532306.71	S42°18'05"E	117.24
L19	425412.31	532413.37	S28°33'11"E	93.01
L20	425308.61	532471.73	S36°00'46"E	234.71
L21	425111.33	532614.87	S33°25'36"E	29.96
L22	425057.40	532654.59	S44°12'19"E	173.75
L23	424910.36	532799.47	S48°53'29"E	38.02
L24	424879.43	532918.99	N56°21'17"E	160.24

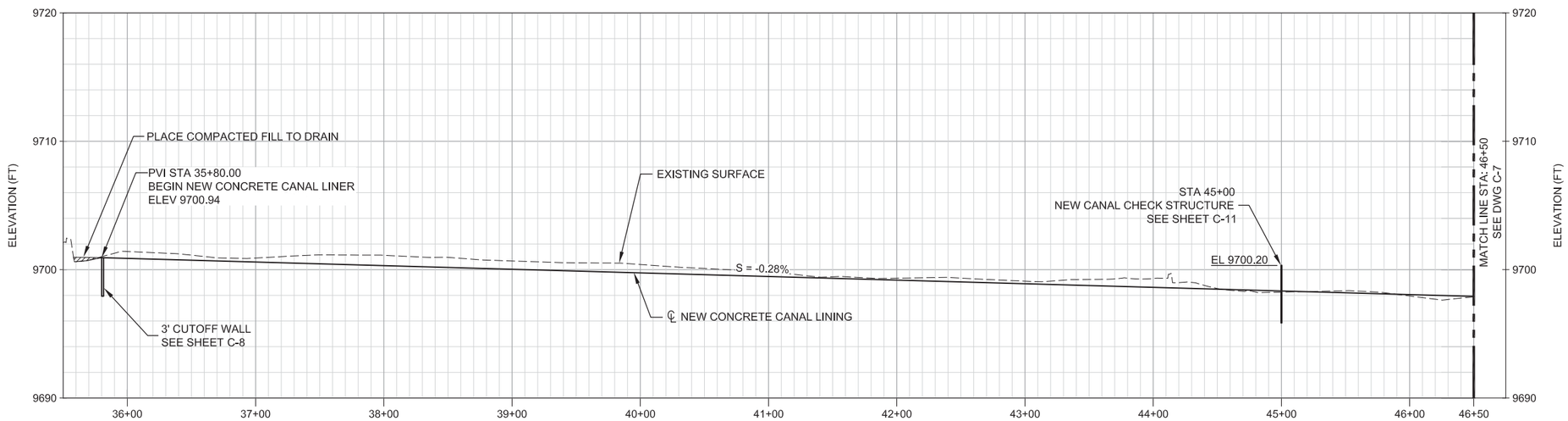
CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	TANGENT	CHORD
C18	47.99	200.00	13°44'54"	24.11	47.88
C19	26.04	200.00	7°27'35"	13.04	26.02
C20	9.03	200.00	2°35'10"	4.51	9.03
C21	37.14	200.00	10°38'22"	18.62	37.09
C22	32.72	400.00	4°41'10"	16.37	32.71
C23	97.85	75.00	74°45'14"	57.29	91.06



CANAL PLAN

0 50 100 150

HORIZONTAL SCALE IN FEET



CANAL PROFILE

0 5 10 15

VERTICAL SCALE IN FEET

0 50 100 150

HORIZONTAL SCALE IN FEET

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA CANAL IMPROVEMENTS

FINAL DESIGN

COLORADO LICENSED JOSEPH PATRICK DONNELLY 40212 5/18/12 PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	5/18/12 (DATE)	JPD (BY)
ISSUED FOR CONSTRUCTION	(DATE)	(BY)

REVISIONS

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CHECKED BY:	
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ACAD VER:	2012

SHEET TITLE

CANAL LINER PLAN & PROFILE STA 35+50 TO 46+50

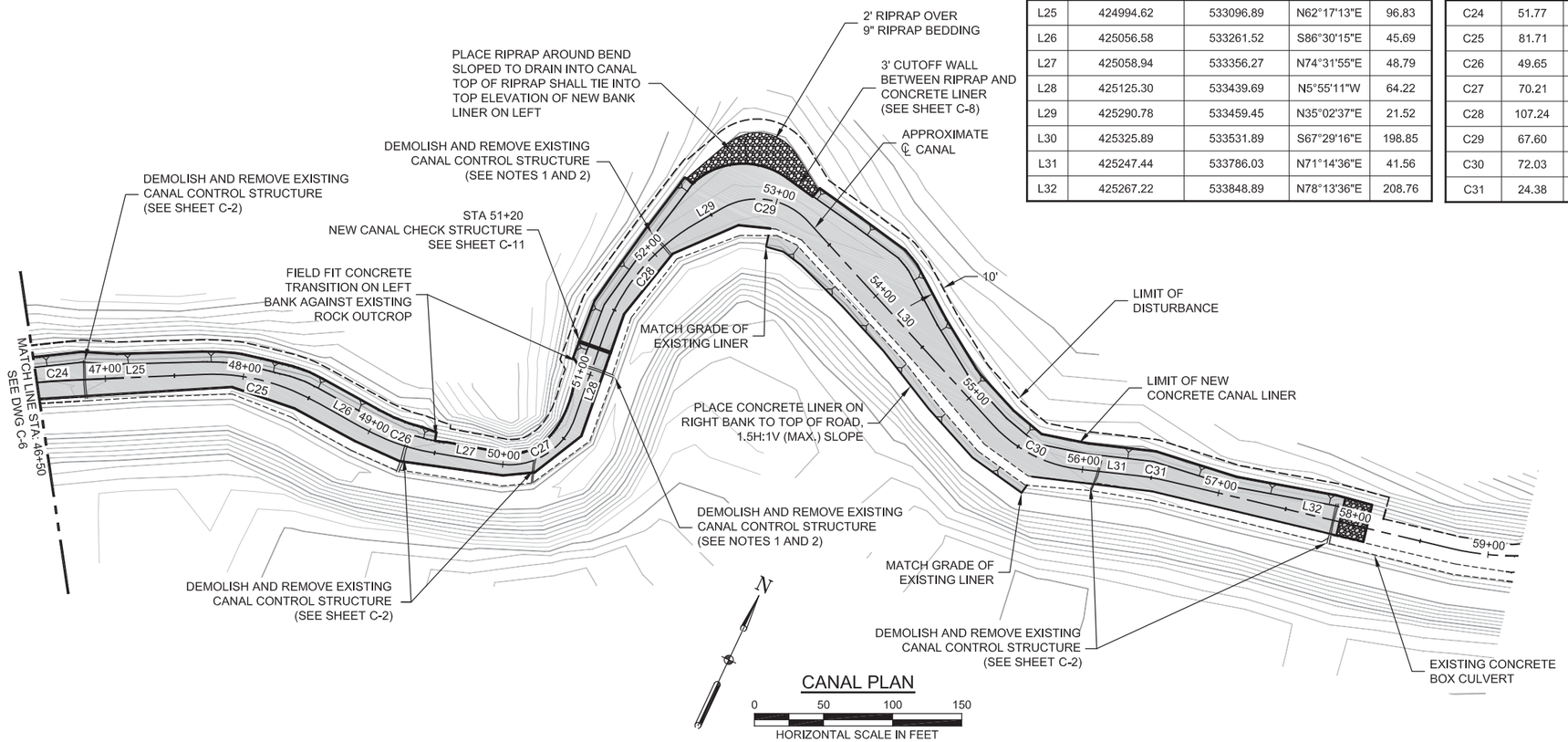
C-6

SHEET 7 OF 12 D-17

DRAWING PATH: N:\Projects\22241248_Santa_Maria_ContineSub_009.0_Constr_Design\Santa Maria Canal\Plan_Sheets\Plan and Profile.dwg

LINE TABLE				
LINE	BEGIN NORTHING	BEGIN EASTING	BEARING	LENGTH
L25	424994.62	533096.89	N62°17'13"E	96.83
L26	425056.58	533261.52	S86°30'15"E	45.69
L27	425058.94	533356.27	N74°31'55"E	48.79
L28	425125.30	533439.69	N5°55'11"W	64.22
L29	425290.78	533459.45	N35°02'37"E	21.52
L30	425325.89	533531.89	S67°29'16"E	198.85
L31	425247.44	533786.03	N71°14'36"E	41.56
L32	425267.22	533848.89	N78°13'36"E	208.76

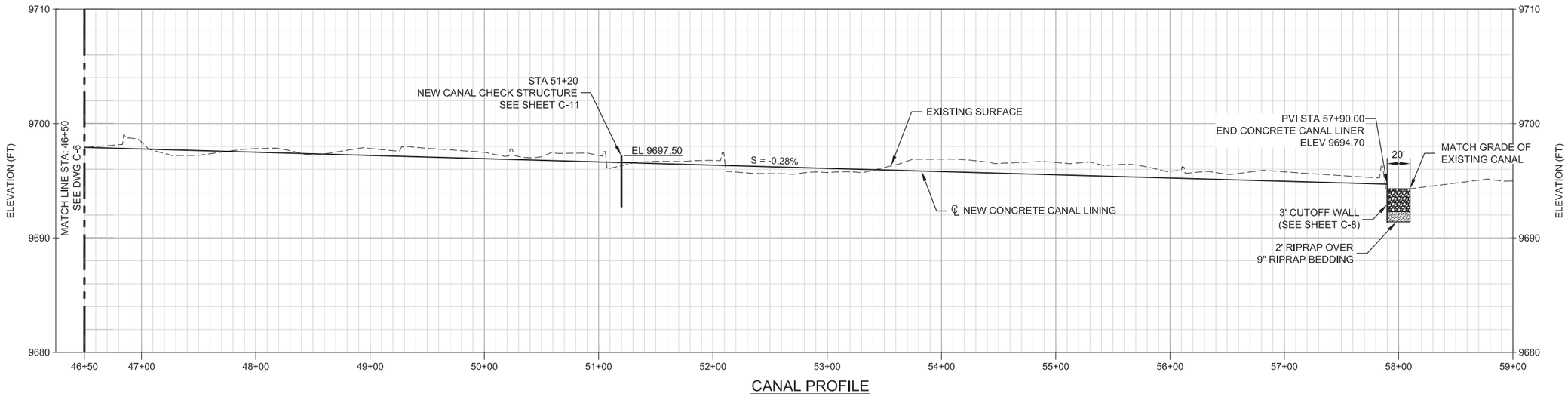
CURVE TABLE					
CURVE	LENGTH	RADIUS	DELTA	TANGENT	CHORD
C24	51.77	500.00	5°55'56"	25.91	51.75
C25	81.71	150.00	31°12'33"	41.89	80.70
C26	49.65	150.00	18°57'51"	25.05	49.42
C27	70.21	50.00	80°27'06"	42.29	64.58
C28	107.24	150.00	40°57'48"	56.03	104.97
C29	67.60	50.00	77°28'07"	40.11	62.57
C30	72.03	100.00	41°16'08"	37.66	70.48
C31	24.38	200.00	6°59'01"	12.20	24.36



CANAL PLAN

0 50 100 150

HORIZONTAL SCALE IN FEET



CANAL PROFILE

0 5 10 15

VERTICAL SCALE IN FEET

0 50 100 150

HORIZONTAL SCALE IN FEET

URS

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SANTA MARIA RESERVOIR COMPANY

SANTA MARIA CANAL IMPROVEMENTS

FINAL DESIGN

COLORADO LICENSED
JOSEPH PATRICK DONNELLY
40212
5/18/12
PROFESSIONAL ENGINEER

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ISSUED FOR CONSTRUCTION	(DATE)	(BY)

REVISIONS

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ACAD VER:	2012

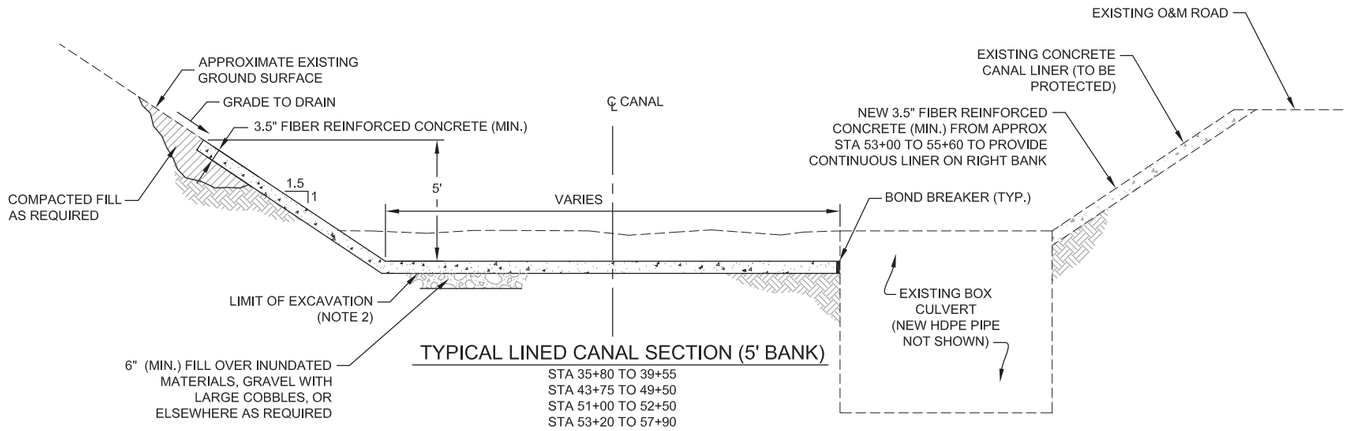
SHEET TITLE

CANAL LINER
PLAN & PROFILE
STA 46+50 TO 59+00

C-7

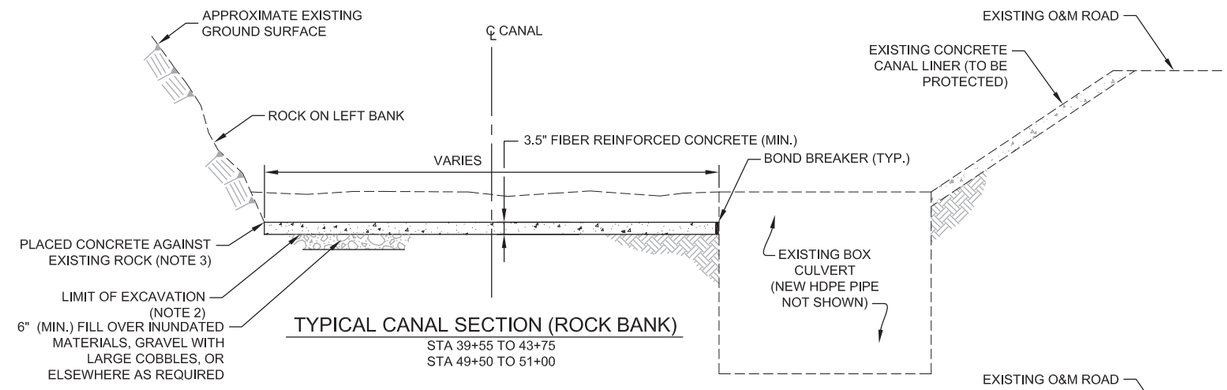
SHEET 8 OF 12 D-18

DRAWING PATH: N:\Projects\22241248_Santa_Maria_Contline\Sub_00\9.0_Constr_Design\Santa Maria Canal\Plan_Sheets\Plan and Profile.dwg



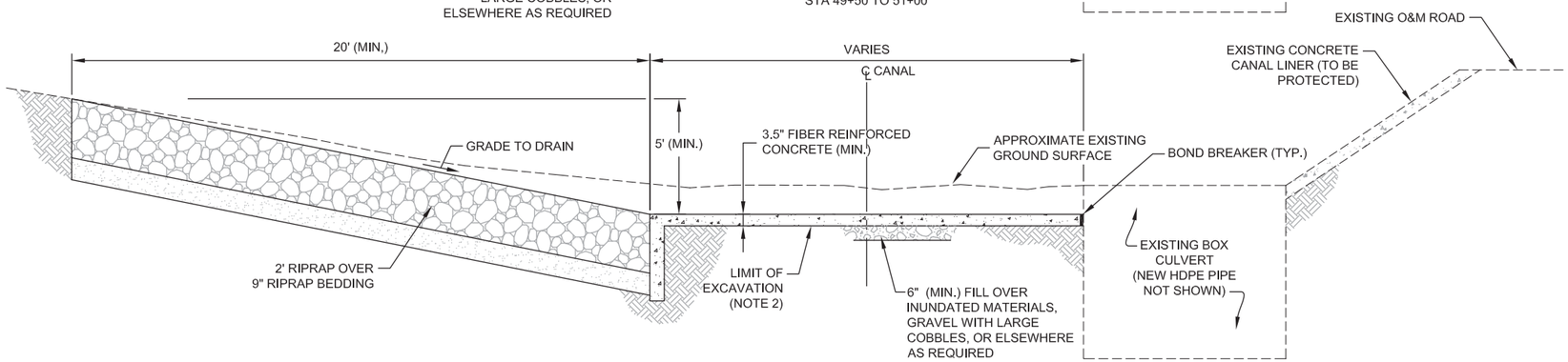
TYPICAL LINED CANAL SECTION (5' BANK)

STA 35+80 TO 39+55
STA 43+75 TO 49+50
STA 51+00 TO 52+50
STA 53+20 TO 57+90



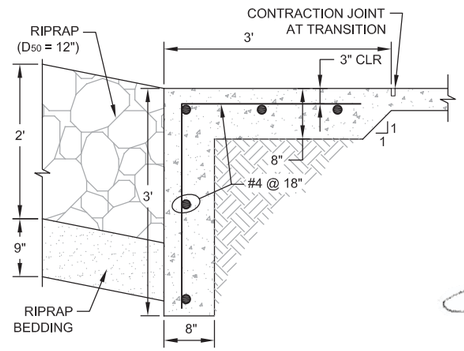
TYPICAL CANAL SECTION (ROCK BANK)

STA 39+55 TO 43+75
STA 49+50 TO 51+00



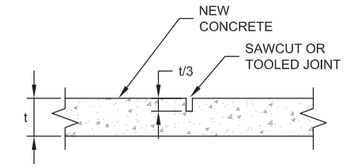
TYPICAL CANAL SECTION (RIPRAP BANK)

STA 52+50 TO 53+20



CUTOFF WALL DETAIL

1" : 1'



C / C-6 CONTRACTION JOINT DETAIL

1" = 1'

NOTES

1. CONCRETE CANAL LINER CONTRACTION JOINTS TO BE CONSTRUCTED AT A MINIMUM LONGITUDINAL SPACING OF 10'.
2. CONCRETE CANAL LINER SUBGRADE SHALL NOT CONTAIN VEGETATION, ROOTS, AND OTHER DELETERIOUS MATERIAL.
3. REMOVE ROCK PROTRUSIONS AND ANY LOOSE MATERIAL AT THE DIRECTION OF THE ENGINEER.

URS
URS Center
8181 East Tufts Avenue
Denver, Co. 80237-2637
303 694-2770 (phone)
303-694-3946 (fax)

SANTA MARIA RESERVOIR COMPANY

SANTA MARIA CANAL IMPROVEMENTS

FINAL DESIGN

COLORADO LICENSED
JOSEPH PATRICK DONNELLY
40212
5/18/12
PROFESSIONAL ENGINEER

ISSUED FOR BIDDING	5/18/12 (DATE)	JPD (BY)
ISSUED FOR CONSTRUCTION	(DATE)	(BY)

REVISIONS

NO.	DESCRIPTION	DATE
1	ISSUED FOR BID	5/18/12
2		
3		
4		
5		

URS PROJECT NO:	22241248
DRAWN BY:	PRH
DESIGNED BY:	
CHECKED BY:	
DATE CREATED:	4/27/2012
PLOT DATE:	
SCALE:	AS SHOWN
ACAD VER:	2012

SHEET TITLE

CANAL LINING DETAILS

C-8

SHEET 9 OF 12 D-19