

RECLAMATION

Managing Water in the West

Draft Environmental Assessment Wellsville-Mendon Canal Piping Project, Hyrum Project

PRO-EA-16-009

**Provo Area Office Provo, Utah
Upper Colorado Region**



**U.S. Department of the Interior
Bureau of Reclamation
Provo Area Office, Utah**

December 2015

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Draft Environmental Assessment Wellsville-Mendon Canal Piping Project, Hyrum Project

PRO-EA-16-009

Provo Area Office
Provo, Utah
Upper Colorado Region

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U.S. Department of the Interior
Bureau of Reclamation
Provo Area Office, Utah

December 2015

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Appendix 1 – Map of Hyrum-Mendon Canal Repair

Appendix 2 – Pipe Specification

Chapter 1 - Introduction

This Environmental Assessment (EA) has been prepared by the Bureau of Reclamation Provo Area Office, to assess the potential environmental impacts of piping the first 2,100 feet of the Wellsville-Mendon Canal (also known as and referred to in other documents and by other people as the Hyrum-Mendon Canal and the Wellsville-East Field Canal) from the end of the siphon downstream. As part of this effort Reclamation will have to decide whether to authorize this Federal action. This document has been prepared as required by the National Environmental Policy Act (NEPA), the Council on Environmental Quality, and the U.S. Department of Interior regulations. If potentially significant impacts to environmental resources are identified, an Environmental Impact Statement will be prepared. If no significant impacts are identified, a Finding of No Significant Impact will be issued.

1.1 Background

The Wellsville-Mendon Canal begins at the Wellsville Canal Pumping Plant at the base of Hyrum Reservoir, and terminates north of Mendon, Utah. The canal is 14-miles long and has 89 cubic feet per second capacity. The water enters the canal from Hyrum Reservoir via a 48-inch-diameter inverted siphon. From there, the canal is an open channel which water to lands on the west side of Cache Valley. The canal was constructed in 1934-35 and is owned by Reclamation. The canal is operated and maintained by the Wellsville-Mendon Conservation District (WMCD) under contract with the South Cache Water Users Association.

1.2 Purpose of and Need for Action

In late August 2015, there was a landslide that occurred down slope of the Wellsville-Mendon Canal near the head of the canal. Upon further investigation of the landslide, it was discovered that water was coming out of the face of the slide. It was determined by Reclamation that there is a high likelihood that this water was seeping out of the canal and surfacing in the landslide area. Reclamation issued a mandate to WMCD, stating that no water should be placed in the canal for the 2016 water season until improvements had been made to the channel to eliminate seepage. Therefore, the purpose and need of the project are to prevent additional seepage and the potential for failure of the canal.

1.3 Scoping

The issuance of this EA fulfills our obligation for public involvement. Any comments received will be addressed through the NEPA process. We invite comments from interested parties regarding this action.

1.4 Relationship to Other Projects

The Hyrum Spillway Replacement Project (Safety of Dams – SOD Project) is concurrently being designed and the NEPA process completed. Though they are a part of the same congressionally authorized project, the Wellsville-Mendon Canal Piping Project would not have been proposed if not for the canal leak and slump.

Chapter 2 - Alternatives

2.1 Introduction

This chapter describes the features of the No Action and Proposed Action Alternatives and presents a comparative analysis. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, defining the differences between the two alternatives.

2.2 No Action Alternative

Under the No Action Alternative none of the Wellsville-Mendon Canal would be altered. The sections in the first 2,100 feet downstream of the head of the canal which attaches to the siphon would remain in disrepair. Taking no action would mean there would be a greater likelihood of additional slumps or a complete failure of the canal in this section. The rest of the canal would remain unchanged.

2.3 Proposed Action Alternative (Preferred)

Under the Preferred Alternative, WMCD would pipe approximately 2,100 feet of the Wellsville-Mendon Canal (Appendix 1). They would use 72-inch reinforced concrete pipe (RCP) (Appendix 2). The pipeline would begin at the head of the canal. In this location, a concrete inlet structure would be constructed to connect the end of the existing 48-inch siphon pipe to the new 72-inch RCP. Standard construction equipment including large earth moving excavators, bull dozers, front-end loaders, and dump trucks would perform the majority of the work. Some cast-in-place concrete work would also be performed on the job. The new pipe would be installed in the same alignment as the existing canal.

Additionally, the flow line elevation would need to be lowered in order to maintain the hydraulic integrity of the system. In order to lower the flow line, approximately 1,000 feet of concrete liner would be removed from the canal. Once the pipe is installed the contractor will back fill the pipe with native backfill material which is very plentiful on the site. The topography of the canal cross section would also change; instead of an open channel, there would be a relatively flat cross section with a buried pipe. The topography would facilitate down slope drainage and maintenance access. The work to pipe the canal would occur on Government property. Staging areas for equipment, material, and pipe would likely occur on private land to the north. The work would be scheduled to begin in late winter and finish in early spring, in order to have water in the canal during the irrigation system.

2.4 Comparison of Alternatives

By choosing the No Action Alternative, the canal would continue to leak, likely leading to additional slumps and potential canal failure. That failure could lead to property damage and considerable crop damage or failure downstream if the water cannot reach the shareholders. In contrast, implementing the Preferred Alternative would stop the leakage of the canal in the current location and throughout the 2,100 feet proposed for piping. In addition, it would eliminate seepage and water losses in that reach preventing additional damage downslope. In order to remediate the existing problem, the Preferred Alternative would meet that need.

2.5 Alternatives Considered and Eliminated

Many different solutions to the leak were considered. In fact, upon discovery of the leak and slump, efforts were made immediately to try to line the canal with clay. Due to the steepness of the bank and the saturated nature of the soils, the attempt to line it with clay failed and the leak continued. Therefore, a traditional clay lining was considered but eliminated from further consideration. Other kinds of piping materials were considered, but their durability, potential for leakage, and overall usability in this application, prevented them from being considered further.

Chapter 3 - Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the resources of the human environment that could be affected by the Proposed Action. Some of the environmental resources may not receive in-depth analysis due to no or negligible effects or due to their absence in the Project area. The table below (Table 3-1) provides each resource, whether it is present within the project area and the rationale for inclusion or elimination from further analysis.

Table 3-1

| Resource | Rationale for Inclusion or Elimination from Further Analysis |
|------------------------------------|---|
| Hydrology | There would be no change to the current hydrology of the area. Therefore this resource is eliminated from further consideration. |
| Water Quality | There would be no change to the source (Hyrum Reservoir), conveyance through the siphon, or potential for contaminants due to the Proposed Action. Therefore this resource is eliminated from further consideration. |
| System Operations | There would be no changes to operations of the Wellsville-Mendon Canal. Therefore this resource is eliminated from further consideration. |
| Water Rights | There would be no changes to water rights as a result of this action. Therefore this resource is eliminated from further consideration. |
| Geology and Soils | Minor disturbance of soils would occur during construction, but they would be minor in nature and restored to their current state or better post-construction. Therefore this resource is eliminated from further consideration. |
| Prime and Unique Farmland | Though there are prime and unique farmlands in the area, if irrigated, they would not be affected appreciably by the Proposed Action. Therefore this resource is eliminated from further consideration. |
| Wild and Scenic Rivers | There are no wild and scenic rivers in the project area, therefore this resource is eliminated from further consideration. |
| Fish, Wildlife and Migratory Birds | There would be no impacts to fish as they do not occur in the canal. Wildlife and migratory birds may be affected minimally during the construction season, but would not likely nest in the area as construction would begin prior to the nesting season. Therefore this resource is eliminated from further consideration. |

| Resource | Rationale for Inclusion or Elimination from Further Analysis |
|---|---|
| Sensitive, Threatened and Endangered Species | Sensitive species in the area may be affected minimally, but with most of the construction occurring during the late winter, impacts will be negligible. Only three Threatened and Endangered Species are listed in the area: Ute ladies'-tresses, Canada lynx, and yellow-billed cuckoo. There is either no or unsuitable habitat for each of these species. Therefore this resource is eliminated from further consideration |
| Wetlands, Riparian and Existing Vegetation | There are no wetlands in the project area. The riparian and existing vegetation that does occur there is irrigation induced. The area would become a restored upland site post-construction, and therefore, this resource is eliminated from further consideration. |
| Cultural Resources | As the canal is considered an eligible property under the criteria delineated in the National Historic Preservation Act, there may be adverse impacts. Therefore additional analysis of this resource is required. Please see below. |
| Paleontological Resources | No known paleontological resources occur in the area. Therefore this resource is eliminated from further consideration. |
| Recreation | Recreation in the project area is limited due to the mix of private and Federal land. Occasional hunting and bird watching may occur at times by private land owners, but the proposed action would not affect that due to the construction time frame. Therefore this resource is eliminated from further consideration. |
| Visual Resources | The portion of the canal to be repaired cannot be seen by the public or casual observer unless you are standing right next to and above it. It sits at the bottom of a deep trench. As such, this resource would not be affected and is eliminated from further consideration. |
| Socioeconomics | The repair of the canal would help continue to provide an irrigation water supply to the shareholders. The majority of the water would continue to be used for irrigation of crops, and the principal benefit to the water users would be reduced annual maintenance costs and increased efficiency, which would help to conserve valuable resources. Therefore this resource is eliminated from further consideration. |
| Public Health and Safety, Air Quality and Noise | Public health and safety would be improved by repairing the canal, and potentially harmed by increased canal failure. In addition, this is an area of non-attainment and air quality and noise will only be affected during construction. Therefore this resource is eliminated from further consideration. |
| Access and Transportation | There would be no road closures or access issues to private land in the area. The roads or transportation currently in use would continue to service the public. Therefore this resource is eliminated from further consideration. |

All other human or environmental resources other than cultural resources were eliminated from further analysis. Below in Section 3.2 is the description of the affected environment and environmental consequences of the No Action and Preferred Action Alternatives.

3.2 Cultural Resources

Cultural resources are defined as physical or other expressions of human activity or occupation. Such resources include culturally significant landscapes, prehistoric and historic archaeological sites as well as isolated artifacts or features, traditional cultural properties, Native American and other sacred places, and artifacts and documents of cultural and historic significance.

Section 106 of the National Historic Preservation Act of 1966 (NHPA), mandates that Reclamation take into account the potential effects of a proposed Federal undertaking on historic properties. Historic properties are defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for, inclusion in the National Register of Historic Places (NRHP). Potential effects of the described alternatives on historic properties are the primary focus of this analysis.

The affected environment for cultural resources is identified as the Area of Potential Effects (APE), in compliance with the regulations to Section 106 of the NHPA (36 CFR 800.16). The APE is defined as the geographic area within which Federal actions may directly or indirectly cause alterations in the character or use of historic properties. The APE for this proposed action includes < 5 acres that could be physically affected by the proposed action (Appendix 1).

A Class I literature review and a Class III cultural resource inventory were completed for the APE in November 2015. A total of approximately 5 acres were inventoried during the Class III inventory to determine if the proposed action would affect cultural resources. The Wellsville-Mendon Canal was identified as an eligible cultural property that would be affected.

In accordance with 36 CFR 800.4, this site was evaluated for significance in terms of NRHP eligibility. The significance criteria applied to evaluate cultural resources are defined in 36 CFR 60.4 as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

1. That are associated with events that have made a significant contribution to the broad patterns of our history; or
2. That are associated with the lives of persons significant in our past; or
3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

4. That have yielded, or may be likely to yield, information important in prehistory or history.

Based upon these considerations the Wellsville-Mendon Canal and the nearby Hyrum Spillway are historic resources eligible for inclusion on the NRHP. In a previous consultation on July 30, 2015, the Utah State Historic Preservation Office (SHPO) concurred with these findings. As eligible resources, any changes made to these structures that are not in keeping with their historic integrity would result in an adverse effect to these historic resources.

3.2.1 No Action Alternative

Under the No Action Alternative, there would be no adverse effects to cultural resources. There would be no need for ground disturbance associated with construction activities. Existing conditions would continue.

3.2.2 Proposed Action Alternative (Preferred)

As stated in Section 3.2, during the Class III cultural resource inventory, the Hyrum Spillway and the Wellsville-Mendon Canal were found to be eligible for the NRHP. The proposed action would cause an alteration to the characteristics of the Wellsville-Mendon Canal which make it eligible for the NRHP and will, therefore, have an effect on the property according to 36 CFR 800.16(i).

Pursuant to 36 CFR 800.5, the criteria of adverse effect were applied to the Wellsville-Mendon Canal. An adverse effect is defined as an effect that could diminish the integrity of a historic property's location, design, setting, materials, workmanship, feeling, or association. The proposed action will diminish the integrity of the Wellsville-Mendon Canal and will have an adverse effect to the historic property.

In compliance with 36 CFR 800.4(dX2) and 36 CFR 800.11(e), a copy of the cultural resource inventory report and a determination of historic properties affected have been submitted to the SHPO, the Advisory Council on Historic Preservation, and tribes which may attach religious or cultural significance to historic properties possibly affected by the proposed action for consultation.

Pursuant to 36 CFR 800.6(c), a Memorandum of Agreement (MOA) will be developed to resolve the adverse effects to the Hyrum Spillway and to the Wellsville-Mendon Canal. Signatories to the MOA will include Reclamation, SHPO, and the South Cache Water Users Association. Consultation with SHPO is ongoing.

3.3 Indian Trust Assets

Indian Trust Assets (ITA) are legal interests in property held in trust by the United States for Indian tribes or individuals. The Department of Interior's policy is to recognize and fulfill its legal obligations to identify, protect, and conserve the

trust resources of Federally recognized Indian tribes and tribal members, and to consult with tribes on a Government-to-Government basis whenever plans or actions affect tribal trust resources, trust assets, or tribal safety (see Departmental Manual, 512 DM 2). Under this policy, as well as Reclamation's ITA policy, Reclamation is committed to carrying out its activities in a manner which avoids adverse impacts to ITA when possible, and to mitigate or compensate for such impacts when it cannot. All impacts to ITA, even those considered nonsignificant, must be discussed in the trust analyses in NEPA compliance documents and appropriate compensation or mitigation must be implemented.

Trust assets may include lands, minerals, hunting and fishing rights, traditional gathering grounds, and water rights. Impacts to ITA are evaluated by assessing how the action affects the use and quality of ITA. Any action that adversely affects the use, value, quality or enjoyment of an ITA is considered to have an adverse impact to the resources. There are no known ITA in the project area vicinity, and no ITA concerns were identified by potentially affected tribes during the tribal consultation process.

3.4 Environmental Justice

3.4.1 No Action Alternative

The No Action Alternative would have no impact on environmental justice.

3.4.2 Proposed Action Alternative (Preferred)

Implementation of the Proposed Action would not disproportionately (unequally) affect any low-income or minority communities within the project area. The reason for this is that the Proposed Action would not involve major facility construction, population relocation, health hazards, hazardous waste, or substantial economic impacts. This alternative would therefore, have no adverse human health or environmental effects on minority and low-income populations as defined by environmental justice policies and directives.

3.5 Summary of Environmental Effects

The only resource affected by allowing WMCD to repair the first 2,100 feet of the canal, was cultural resources. Those impacts are being mitigated via a MOA (see Section 3.2.2). All other resources were either not present or would not be affected appreciably by implementation of the Proposed Action.

Chapter 4 - Environmental Commitments

4.1 Commitments

The following environmental commitments will be implemented as an integral part of the Proposed Action.

1. Standard Reclamation Best Management Practices (BMP) - Standard Reclamation BMP will be applied during construction activities to minimize environmental effects and will be implemented by construction forces, or included in construction specifications. Such practices or specifications include sections in the present EA on public safety, dust abatement, air pollution, noise abatement, water pollution abatement, waste material disposal, erosion control, archaeological and historical resources, vegetation, wildlife and threatened and endangered species. Excavated material and construction debris may not be wasted in any stream or river channel in flowing waters. This includes material such as grease, oil, joint coating, or any other possible pollutant. Excess materials must be wasted at a Reclamation approved upland site well away from any channel. Construction materials, bedding material, excavation material, etc. may not be stockpiled in riparian or water channel areas. Silt fencing will be appropriately installed and left in place until after revegetation becomes established, at which time the silt fence can then be carefully removed. Machinery must be fueled and properly cleaned of dirt, weeds, organisms, or any other possibly contaminating substances offsite prior to construction.
2. Additional Analyses - If the Proposed Action were to change significantly from that described in this EA because of additional or new information, or if other spoil, or work areas beyond those outlined in this analysis are required outside the defined Project construction area, additional environmental analyses may be necessary.
3. Utah Pollution Discharge and Elimination System (UPDES) Permit - A UPDES Permit will be required from the State of Utah before any discharges of water, if such water is to be discharged as a point source into a regulated water body. Appropriate measures will be taken to ensure that construction related sediments will not enter the

stream either during or after construction. Settlement ponds and intercepting ditches for capturing sediments will be constructed, and the sediment and other contents collected will be hauled off the site for appropriate disposal upon completion of the Project.

4. Fugitive Dust Control Permit - The Division of Air Quality regulates fugitive dust from construction sites, requiring compliance with rules for sites disturbing greater than one-quarter of an acre. Utah Administrative Code R307-205-5, requires steps be taken to minimize fugitive dust from construction activities. Sensitive receptors include those individuals working at the site or motorists that could be affected by changes in air quality due to emissions from the construction activity.
5. Cultural Resources - In the case that any cultural resources, either on the surface or subsurface, are discovered during construction, Reclamation's Provo Area Office archeologist shall be notified and construction in the area of the inadvertent discovery will cease until an assessment of the resource and recommendations for further work can be made.

Any person who knows or has reason to know that he/she has inadvertently discovered possible human remains on Federal land, he/she must provide immediate telephone notification of the discovery to Reclamation's Provo Area Office archaeologist. Work will stop until the proper authorities are able to assess the situation onsite. This action will promptly be followed by written confirmation to the responsible Federal agency official, with respect to Federal lands. The Utah SHPO and interested Native American Tribal representatives will be promptly notified. Consultation will begin immediately. This requirement is prescribed under the Native American Graves Protection and Repatriation Act (43 CFR Part 10); and the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470).

6. Paleontological Resources - Should vertebrate fossils be encountered by the proponent during ground disturbing actions, construction must be suspended until a qualified paleontologist can be contacted to assess the find.
7. Wildlife Resources - Migratory Bird Protection
 - a. Perform any ground-disturbing activities or vegetation treatments before migratory birds begin nesting or after all young have fledged.

- b. If activities must be scheduled to start during the migratory bird breeding season, take appropriate steps to prevent migratory birds from establishing nests in the potential impact area. These steps could include covering equipment and structures and use of various excluders (e.g., noise). Prior to nesting, birds can be harassed to prevent them from nesting on the site.
 - c. If activities must be scheduled during the migratory bird breeding season, a site-specific survey for nesting birds should be performed starting at least 2 weeks prior to groundbreaking activities or vegetation treatments. Established nests with eggs or young cannot be moved, and the birds cannot be harassed (see b. above), until all young have fledged and are capable of leaving the nest site.
 - d. If nesting birds are found during the survey, appropriate spatial buffers should be established around nests. Vegetation treatments or ground-disturbing activities within the buffer areas should be postponed until the birds have left the nest. Confirmation that all young have fledged should be made by a qualified biologist.
8. Raptor Protection - Raptor protection measures will be implemented to provide full compliance with environmental laws. Raptor surveys will be developed using the Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances (Romin and Muck 2002), to ensure that the proposed project will avoid adverse impacts to raptors, including bald and golden eagles. Locations of existing raptor nests and eagle roosting areas will be identified prior to the initiation of project activities. Appropriate spatial buffer zones of inactivity will be established during breeding, nesting, and roosting periods. Arrival at nesting sites can occur as early as December for certain raptor species. Nesting and fledging can continue through August. Wintering bald eagles may roost from November through March.
9. Previously Disturbed Areas - Construction activities will be confined to previously disturbed areas where possible for such activities as work, staging, and storage, waste areas and vehicle and equipment parking areas. Vegetation disturbance will be minimized as much as possible.
10. Public Access - Construction sites will be closed to public access. Temporary fencing, along with signs, will be installed to prevent public access. The Association will coordinate with landowners or those holding special permits and other authorized parties regarding access to or through the Project area.

11. Disturbed Areas - All disturbed areas resulting from the Project will be smoothed, shaped, contoured, and rehabilitated to as near the pre-Project construction condition as practicable. After completion of the construction and restoration activities, disturbed areas will be seeded at appropriate times with weed-free, native seed mixes having a variety of appropriate species (especially woody species where feasible) to help hold the soil around structures, prevent excessive erosion, and to help maintain other riverine and riparian functions. The composition of seed mixes will be coordinated with wildlife habitat specialists and Reclamation biologists. Weed control on all disturbed areas will be required. Successful revegetation efforts must be monitored and reported to Reclamation, along with photos of the completed Project.

Chapter 5 - Consultation and Coordination

5.1 Introduction

This chapter details consultation and coordination between Reclamation and other Federal, state, and local Government Agencies, Native American Tribes, and the public during the preparation of this EA. Compliance with NEPA is a Federal responsibility that involves the participation of all of these entities in the planning process. The NEPA requires full disclosure about major actions taken by Federal agencies and accompanying alternatives, impacts, and potential mitigation of impacts.

5.2 Public Involvement

The Proposed Action is being presented to the public and cooperating agencies through dissemination of this document. A letter was sent out to landowners, multiple municipalities, state and Federal agencies, and other interested stakeholders. The letter invited the recipients to review and comment on any concerns they have with the EA. They were asked to send in those comments to Reclamation within 21 days of the mailing. Those comments will be taken into consideration in the final EA.

5.3 Native American Consultation

Reclamation is currently conducting Native American consultation throughout the public involvement process. A consultation letter and copy of the Class III Cultural Resource Inventory Report was sent to the potentially affected tribes. This consultation was conducted in compliance with 36 CFR 800.2(c)(2) on a Government-to-Government basis. Through this effort the tribe was given a reasonable opportunity to identify any concerns about historic properties; to advise on the identification and evaluation of historic properties, including those of traditional religious and cultural importance; to express their views on the effects of the Proposed Action on such properties; and to participate in the resolution of adverse effects. This represents Reclamation's reasonable and good faith attempts to carry out appropriate identification efforts.

5.4 Utah Geological Survey

Reclamation requested a paleontological file search from the Utah Geological Survey (UGS) to determine the nature and extent of paleontological resources within the APE. File search results and recommendations from the UGS have not yet been received.

5.5 Utah State Historic Preservation Office

A copy of the Class III Cultural Resource Inventory Report and a determination of historic properties affected for the Proposed Action Alternative was submitted to the Utah SHPO. Consultation is ongoing.

Chapter 6 - Preparers

| Team Members | Position | Agency |
|---------------------|--|-----------------------|
| Dr. Rick Baxter | Chief, Environmental Group | Bureau of Reclamation |
| Mr. Michael Talbot | Engineer, P.E. | Bureau of Reclamation |
| Dr. Zachary Nelson | Archaeologist | Bureau of Reclamation |
| Mr. Wayne Pullan | Area Manager | Bureau of Reclamation |
| Mrs. Mary Halverson | Acting Manager, Environmental and Water Resources Division | Bureau of Reclamation |

Appendix 1

Map of the Hyrum-Mendon Canal Repair

Appendix 1 Map of Hyrum-Mendon Canal Repair



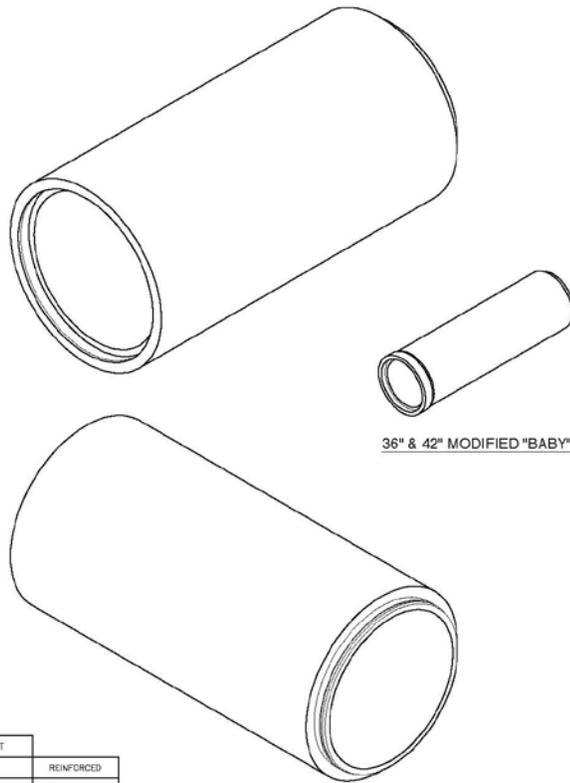
Appendix 2

Pipe Specification

Appendix 2 Pipe specifications

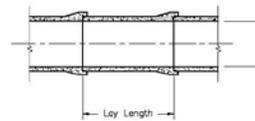
**O Ring
Pipe**

Concrete Pipe
36" thru 96"
O-Ring Joint

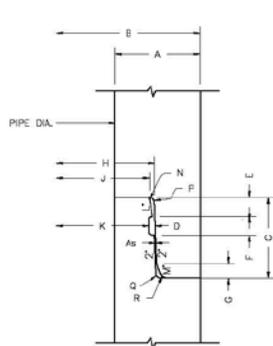


36" & 42" MODIFIED "BABY" BELL

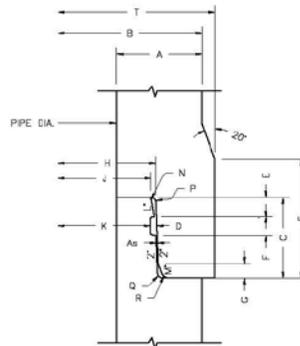
| DIA. | WEIGHT PER LINEAR FOOT | | REINFORCED ASTM C-76 |
|------|------------------------|---------|-------------------------|
| | 8' | 12' | |
| 36" | — | 536 # | II, III, IV, V |
| 42" | — | 714 # | II, III, IV, V |
| 48" | — | 1,012 # | II, III, IV, V |
| 54" | 1,233 # | 1,233 # | II, III, IV, V |
| 60" | 1,470 # | 1,470 # | II, III, IV, V |
| 66" | 1,739 # | 1,739 # | II, III, IV, V |
| 72" | 2,024 # | 2,024 # | II, III, IV, V |
| 84" | 2,658 # | — | II, III, IV, V |
| 90" | 3,009 # | — | II, III, IV, V |
| 96" | 3,098 # | — | II, III, IV, V |



NOTES:
1. Pipe is also available in Low-Head Pressure pipe meeting ASTM C-361, up to 125 feet of head.
2. Pipe fittings are available.



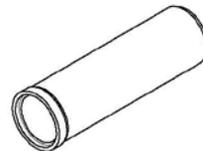
STANDARD JOINT DETAIL



MODIFIED "BABY" BELL JOINT DETAIL
36" & 42" DIA. ONLY

| DIA. | A | B DIA. | C | D | E | F | G | H DIA. | J DIA. | K DIA. | L' | M' | N RAD. |
|------|------|--------|-------|-------|-------|-------|-------|---------|---------|---------|-------|-----|--------|
| 36" | 4.00 | 44.00 | 3.50 | - | - | - | - | - | - | 39.298 | - | - | - |
| 42" | 4.50 | 51.00 | 4.25 | 0.337 | 1.0 | 1.0 | 0.75 | 46.137 | 45.614 | 45.567 | 10' | 20' | 0.125 |
| 48" | 5.75 | 59.50 | 4.50 | - | 1.014 | 1.174 | 1.126 | 52.312 | 52.094 | 51.364 | 1.83' | 30' | 0.625 |
| 54" | 6.25 | 66.50 | 4.25 | 0.430 | 1.0 | 1.188 | 0.875 | 59.028 | 58.363 | 58.279 | 10' | 20' | - |
| 60" | 6.75 | 73.50 | 4.75 | 0.430 | 1.0 | 1.188 | 0.875 | 65.175 | 64.510 | 64.426 | 10' | 20' | - |
| 66" | 7.25 | 80.50 | 5.00 | 0.430 | 1.0 | 1.188 | 0.875 | 71.675 | 71.010 | 70.926 | 10' | 20' | - |
| 72" | 7.75 | 87.50 | 5.00 | 0.547 | 1.0 | 1.250 | 0.875 | 79.250 | 78.585 | 78.270 | 10' | 20' | 0.25 |
| 84" | 8.75 | 101.50 | 5.00 | 0.547 | 1.250 | 1.250 | 1.250 | 90.970 | 90.430 | 90.007 | 5' | 20' | - |
| 90" | 9.25 | 108.50 | 6.125 | 0.605 | 1.517 | 1.514 | 1.125 | 97.616 | 97.242 | 96.551 | 1'50" | 30' | 0.625 |
| 96" | 9.00 | 114.00 | 6.25 | 0.605 | 1.517 | 1.514 | 1.125 | 104.041 | 103.667 | 102.976 | 1'50" | 30' | 0.625 |

| DIA. | P RAD. | Q RAD. | R RAD. | S | T DIA. | As |
|------|--------|--------|--------|------|--------|-------|
| 36" | - | - | - | 7.0 | 45.64 | - |
| 42" | 0.25 | 0.25 | 0.375 | 6.25 | 52.36 | 0.058 |
| 48" | 0.625 | 0.50 | 0.50 | NA | NA | - |
| 54" | - | - | - | NA | NA | 0.094 |
| 60" | - | - | - | NA | NA | 0.094 |
| 66" | - | - | - | NA | NA | 0.094 |
| 72" | 0.50 | 0.50 | 0.50 | NA | NA | 0.094 |
| 84" | - | - | - | NA | NA | 0.094 |
| 90" | 0.625 | 1.00 | 0.50 | NA | NA | 0.110 |
| 96" | 0.625 | 1.00 | 0.50 | NA | NA | 0.110 |



36" & 42" MODIFIED "BABY" BELL

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