Prepared For

City of Laramie

The West Laramie Drainage Master Plan

SEH Job Number - ALARAM0801.00

Final Submittal

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EXECUTIVE SUMMARY

SEH has completed this Drainage Master Plan for West Laramie in order to develop a plan for stormwater infrastructure that can be implemented as funds become available, development and redevelopment occur, and as street paving objectives materialize. The plan includes a hydrologic analysis that provides flood flows at key points in West Laramie. The predicted flow values have been used to estimate required pipe sizes and establish inlet locations. Final pipe sizes and inlet locations will need to be determined during final design. Flood protection will be provided in the form of facilities that provide increased conveyance or facilities that provide temporary storage.

The planning effort for this project began in 2007. Since that time, a series of progress meetings and public meetings have taken place to exchange information, discuss ideas and findings, and present the results of the study. Project participants included the project sponsors, community members, and representatives from the City of Laramie.

The study area encompasses approximately 903 total acres, including all areas west of Interstate 80 (I-80) tributary to West Laramie. The study area boundary is generally defined by I-80 on the east, Franklin Street on the south, the ridge at the west side of Section 31, and Madison Street on the north.

There are no major waterways in the study area, but the West Laramie area is tributary to the Laramie River, one-half mile east of I-80. The existing storm sewer infrastructure was studied to determine its capacities and limitations. Proposed improvements are based on future land uses. Generally, the existing storm drainage system in Snowy Range Road only accounts for the tributary area one-half block north and one-half block south of Snowy Range Road. A recently completed project upsized the outfall from the I-80/Snowy Range Road Interchange to the Laramie River outfall to accommodate the proposed improvements shown in this report.

The area of influence and drainage for the Arthur South portion of the project extends beyond the study limits. Previous studies have indicated that flows from the Arthur South area need to be directed to the south and east using open channel concepts. Anticipated flow rates for the Arthur South area are shown within this report. The final disposition of these flows are best left for a future South Laramie drainage study. Drainage infrastructure costs (within the study area) have been included for the Arthur South area. However, the final disposition of these flows and ultimate outfall will need to be determined in future studies.

ACKNOWLEDGEMENT

SEH wishes to acknowledge the various individuals who assisted in the preparation of this West Laramie Drainage Master Plan. The City of Laramie provided the guidance and knowledge of the West Laramie drainage issues that made this Drainage Master Plan possible.

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The following members of the SEH project team have contributed in the preparation of this report.

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INTRODUCTION

The West Laramie Drainage Master Plan was created in response to the many drainage problems that exist in West Laramie. Many of the drainage problems are due to the elevation of properties relative to existing streets and very flat terrain. Street paving initiatives are being developed in a manner that lowers existing street profiles to the extent possible considering existing utilities and other constraints. The West Laramie Drainage Master Plan has been completed in order to develop a technically and financially feasible approach for improving the storm drainage problems that currently exist in West Laramie.

This Master Plan provides an analysis of existing drainage conditions for all drainage basins tributary to the West Laramie neighborhoods. Stormwater improvement alternatives include stormwater quality improvements and flood control improvements.

BACKGROUND

This West Laramie Drainage Master Plan began in late 2007 and was completed in July of 2010. West Laramie was broken into fifty-two (52) drainage basins in order to determine flood flow values at key points throughout the area of study.

Data Sources

Data sources for the West Laramie Drainage Master Plan include the West Laramie Drainage Improvement Project Report on Alternative Evaluation (dated March 3, 1994) and existing storm sewer mapping. New topographic mapping was developed for Section 31, Township 16N, Range 73W which includes the current area known as West Laramie. The contour interval for the new topographic mapping is two feet. In many cases, the drainage areas for the West Laramie neighborhood extended beyond the limits of the new topographic mapping. U.S. Geological Survey Quadrangles were utilized to determine the drainage area boundaries outside of the limits of the new topographic mapping. Ground topography spot elevations were also obtained at many of the intersections due to the flatness of the terrain.

The City of Laramie has compiled photos of historic flooding events at various locations throughout the study area. Some of these photos are included in the report. Additional photo reconnaissance was completed on specific areas within the limits of the West Laramie neighborhood.

The City of Laramie utility maps and as-constructed drawings (which show the existing storm sewer system's location, pipe size, inlets, etc.) were also used in the development of this Master Plan.

PLAN FORMULATION

Meetings

Regular progress meetings were held from January 2008 through July 2010. Attendance at the meetings included members of the consultant team and the City of Laramie staff members who were involved in the project.

Two public meetings were held in the West Laramie neighborhood to present project progress information, receive project input, as well as provide an introduction to stormwater management principles, and risk assessment.

Hydrologic & Hydraulic Analysis Methodology

Existing and proposed condition runoff hydrographs were developed for the 5, 10, and 100-year return period events. Routing of sub-basin runoff hydrographs was performed at key design points associated with critical collection and conveyance facility components to determine peak flows for the above stated return periods. Proposed condition analysis included storage routing through existing and proposed detention ponds and other significant proposed storage elements.

The drainage basin boundaries were delineated using the recent 2-foot contour interval topographic mapping and existing USGS quadrangles. A basin map can be seen in Appendix B. Two basic scenarios were developed for hydrologic analysis – existing and proposed conditions. Since the majority of West Laramie is developed, the main difference between the two conditions is that the proposed (future) conditions hydrology assumed that all streets were paved.

Infiltration parameters were developed using land use and soil type information available through the Soil Conservation Service. The Soil Survey reports were used to classify soils in the West Laramie neighborhood into hydrologic soil types that are utilized by the Soil Conservation Service. A soils map can be found in Appendix B.

The hydrologic analysis was performed using the Colorado Urban Hydrograph Procedure (CUHP), 2005 version, as the basic methodology for analysis of runoff response to a specified design storm. It was developed by Denver's Urban Drainage and Flood Control District (UDFCD). The physical characteristics for each sub-watershed in the CUHP analysis include:

- Drainage Area
- Length of the watershed
- Watershed slope
- Distance to watershed centroid
- Percent impervious
- Time of concentration
- Soil infiltration rates
- Surface retention rates

The CUHP model takes the one-hour point rainfall for each storm event and converts it in accordance with the CUHP guidelines into a two-hour design storm. This methodology was adopted as the design storm for the analysis of all basins included in the study. The CUHP model was used to determine rainfall excess amounts for this two-hour design storm discussed above based on required infiltration parameters. The CUHP model creates unit hydrographs with predicted rainfall excess amounts to obtain the flood hydrograph for the 5, 10, and 100-year design storms.

Routing of sub-basin hydrographs was accomplished using full dynamic wave routing procedures contained in the XP-SWMM software. XP-SWMM uses a link and node topology to describe drainage catchments. It has the capacity to model underground conveyance and surface conveyance elements simultaneously in a link between nodes. Conveyance elements that can be modeled include weirs, orifices, pipes, and open channels with described geometry. The model allows for the determination of the depth of surface flow in described conveyance elements for evaluation of compliance with the minor and major storm criteria as presented herein.

The development of the routing model included development of a routing schematic that contains the sub-basin identifier, the conveyance or storage element identifier and the design point identifier. Routing schematics for each of the major drainage basins are included in Appendix D.

CUHP Parameters

Watershed Delineation

A total of 52 watersheds were delineated for West Laramie. The individual watersheds, or basins, can be seen in Appendix B, Basin Mapping. The 2-foot contour mapping, provided by the City of Laramie, was used to delineate watersheds. USGS quadrangle maps were used as necessary to supplement contour data when it was unavailable.

Watershed Length & Slope

Once basins were delineated, a flow path from the basin high point to the low point was determined in AutoCAD. These lengths were used in CUHP calculations, and can be seen in Appendix D. Once the length was determined, the basin slope was calculated over the flow path. A weighted slope calculation was used in areas where slopes were not constant.

Percent Impervious

Watershed imperviousness was determined based on land use. Since the majority of West Laramie is developed, the land use in the existing and future conditions is generally identical. Currently, the majority of streets in West Laramie are unpaved. Due to recent paving projects, the future condition assumes that the entire street network in West Laramie will be paved. See Appendix B for a land use map.

Based on UDFCD recommendations, offsite areas (Basins 1, 8, 9, 16, 23, and 37) were assumed to be 40% impervious, to account for unknowns and possible future development. For this reason, it is assumed that offsite flows from the west are conservative.

Soils Data

Soils mapping was obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey. Several soil types were identified in West Laramie. The predominant soil types are Bosler, Forelle, Stunner, and Rock River, which are loamy soils with a hydrologic soil group B rating. Several type C soils also exist. See Appendix B for a map of soil types.

Infiltration parameters were developed based on the hydrologic soil group. Where multiple soil types exist in a basin, a weighted average was used to determine infiltration rates. Infiltration rates were based on UDFCD criteria, shown below in Table 1.

Table 1: Infiltration Rates

NRCS Hydrologic Soil Group	Infiltration Rates (in/hr)		Horton's Decay Coefficient
	Initial	Final	
A	5	1	0.0017
B	4.5	0.6	0.0018
C	3	0.5	0.0018
D	3	0.5	0.0018

Rainfall Data

The one-hour point rainfall depths used in CUHP analysis were obtained from the NOAA Atlas 2, Volume II, Wyoming. See Table 2, below, for rainfall point depths used in CUHP analysis.

Table 2: Point Rainfall Depths

Return Period	*Point Rainfall Depth (1 hr)*
5-Year	*0.9 inches*
10-Year	*1.1 inches*
100-Year	*1.9 inches*

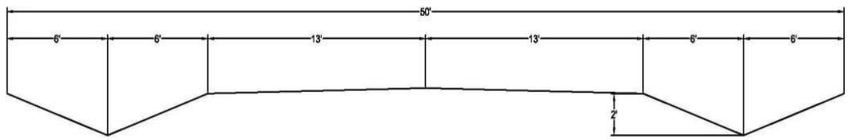
SWMM Parameters

See Appendix D for a SWMM routing schematic. The routing schematic shows where the drainage basins connect into the drainage system, how and where runoff is conveyed.

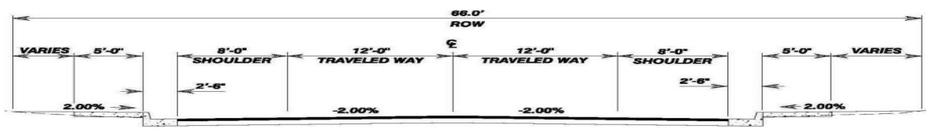
Routing Elements

Routing elements include open channels, storm sewers, and paved and unpaved streets. Conveyance element properties such as length and slope were determined using AutoCAD, from aerial mapping provided by the City. For conveyance element properties, see Appendix D.

Typical street sections were developed from field measurement and from assumed paved street sections. Typical street sections are shown in Figure 1 below.



TYPICAL UNPAVED STREET SECTION



URBAN TYPICAL SECTION
WITH CURB, GUTTER & SIDEWALK

Figure 1: Typical Street Sections

Detention

Proposed detention basins were incorporated into SWMM modeling based on required detention volumes. The existing detention basin at the intersection of Colorado and Van Buren Streets was not included in the analysis, due to its negligible volume.

The Grant Street Pond, completed in 2009 as part of Phase 1 improvements, was modeled based on proposed grading found in construction drawings for Fire Station No. 3. in order to determine proposed pipe sizes on Monroe Street.

Development of Alternatives

Alternative improvement plans were developed to address existing drainage problems within the study area. Existing drainage problems addressed include areas of flooding documented by the City of Laramie. Additionally, problems presented by the public or those identified during analysis were also addressed. Up to three (3) conceptual level design solutions were developed for each flooding problem area. Solutions consist of:

- Provision of storage to reduce flood peak discharges at downstream locations
- Provision of increased conveyance or cross drainage
- Combinations of the above

During alternative development, areas for proposed regional detention ponds were identified. In addition, existing drainage corridors, which need maintenance and/or upsizing, have been identified. Areas where new drainage corridors are needed have also been identified.

Water Quality

Whenever possible, water quality improvements were identified for West Laramie. Components of an overall strategy to protect water quality include the following:

- ***In-stream Treatment*** – Opportunities may exist to create a network of drainageways in given watersheds that not only provide for flood conveyance, but also enhance water quality. Drainageways that feature stable base-flow channels and wide, well vegetated over banks can infiltrate and filter runoff, as well as provide favorable habitat. It is important to dedicate adequate corridors for these drainageways so water quality opportunities may remain.

Effective Stormwater Detention – An effective detention strategy in the upstream watershed can also improve water quality. Extended-duration detention (draining over several days) helps to settle out sediment and adsorbed pollutants. Effective flood control detention also reduces peak discharges that can lead to stream erosion. A new concept to be considered is "full-spectrum detention", an approach being explored by UDFCD for effective water quality and flood detention. This concept has been shown through hydrologic modeling to approximate historic condition runoff peaks for a full spectrum of storm sizes and development conditions. At a minimum, new development that results in a significant increase in impervious area should be required to provide for detention of the water quality capture volume as prescribed in Volume III of the Storm Drainage Criteria Manual published by UDFCD.

Regional detention was also explored for West Laramie. Regional detention facilities that are publicly owned and maintained have the best chance of operating effectively over the long-term. Regional detention ponds can be used to provide for peak discharge reduction as well as stormwater quality.

A geotechnical investigation was completed by Terracon Geotechnical Consultants for the West Laramie Drainage Master Plan. The results of this geotechnical study indicate generally shallow groundwater that will limit detention basin depth. The depth to groundwater in the borings ranges from five feet to ten feet, and this report indicates that the shallow weathered bedrock incurred is suitable for detention basins. The groundwater depth at potential detention basin locations ranges generally from six to ten feet with areas as shallow as four (4) feet.

The large wetland area adjacent to Interstate 80 (I-80), the McCue Wetlands, is well situated to provide detention storage. A significant drainage area could contribute to a detention basin at this location. The vegetation in the detention area appears to include native grass and significant wetland vegetation. It is likely that there is a high water table in the proposed detention area that would make other land uses problematic at this location. The periodic inundation of the McCue Wetlands resulting from the discharge of stormwater will help to support the wetland vegetation. Stormwater detention in such a large open area will promote infiltration, which will help to offset increases in runoff due to addition of impervious area. Providing detention in the McCue Wetlands can be beneficial to stormwater quality and can provide flood peak discharge reduction. When National Pollutant Discharge Elimination System (NPDES) stormwater quality requirements come into effect for the City of Laramie, this detention area will be helpful in achieving regulatory compliance. Detailed studies were performed to assess the benefits of using McCue Wetlands as a detention facility. These studies included a hydraulic study of the basin during the 100-year event after final build out (SEH 2010) and a wetland delineation/mitigation report that was submitted to the U.S. Army Corp of Engineers (Hydrologic, 2009). The hydraulic report indicates that the existing basin can contain the 100-year event without overtopping. The wetland report was reviewed and approved by the USACE. Both reports are provided in the appendix.

Photo 1: McCue Wetlands

Photo 2: McCue Wetlands

Low Impact Development – Another potential component in the stormwater quality strategy for the watershed is a development practice termed by the UDFCD as "minimizing directly connected impervious areas (MDCIA)". The practice is termed "low impact development (LID)" by staff in Prince Georges County, Maryland, who have also published guidance documents promoting the approach. The goal is to take advantage of the natural ability of vegetated soils to slow down, filter, and infiltrate stormwater runoff, and to moderate the rapid runoff and wash off from paved surfaces.

Low impact development approaches feature more grass buffers, swales, and depressions or inlets in landscape areas and fewer storm sewers and inlets in pavement areas. Sometimes, curb and gutter is eliminated. Low impact development should be applied carefully, considering local soils, groundwater issues, and typical development practices in Laramie.

The City of Laramie is not currently under any NPDES stormwater regulation but there are several stormwater controls that can be voluntarily implemented for City projects. These measures include the implementation of erosion control Best Management Practices (BMP's) during construction, as well as permanent stormwater quality BMP's. There are several recognized structural controls for stormwater quality, including minimization of directly connected impervious areas, wet ponds, existing or constructed wetlands, grass buffers, grass swales, modular block pavers, porous pavement, and filtration.

Cost Modeling

Planning level construction costs were compiled for the selected drainage alternative. Unit pricing was developed based on bid schedules submitted to the City for the West Laramie 2009 Priority Improvement project. Table 3 shows the standardized unit prices adopted for the Master Plan.

HDPE was chosen for pipe material rather than RCP because slopes in West Laramie are very flat and its lower roughness coefficient will maximize conveyance in the Master Plan storm sewer systems. In addition, review of local bid tab information indicates installation costs of HDPE are lower than similarly sized RCP, decreasing the cost of some of the Master Planned facilities recommended in this report.

Indirect costs and contingency have been expressed as a percentage of the direct construction costs. The indirect costs and contingency are as follows:

- Traffic Control: 3%
- Mobilization/Demolition: 10%
- Materials Management (limited to environmental remediation and disposal): 5%
- Contingency: 25%

Indirect Cost Total **43%**

This indirect cost was added to the direct construction cost to obtain a total for each alternative. The alternatives were than summed to determine the total construction cost for each phase. The design and construction management costs for each phase were then estimated by using 7.5% of the total construction cost for each, giving a total cost for each phase. The future value of the total cost was determined using a straight line inflation of 4.0% per year. The total future value was increased based on a 10% contingency to determine the total budget and make allowance for standard city budgeting process which includes a 10% contingency above the awarded construction contract.

Table 3: Standard Unit Prices

Storm Sewer Facilities

Cost Includes pipe materials and installation

Structure Size	Unit Cost	Manhole Size	Unit Cost
18" HDPE	$ 50/lf	5 foot	$ 4,250
24" HDPE	$ 60/lf	6 foot	$ 4,750
30" HDPE	$ 70/lf	7 foot	$ 6,750
36" HDPE	$ 85/lf	Square/ Vault	$ 14,000
42" HDPE	$ 110/lf		
48" HDPE	$ 125/lf		
54" HDPE	$ 140/lf		
60" HDPE	$ 150/lf		

Other Items

Box Culverts:	$350/cy concrete,$0.70/lb. steel
Junction Boxes:	$500/cy of reinforced concrete
Inlets:	$4000/each
Stormwater Detention Facility:	$40,000/ac-ft active storage volume (< 7 ac-ft)
	$15,000/ac-ft active storage volume (> 7 ac-ft)
Asphalt Patch	$30/sy
Dry Utility Administration Cost:	5% of subtotal construction costs

Financial Planning Summary and Impact Fee Development

The City of Laramie will be financing the design and construction of storm drainage improvements in West Laramie on a "pay as you go" basis. Available city funds and grants will be allocated to the construction of drainage improvements on a prioritized basis. For the purpose of allocating available funds to drainage improvements in West Laramie, projects will be implemented based on an objective prioritization procedure. The spreadsheet included with this report is offered as an objective tool for prioritizing the drainage improvements in the West Laramie neighborhood.

This Master Plan is based on detailed hydrologic analysis of all of the drainage basins; however, a final design phase will be necessary for the entire planned stormwater infrastructure. A final design that considers interaction with other underground utilities, exact alignments of proposed underground stormwater infrastructure, and additional hydrologic and hydraulic analysis may be required in order to construct improvements.

Table 4 presented below provides a summary of anticipated construction, design and construction management cost by phase. Currently programmed available budgets for the work are also shown and the anticipated excess or short fall between project costs and available budget are calculated.

Table 4: Summary of Anticipated Costs

Phase	*Construction Cost*	*Design Cost*	*Construction Management*	*Total Cost*	*Future Value**	*Total Budget***	*Total Available Budget*	*Excess / Deficiency*
FY 2009	*-*				*-*			
FY 2010	*$1,087,687*	*$81,577*	*$81,577*	*$1,250,840*	*$1,250,840*	*$1,376,000*	*$2,030,000*	*$654,000*
FY 2011	*$714,345*	*$53,576*	*$53,576*	*$821,497*	*$854,357*	*$940,000*	*$1,185,000*	*$245,000*
FY 2012	*$1,161,167*	*$87,088*	*$87,088*	*$1,335,343*	*$1,442,170*	*$1,587,000*	*$1,346,000*	*($241,000)*
FY 2013	*$632,045*	*$47,403*	*$47,403*	*$726,852*	*$814,074*	*$896,000*	*$1,384,000*	*$488,000*
FY 2014	*$614,732*	*$46,105*	*$46,105*	*$706,942*	*$820,052*	*$903,000*	*$1,030,000*	*$127,000*
FY 2015	*$847,829*	*$63,587*	*$63,587*	*$975,003*	*$1,170,004*	*$1,288,000*	*$1,587,000*	*$299,000*
Outyear	*$4,336,810*	*$325,261*	*$325,261*	*$4,987,331*	*$6,184,291*	*$6,803,000*		

* Based on 4% linear inflation

** 10% contingency (Future Value *1.1)

Detailed information on anticipated project construction phases are provided in the following section.

MASTER DRAINAGE PLAN PHASING

Construction phasing of this master drainage plan has been developed based on several influential factors. These factors include:

- Constructing the storm drain in an upstream direction from the defined outfalls
- Coordinating storm drain construction with proposed street construction phasing
- Coordinating storm drain construction with proposed public facility construction

To the extent possible, the phasing plan presented herein attempts to construct the proposed improvements from defined outfalls and propagate these improvements in an upstream direction. This methodology is being employed to activate and make use of the proposed storm drainage improvements in the most expeditious manner possible.

Proposed street construction phasing planned for the West Laramie area generally starts adjacent to Snowy Range Road and emanates outward to the north and the south. The storm drainage phasing shown in this Master Drainage Plan considers the anticipated street construction phasing.

Finally, anticipated and proposed public improvements including the future WYDOT Urban System projects on Wyoming Avenue and Pierce Street have been considered in the proposed storm drain phasing. Recent construction of the West Laramie Fire Station and associated storm drainage infrastructure resulted in the need to develop temporary outfall infrastructure from the Grant Pond detention facility because ultimate storm drain facilities, which will drain the pond, are yet to be constructed. Therefore, construction of the proposed Monroe Street storm drainage line is a high priority to eliminate the need for the temporary outfall infrastructure.

Currently, Pierce Street has been ranked fifth on the WYDOT Urban Systems list for street construction improvements. Thus, storm drain associated with Pierce Street will need to be constructed prior to or in conjunction with this anticipated street construction. Wyoming Avenue is currently third on the WYDOT Urban System list. However, this street does not have a significant amount of proposed storm drain infrastructure.

Existing storm drainage systems presented in this report include storm drainage infrastructure that was constructed prior to 2009 and storm drainage infrastructure that is currently being constructed under the 2009 West Laramie Priority Water Main/Street Paving/Storm Drainage construction project.

The ultimate phasing of storm drain construction is based on many factors beyond the direct control of the City of Laramie. These factors include pending development, timing of WYDOT Urban Systems projects and available funding. The phasing plan presented herein considers each of the above factors. However, final phasing plans will ultimately be determined based on timing of the above considerations.

Drainage Deficiencies

The main drainage deficiency is the absence of drainage infrastructure in West Laramie. A typical street section is an approximately 35 foot wide dirt road, with shallow roadside ditches and very limited capacity. Some roads do not have ditches, and during a major storm event, runoff could potentially cause great harm to residential structures. Compounding the issue is the relative flatness of the area – several drainage basins contain internal low points, which could potentially cause ponding during a rainfall event. Below is a list of areas identified as deficient.

City of Laramie maintenance staff has reported the following ponding issue:

- According to City staff, the existing pond at the intersection of Colorado Avenue and Van Buren Street does not have an outlet structure. Due to locally high groundwater, this pond typically contains standing water. It is recommended that this pond be filled, at a minimum, to one foot above the standing water elevation. In order for this to be a viable detention

pond, a release structure should be added. Due to this pond's small footprint, it contains very little detention capacity. Another viable option is to fill this pond completely.

A meeting was held with City of Laramie staff in October 2008 to discuss drainage problem areas. The following list was compiled by city maintenance staff:

- Arthur Street at Dadisman & Monroe Streets

  City Staff indicated that ponding occurs at these two intersections.

- Low point in Eberhart Street

  There are several infiltration wells at this low point that allow runoff to pond during a large storm, with nowhere to drain. These ponding issues are magnified by the lack of drainage infrastructure in this area.

  Ponding at this location may also be caused by runoff from areas to the west of Schrader Avenue.

The following problem areas outfall to the McCue Wetlands:

- Wyoming Avenue & Johnson Street (southwest & northeast side)
- Grant Street & Wyoming Avenue (northwest side)
- Fillmore Street & Van Buren Street (by trailer park)
- Van Buren Street & Adams Street
- Polk Street, Pierce Street to Fillmore Street
- Lincoln Street & Van Buren Street (north side)

The following problem areas are tributary to the Snowy Range Road storm sewer:

- Grant Street south of Harrison Street

  A low point exists along Grant Street south of Harrison Street, on the east side of Grant. Field reconnaissance located an existing inlet at the south end of Grant Street, on the east side. It was unclear where this inlet drains.
- Harrison Street & Fillmore Street (west side, north & south)
- Taylor Street, Snowy Range Road to Harrison (east side)
- Harrison Street & Adams Street
- Taylor Street, Snowy Range Road to Monroe Street (valley gutter)

  There is an existing valley gutter on Taylor Street which experiences flooding during storm events.
- Colorado Avenue, Snowy Range Road to Monroe Street (west side)
- Colorado Avenue, Jefferson Street to Monroe Street (east side)
- Pierce Street & Jefferson Street
- Adams Street, Monroe Street to Jefferson Street (east side)

Description of Improvement Areas & Phasing

Existing

2009 Priority Improvements and Other Recent Improvements

The following improvements have been constructed based on draft recommendations of this Master Drainage Plan:

- Harrison Street, Adams Street to Buchanan Street

  The Harrison Street system is tributary to the Snowy Range Road drainage network. This pipe network was included to eliminate problem areas at the intersection of Harrison and Fillmore and Harrison and Adams as outlined by city staff and ultimately drain the upper reaches of Harrison Street. Beginning at Buchanan and Harrison Streets, an existing 42" pipe conveys flows east to Adams Street. At both Fillmore and Pierce Streets, an 18" pipe conveys flows from Basins 46 and 48. Several inlets were included in this construction. This system will be extended to the west in Phases FY 2010 and FY 2014.

Photo 3: Harrison St. and Adams St.

Adams Street, Snowy Range Road to Franklin Street

A 48" pipe was installed on Adams Street, from Snowy Range Road to Franklin Street, to accommodate future improvements to the west on Harrison and Franklin Streets. These improvements were made as part of the Adams Street 2008 Improvements. A 30" line was stubbed out to the west at Harrison Street and a 48" line was stubbed out to the west on Franklin Street. Additional storm drainage was constructed upstream of Franklin (a 15" line).

Grant Street, Jefferson Street to Monroe Street

Constructed improvements include two 10' inlets at the intersection of Jefferson and Grant Streets. A 24" pipe extends south to the new pond at Monroe and Grant Streets. This 24" pipe conveys flows from the new Fire Station site located at Snowy Range Road and Jefferson Streets. At the intersection of Grant and Monroe, this 24" pipe upsizes to 48" running east to west along the Monroe alignment to accommodate future flows from the west. The current outfall of the existing system drains into a retention pond that has been constructed in the southeast corner of the Grant/Monroe intersection. The ultimate outfall for this pond has not been constructed (i.e., the Monroe Street line). Therefore, temporary pumping operations have been constructed to drain the pond to the existing Snowy Range drainage system. A primary goal in future phasing is to complete the Monroe Street system between the Snowy Range/Adams intersection and the Monroe/Grant Street Pond to eliminate the need for current temporary pumping of the Grant Street Pond.

- Snowy Range Road at Johnson and Taylor Streets

  Inlets were installed north of Snowy Range Road at Taylor Street and Johnson Street and were connected to the Snowy Range Road drainage system via 18" laterals. These pipes convey flows to the existing system in Snowy Range Road. These improvements alleviate the flooding seen in the existing valley gutter on Taylor Street, as pointed out by City maintenance staff.

  Inlets were also added south of Snowy Range Road on Taylor Street, to alleviate flooding recorded in this area. This inlet connects to an existing inlet via an 18" pipe.

McCue Wetlands Outfall

An outfall was constructed to the McCue Wetlands using a 4'x5' box culvert, extending from the southwest corner of the McCue Wetlands, under Interstate 80, to the intersection of Adams and Madison Streets. At Adams Street, this system turns south with a 48" pipe to the intersection of Adams and Van Buren Streets. Improvements to the west on Van Buren are proposed for FY 2012.

A riprap sedimentation forebay was constructed at the downstream end of the 4'x5' box culvert in the McCue Wetlands in order to reduce the amount of sediment that may enter the wetlands. This forebay was sized based on UDFCD criteria, which typically calls for a

sedimentation volume of 2-5% of the water quality control volume (WQCV). This equates to a forebay volume of approximately 10,000 cubic feet.

A hydraulic analysis of the McCue Wetlands was performed in order to determine the 100-year water surface elevation during runoff events. It indicated that, during a 100-year runoff event, the wetlands would not overflow into the trailer park to the north. This analysis included the existing storage relationship in the western half of the wetlands, as well as the existing pipes crossing McCue Street, which are approximately half full of silt. Further information and an analysis of the McCue Wetlands can be found in Appendix E in the "Hydraulic Analysis of the McCue Wetlands", by SEH, submitted to the City of Laramie in September 2009.

Photo 4: McCue Wetlands

Fire Station No. 3 Improvements

As part of the West Laramie Fire Station No. 3 project, several drainage improvements were constructed in 2009. A portion of these improvements is the Grant Street system from Jefferson to Monroe, mentioned above. A detention pond was also constructed at the southeast corner of the Monroe/Grant intersection.

As of 2009, this pond temporarily outfalls (using a pump station) to the existing storm drainage system in Snowy Range Road. Since the pond bottom is below the elevation of the Snowy Range storm sewer, this pond will be pumped until a permanent outfall can be constructed. Improvements for FY 2010, described below, include the construction of the permanent outfall for this pond.

This pond was sized in order to take full advantage of its detention volume and to reduce the required pumping rate. As a result, current outflows from this pond are reduced. Typically during a 100-year runoff event, 1 cfs/acre of tributary area is allowed to be released. This would have resulted in very costly pumps, which the City did not wish to pursue. The actual 100-year outflow from this pond was reduced to 0.12 cfs/acre, well below the recommended limit. A hydraulic analysis of the area was performed, and can be found in a May 11, 2009 document to the City of Laramie entitled "Grant Street Pond, Temporary Outfall", by SEH.

FY 2010

Improvements for Fiscal Year (FY) 2010 consist of the projects described below. The total anticipated cost for storm improvements for FY 2010 is approximately $1,376,000.

- Snowy Range Road and Adams Street to Pond at Grant Street and Monroe Street

  The series of improvements begins at Snowy Range Road and Adams Street with a 54" pipe that decreases in size to a 48" pipe at Monroe Street and Buchanan Street and continues west to the Grant Street Pond. It also includes a 24" outlet pipe from the Grant Street Pond to the 48" system along Monroe Street and several inlets along Monroe Street. The improvements will intercept flows from Basins 27, 29 and 35.

- Harrison Street and Lincoln Street to Harrison Street and Buchanan Street
  This system will connect into the existing 42” storm sewer system in Harrison Street. The improvements along Harrison Street include 36” pipe between Lincoln and Buchanan Streets; 30” pipe along Lincoln Street, north of Harrison Street; and 30” pipe along Buchanan Street, south of Harrison Street, in addition to inlets on Lincoln and Buchanan Streets. This system intercepts flows from Basins 45.

Photo 5: Harrison St. and Buchanan St.

Photo 6: Harrison St. and Lincoln St.

FY 2011

Improvements for Fiscal Year 2011 consist of the projects described below. The total anticipated cost for storm improvements for FY 2011 is approximately $1,185,000.

- Monroe Street and Grant Street to Dadisman Street and Eberhart Street
  The improvements continue upstream or west of the Grant Street Pond. Beginning at Grant Street Pond, the improvements include 48” pipe west along Monroe Street to Cleveland Street. At Cleveland Street, the pipe downsizes to a 36” pipe to Arthur Street, where it continues south on Arthur Street, terminating south of Dadisman Street. The system also includes several inlets. The improvements will intercept flows from Basin 38.

  All flows upstream of the Grant Pond will bypass the pond and connect to the FY 2010 improvements in Grant Street as the pond does not have the capacity to detain these flows.

Photo 7: Arthur St. and Monroe St.

Photo 8: Cleveland St. and Kennedy St.

- Monroe Street and Snowy Range Road to Jefferson Street and Snowy Range Road
  The improvements include a 30" storm sewer on Snowy Range Road north of Monroe Street to West Jefferson Street and continues west on West Jefferson Street. This system also includes inlets at appropriate locations. The improvements will intercept flows from Basin 24.

- Monroe Street and Cleveland Street to Kennedy Street and Cleveland Street
  The improvements include a 30" storm sewer on Cleveland Street north of Monroe Street to Kennedy Street and continues west on Kennedy Street. This system also includes a couple inlets. The improvements will intercept flows from Basin 25.

FY 2012

Improvements for Fiscal Year 2012 consist of the projects described below. The total anticipated cost for storm improvements for FY 2012 is approximately $1,346,000.

- Van Buren Street and Adams Street to Wyoming Avenue and Johnson Street
  The improvements connect to the existing 48" pipe in Adams Street that connects to the existing 4'x5' box culvert and eventually outlets to the McCue Wetlands. The improvements consist of 48" pipe along Van Buren Street to Colorado Avenue. At Colorado Avenue the pipe downsizes to a 36" and runs south down Colorado Avenue to Wyoming Avenue and continues west at Wyoming Avenue to Johnson Street. The improvements also consist of several inlets along Van Buren Street, Colorado Avenue and Wyoming Avenue. The improvements will intercept flows from Basins 20 and 22.

- Van Buren Street and Taylor Street to Polk Street and Fillmore Street
  The improvements that tie into the 48" system along Van Buren Street consist of 36" pipe that runs along Taylor Street south of Van Buren Street to Polk Street and 24" pipe that runs west along Polk Street from Taylor Street to Fillmore Street. The improvements also consist of a couple inlets along Polk Street. The improvements will intercept flows from Basin 21.
- Van Buren Street and Pierce Street to Polk Street and Pierce Street
  The improvements that tie into the 48" system along Van Buren Street consist of 24" pipe that runs along Pierce Street and includes a couple of inlets. The improvements will intercept flows from Basin19.

Photo 9: Wyoming Ave. and Colorado Ave.

FY 2013

Improvements for Fiscal Year 2013 consist of the projects described below. The total anticipated cost for storm improvements for FY 2013 is approximately $1,384,000.

- Madison Street and Adams Street to Madison Street and Lincoln Street
  The improvements consist of 36" pipe from McCue Wetlands along Madison Street to and including a detention pond at Madison and Lincoln Streets with several inlets along Madison Street. The detention pond was sized to detain a volume of approximately 7.5 acre-feet. It will provide peak flow reduction, as well as an improvement in water quality of water discharged to the McCue Wetlands.

FY 2014

Improvements for Fiscal Year 2014 consist of the projects described below. The total anticipated cost for storm improvements for FY 2014 is approximately $1,030,000.

- Jefferson Street and Johnson Street to Monroe Street and Colorado Avenue
  The improvements consist of 36" pipe from the 48" system in Monroe Street, FY 2010, at Colorado Avenue, north along Colorado Avenue to Jefferson Street and continue west along Jefferson Street to Johnson Street. This system includes inlets along Jefferson Street. The improvements will intercept flows from Basin 28.

- Harrison Street and Lincoln Street to Harrison Street and Hayes Street
  These improvements will connect to the FY 2010 improvements at the intersection of Harrison Street and Lincoln Street. The improvements consist of 36" pipe along Harrison Street west along Harrison Street to Hayes Street. The improvements include several inlets along Harrison Street and inlets along Hayes and Grant Streets, which are connected to the 36" storm system with 18" pipe. The improvements will intercept flows from Basins 42 and 43.

Photo 10: Harrison St. and Grant St.

FY 2015

Improvements for Fiscal Year 2015 consist of the projects described below. The total anticipated cost for storm improvements for FY 2015 is approximately $1,587,000.

- Franklin Street and Adams Street to Franklin Street and Johnson Street
  The improvements that connect into the existing 42" storm sewer system along Adams Street consist of 36" pipe along Franklin Street from Adams and Franklin Streets to Buchanan Street where it transitions into 30" pipe and continues east to Johnson Street. The improvements include several inlets along Franklin Street. The improvements will intercept flows from Basins 44, 47, 49, 50 and 52.

- Franklin Street and Arthur Street to Snowy Range Road and Arthur Street
  The improvements, which connect downstream into the existing storm system along Snowy Range Road, consist of 30" pipe along Arthur Street south to Franklin Street. The improvements will intercept flows from Basin 40.

Outyear Projects

These projects include all additional work beyond FY 2015.

- Kiwanis Park Pond
  The Kiwanis Park Pond is located immediately north of the park. The detention pond was sized to detain a volume of approximately 5.1 acre-feet and will treat and detain flows from Basins 10 and 12. The pond will outfall to Outyear improvements along Van Buren Street.

- Wyoming Avenue and Schrader Street Pond
  The detention pond located at the intersection of Wyoming Avenue and Schrader Street is sized to detain a volume of approximately 4.2 acre-feet and will treat and detain flows from Basins 9 and 16. The pond will outfall to Outyear improvements along Jackson Street which will connect to the existing Snowy Range Road System.

- Wyoming Avenue and Schrader Street to Colorado Avenue and Van Buren Street
  The improvements connect to the FY 2012 improvements at the intersection of Colorado Avenue and Van Buren Street with 48" pipe. The 48" pipe network continues west along Van Buren Street to Grant Street and continues south down Grant Street to Wyoming Avenue. At Wyoming Avenue, the system downsizes to 42" pipe west along Wyoming Avenue to Snowy Range Road. At Snowy Range Road the system downsizes to 36" pipe and continues along Wyoming Avenue to the Pond at Schrader Street. The improvements include several inlets along Grant Street and Wyoming Avenue. The improvements will intercept flows from Basins 11, 17 and 18.

- Monroe Street and Taylor Street to Jefferson Street and Taylor Street
  The improvements consist of 24" pipe that will connect inlets to the 42" pipe as part of FY 2010 improvements at the intersection of Monroe Street and Taylor Street. The improvements will intercept flows from Basin 33.

- Monroe Street and Pierce Street to Wyoming Avenue and Pierce Street
  The improvements consist of 30" pipe along Pierce Street from Monroe Street to Jefferson Street which downsizes to 18" pipe from Jefferson Street to Wyoming Street to connect to an inlet at Wyoming Avenue. The system includes a few inlets along Pierce Street. The improvements will intercept flows from Basin 31.

- Van Buren Street and Lincoln Street to Polk Street and Lincoln Street
  The improvements connect to the FY 2012 improvements at the intersection of Van Buren. They consist of 24" pipe along Polk Street from Van Buren Street to Polk Street which connects to inlets along Lincoln Street. The improvements will intercept flows from Basin 19.

- Jackson Street to Schrader Street Pond to Schrader Street Interception Channel
  Improvements along Schrader Street consist of an interception channel to collect offsite flows from Basin 37. It was anticipated that intercepting these flows before they enter West Laramie will improve flooding problems seen in the area of Eberhart Street. This channel is located on the west side of Schrader Street from Jefferson Street to Jackson Street. The channel outfalls into the detention pond located at the intersection of Schrader Street and Jackson Street. The detention pond was sized to detain a volume of approximately 5.1 acre-feet and will treat and detain flows from the interception channel and Basin 37. The pond outfalls into an 18" storm sewer system along Jackson Street that connects into the existing Snowy Range Road storm system.

Photo 11: Wyoming Ave. and Pierce St.

Photo 12: Harrison St. and Taylor St.

Photo Documentation of Existing Conditions

Photo 13: Jefferson St. and Cleveland St.

Photo 14: Wyoming Ave. and Johnson St.

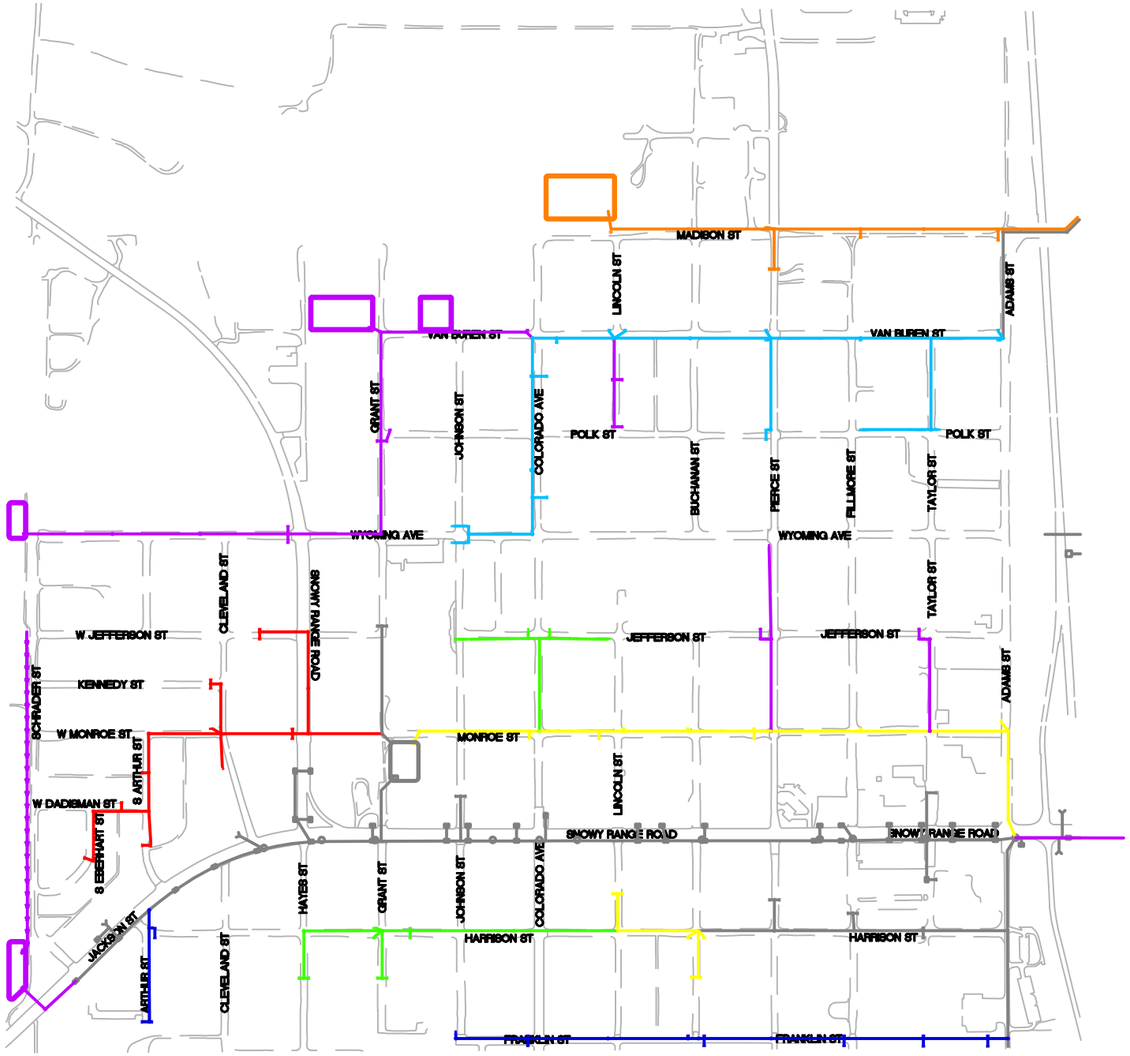
Photo 15: Snowy Range Rd. and Taylor St.

Photo 16: McCue Wetlands

REFERENCES

1. Urban Storm Drainage Criteria Manual Volume 1-3. June 2001.
2. NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States, Volume II – Wyoming, 1973.

Appendix A – Proposed Improvements



FY 2010

FY 2011

FY 2012

FY 2013

FY 2014

FY 2015

PHASE OUTYEAR

EXISTING
(INCLUDING FY 2009)

N

0 400 800

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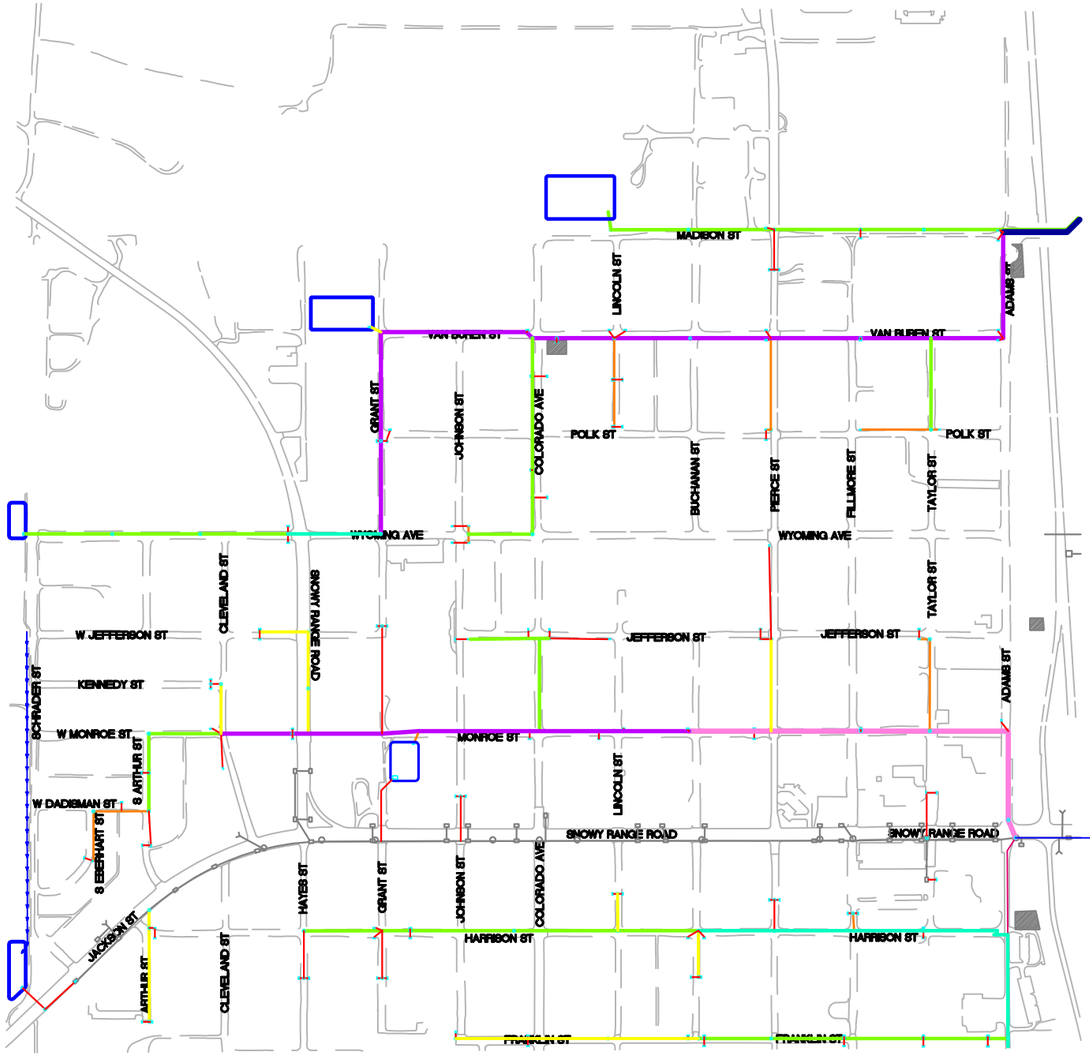
SEH

PROPOSED IMPROVEMENT PHASING
WEST LARAMIE MDP
WEST LARAMIE, WY



18" PIPE

24" PIPE

30" PIPE

36" PIPE

42" PIPE

48" PIPE

54" PIPE

60" PIPE

BOX CULVERT

DETENTION/DIVERSION

EXISTING STORM

EXISTING POND

N

0 400 800

PROPOSED IMPROVEMENT SIZING
WEST LARAMIE MDP
WEST LARAMIE, WY

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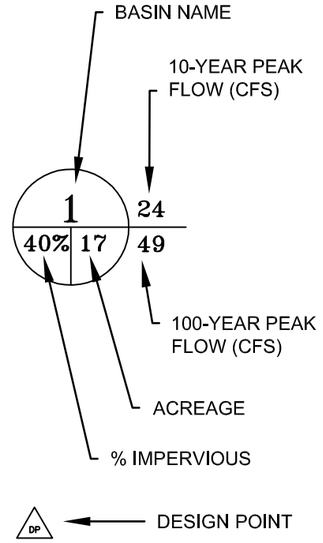
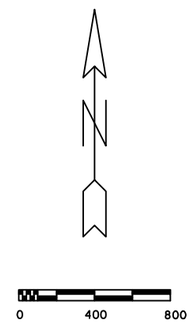
Appendix B – Mapping

Basin	Peak Flow (cfs)		
	5-yr	10-yr	100-yr
1	24	25	49
2	12	14	32
3	4	6	11
4	8	9	19
5	38	47	103
6	5	6	10
7	12	15	32
8	51	54	106
9	47	54	95
10	5	6	12
11	9	10	20
12	9	15	22
13	2	3	6
14	25	25	53
15	21	25	56
16	54	61	112
17	21	25	51
18	7	8	19
19	17	19	35
20	9	15	18
21	13	14	27
22	42	47	82
23	6	7	14
24	21	25	42
25	23	27	49
26	11	12	23
27	29	33	58
28	38	43	76
29	17	15	34
30	5	6	9
31	13	15	27
32	7	6	13
33	10	11	20
34	39	44	73
35	13	15	27
36	43	19	76
37	88	101	185
38	28	31	56
39	5	5	10
40	11	19	20
41	10	11	18
42	21	25	41
43	7	8	13
44	22	25	44
45	8	5	15
46	6	7	13
47	9	6	11
48	12	14	24
49	6	6	12
50	9	15	17
51	27	30	50
52	14	15	27





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SUB-BASIN HYDROLOGY
WEST LARAMIE MDP
WEST LARAMIE, WY

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HYDROLOGIC SOIL GROUP

GROUP B

GROUP C

NOTE: ALL SOILS DATA OBTAINED FROM NRCS WEB SOIL SURVEY.

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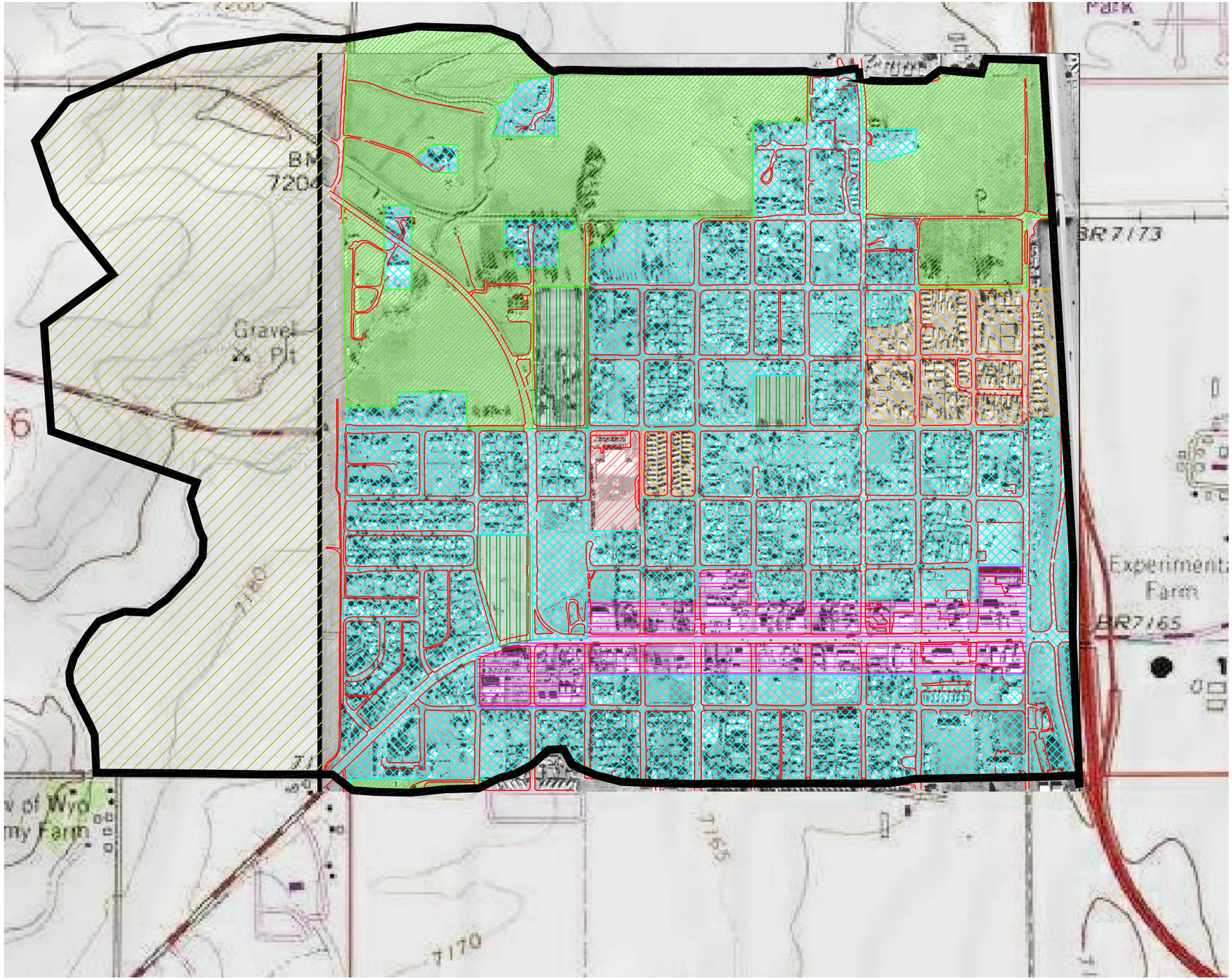
HYDROLOGIC SOILS GROUPS
WEST LARAMIE MDP
WEST LARAMIE, WY



LEGEND

SYMBOL	USE	(% IMP)
	OFFSITE	(40%)
	RESIDENTIAL	(43%)
	BUSINESS	(95%)
	GREENBELT	(2%)
	SCHOOL	(55%)
	MODULAR HOUSING	(55%)
	PARKS	(7%)
	PAVED	(100%)

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% IMPERVIOUS / LAND USE
WEST LARAMIE MDP
WEST LARAMIE, WY

Appendix C –Cost Estimate

Phase	Const. Cost	Design Cost	Const. Mgmt.	Total Cost	Future Value*	Total Budget**	Total Available Budget	Excess / Deficiency
FY2009	-				-			
FY 2010	$1,087,687	$81,577	$81,577	$1,250,840	$1,250,840	$1,376,000	$2,030,000	$654,000
FY 2011	$714,345	$53,576	$53,576	$821,497	$854,357	$940,000	$1,185,000	$245,000
FY 2012	$1,161,167	$87,088	$87,088	$1,335,343	$1,442,170	$1,587,000	$1,346,000	($241,000)
FY 2013	$632,045	$47,403	$47,403	$726,852	$814,074	$896,000	$1,384,000	$488,000
FY 2014	$614,732	$46,105	$46,105	$706,942	$820,052	$903,000	$1,030,000	$127,000
FY 2015	$847,829	$63,587	$63,587	$975,003	$1,170,004	$1,288,000	$1,587,000	$299,000
Outyear	$4,336,810	$325,261	$325,261	$4,987,331	$6,184,291	$6,803,000		

* based on 4% linear inflation
**10% contingency (future value x 1.1)

FY 2010 Snowy Range Rd. & Adams St. to Pond at Grant St. & Monroe St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$19,106	$19,106
2	Mobilization/Demolition (10%)	1	LS	$63,685	$63,685
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$31,843	$31,843
Storm Sewer					
4	18" HDPE	200	LF	$50	$10,000
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	1425	LF	$125	$178,125
10	54" HDPE	2155	LF	$140	$301,700
				Sub-Total	*$489,825*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	8	EA	$6,750	$54,000
14	Square Manhole/Vault	1	EA	$14,000	$14,000
				Sub-Total	*$68,000*
Inlets					
15	Pond Release Structure	1	EA	$5,000	$5,000
16	Type R Inlet	8	EA	$4,000	$32,000
				Sub-Total	*$37,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	390	SY	$30	$11,700
				Sub-Total	*$11,700*
Utility Relocates					
19	Dry Utility Administration	1	LS	$30,326	$30,326
				Sub-Total	*$30,326*
				Sub-Total for Alternative	$751,484
				Contingency (25%)	$187,871
				Total For Alternative	**$939,356**

FY 2010 Harrison St. & Lincoln St. to Harrison St. & Buchanan St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$3,017	$3,017
2	Mobilization/Demolition (10%)	1	LS	$10,056	$10,056
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$5,028	$5,028
Storm Sewer					
4	18" HDPE	40	LF	$50	$2,000
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	195	LF	$70	$13,650
7	36" HDPE	425	LF	$85	$36,125
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$51,775*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	1	EA	$4,750	$4,750
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$20,000*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	6	EA	$4,000	$24,000
				Sub-Total	*$24,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$4,789	$4,789
				Sub-Total	*$4,789*
				Sub-Total for Alternative	$118,665
				Contingency (25%)	$29,666
				Total For Alternative	**$148,332**

FY 2011 Monroe St. & Grant St. to Dadisman St. & Eberhart St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$9,341	$9,341
2	Mobilization/Demolition (10%)	1	LS	$31,137	$31,137
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$15,568	$15,568
Storm Sewer					
4	18" HDPE	359	LF	$50	$17,950
5	24" HDPE	544	LF	$60	$32,640
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	790	LF	$85	$67,150
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	850	LF	$125	$106,250
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$223,990*
Manholes					
11	5' Manhole	1	EA	$4,250	$4,250
12	6' Manhole	2	EA	$4,750	$9,500
13	7' Manhole	3	EA	$6,750	$20,250
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$34,000*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	9	EA	$4,000	$36,000
				Sub-Total	*$36,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	$0
Asphalt Patch					
18	6" Asphalt Patch	85	SY	$30	$2,550
				Sub-Total	*$2,550*
Utility Relocates					
19	Dry Utility Administration	1	LS	$14,827	$14,827
				Sub-Total	*$14,827*
				Sub-Total for Alternative	$367,413
				Contingency (25%)	$91,853
				Total For Alternative	**$459,266**

FY 2011 Monroe St. & Snowy Range Rd. to Jefferson St. & Snowy Range Rd.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$3,336	$3,336
2	Mobilization/Demolition (10%)	1	LS	$11,120	$11,120
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$5,560	$5,560
Storm Sewer					
4	18" HDPE	40	LF	$50	$2,000
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	795	LF	$70	$55,650
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$57,650*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	1	EA	$4,750	$4,750
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$20,000*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	2	EA	$4,000	$8,000
				Sub-Total	*$8,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	675	SY	$30	$20,250
				Sub-Total	*$20,250*
Utility Relocates					
19	Dry Utility Administration	1	LS	$5,295	$5,295
				Sub-Total	*$5,295*
				Sub-Total for Alternative	$131,210
				Contingency (25%)	$32,803
				Total For Alternative	**$164,013**

FY 2011 Monroe St. & Cleveland St. to Kennedy St. & Cleveland St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$1,852	$1,852
2	Mobilization/Demolition (10%)	1	LS	$6,174	$6,174
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$3,087	$3,087
Storm Sewer					
4	18" HDPE	315	LF	$50	$15,750
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	265	LF	$70	$18,550
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$34,300*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$8,500*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	4	EA	$4,000	$16,000
				Sub-Total	*$16,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$2,940	$2,940
				Sub-Total	*$2,940*
				Sub-Total for Alternative	$72,853
				Contingency (25%)	$18,213
				Total For Alternative	**$91,067**

FY 2012 Van Buren St. & Adams St. to Wyoming Ave. & Johnson St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$19,194	$19,194
2	Mobilization/Demolition (10%)	1	LS	$63,979	$63,979
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$31,990	$31,990
Storm Sewer					
4	18" HDPE	525	LF	$50	$26,250
5	24" HDPE	75	LF	$60	$4,500
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	1370	LF	$85	$116,450
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	2485	LF	$125	$310,625
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$457,825*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	4	EA	$4,750	$19,000
13	7' Manhole	6	EA	$6,750	$40,500
14	Square Manhole/Vault	2	EA	$14,000	$28,000
				Sub-Total	*$87,500*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	16	EA	$4,000	$64,000
				Sub-Total	*$64,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	70	SY	$30	$2,100
				Sub-Total	*$2,100*
Utility Relocates					
19	Dry Utility Administration	1	LS	$30,466	$30,466
				Sub-Total	*$30,466*
				Sub-Total for Alternative	$757,054
				Contingency (25%)	$189,263
				Total For Alternative	**$946,317**

FY 2012 Van Buren St. & Taylor St. to Polk St. & Fillmore St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$2,447	$2,447
2	Mobilization/Demolition (10%)	1	LS	$8,156	$8,156
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$4,078	$4,078
Storm Sewer					
4	18" HDPE	0	LF	$50	$0
5	24" HDPE	395	LF	$60	$23,700
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	485	LF	$85	$41,225
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$64,925*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	1	EA	$4,750	$4,750
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$4,750*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	2	EA	$4,000	$8,000
					$8,000
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$3,884	$3,884
				Sub-Total	*$3,884*
				Sub-Total for Alternative	$96,239
				Contingency (25%)	$24,060
				Total For Alternative	**$120,299**

FY 2012 Van Buren St. & Pierce St. to PolkSt. & Pierce St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$1,923	$1,923
2	Mobilization/Demolition (10%)	1	LS	$6,410	$6,410
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$3,205	$3,205
Storm Sewer					
4	18" HDPE	40	LF	$50	$2,000
5	24" HDPE	500	LF	$60	$30,000
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$32,000*
Manholes					
11	5' Manhole	1	EA	$4,250	$4,250
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$4,250*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	2	EA	$4,000	$8,000
				Sub-Total	*$8,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	560	SY	$30	$16,800
				Sub-Total	*$16,800*
Utility Relocates					
19	Dry Utility Administration	1	LS	$3,053	$3,053
				Sub-Total	*$3,053*
				Sub-Total for Alternative	$75,641
				Contingency (25%)	$18,910
				Total For Alternative	**$94,551**

FY 2013 Madison St. & Adams St. to Madison St. & Lincoln St. (No pond)

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$9,159	$9,159
2	Mobilization/Demolition (10%)	1	LS	$30,529	$30,529
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$15,264	$15,264
Storm Sewer					
4	18" HDPE	390	LF	$50	$19,500
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	2600	LF	$85	$221,000
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$240,500*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	2	EA	$4,750	$9,500
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$24,750*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	6	EA	$4,000	$24,000
				Sub-Total	*$24,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	50	SY	$30	$1,500
				Sub-Total	*$1,500*
Utility Relocates					
19	Dry Utility Administration	1	LS	$14,538	$14,538
				Sub-Total	*$14,538*
				Sub-Total for Alternative	$360,239
				Contingency (25%)	$90,060
				Total For Alternative	**$450,299**

FY 2013 Madison St. & Lincoln St. Pond

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$3,697	$3,697
2	Mobilization/Demolition (10%)	1	LS	$12,322	$12,322
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$6,161	$6,161
Storm Sewer					
4	18" HDPE	0	LF	$50	$0
5	24" HDPE	0	LF	$70	$0
6	30" HDPE	0	LF	$80	$0
7	36" HDPE	0	LF	$90	$0
8	42" HDPE	0	LF	$100	$0
9	48" HDPE	0	LF	$110	$0
10	54" HDPE	0	LF	$130	$0
				Sub-Total	*$0*
Manholes					
11	5' Manhole	0	EA	$5,000	$0
12	6' Manhole	0	EA	$5,500	$0
13	7' Manhole	0	EA	$7,500	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$0*
Inlets					
15	Pond Release Structure	1	EA	$5,000	$5,000
16	Type R Inlet	0	EA	$4,000	$0
				Sub-Total	*$5,000*
Detention					
17	Detention Volume	7.49	AC-FT	$15,000	$112,350
				Sub-Total	*$112,350*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$5,868	$5,868
				Sub-Total	*$5,868*
				Sub-Total for Alternative	$145,397
				Contingency (25%)	$36,349
				Total For Alternative	**$181,746**

FY 2014 Jefferson St. & Johnson St. to Monroe St, & Colorado Ave.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$4,564	$4,564
2	Mobilization/Demolition (10%)	1	LS	$15,215	$15,215
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$7,607	$7,607
Storm Sewer					
4	18" HDPE	410	LF	$50	$20,500
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	890	LF	$85	$75,650
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$96,150*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	1	EA	$14,000	$14,000
				Sub-Total	*$20,750*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	7	EA	$4,000	$28,000
				Sub-Total	*$28,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	100	SY	$30	$3,000
				Sub-Total	*$3,000*
Utility Relocates					
19	Dry Utility Administration	1	LS	$7,245	$7,245
				Sub-Total	*$7,245*
				Sub-Total for Alternative	$182,531
				Contingency (25%)	$45,633
				Total For Alternative	**$228,164**

FY 2014 Harrison St. & Lincoln St. to Harrison St. & Hayes St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$7,862	$7,862
2	Mobilization/Demolition (10%)	1	LS	$26,208	$26,208
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$13,104	$13,104
Storm Sewer					
4	18" HDPE	710	LF	$50	$35,500
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	1660	LF	$85	$141,100
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$176,600*
Manholes					
11	5' Manhole	3	EA	$4,250	$12,750
12	6' Manhole	3	EA	$4,750	$14,250
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	1	EA	$14,000	$14,000
				Sub-Total	*$41,000*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	8	EA	$4,000	$32,000
				Sub-Total	*$32,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$12,480	$12,480
				Sub-Total	*$12,480*
				Sub-Total for Alternative	$309,254
				Contingency (25%)	$77,314
				Total For Alternative	**$386,568**

2015 Franklin St. & Adams St. to Franklin St. & Johnson St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$12,925	$12,925
2	Mobilization/Demolition (10%)	1	LS	$43,084	$43,084
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$21,542	$21,542
Storm Sewer					
4	18" HDPE	225	LF	$50	$11,250
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	1280	LF	$70	$89,600
7	36" HDPE	1635	LF	$85	$138,975
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$239,825*
Manholes					
11	5' Manhole	6	EA	$4,250	$25,500
12	6' Manhole	4	EA	$4,750	$19,000
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$51,250*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	12	EA	$4,000	$48,000
				Sub-Total	*$48,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	2375	SY	$30	$71,250
				Sub-Total	*$71,250*
Utility Relocates					
19	Dry Utility Administration	1	LS	$20,516	$20,516
				Sub-Total	*$20,516*
				Sub-Total for Alternative	$508,393
				Contingency (25%)	$573,019
				Total For Alternative	$723,077

2015 Franklin St. & Arthur St. to Snowy Range Road & Arthur St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$2,537	$2,537
2	Mobilization/Demolition (10%)	1	LS	$8,458	$8,458
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$4,229	$4,229
Storm Sewer					
4	18" HDPE	100	LF	$50	$5,000
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	590	LF	$70	$41,300
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$46,300*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$15,250*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	4	EA	$4,000	$16,000
				Sub-Total	*$16,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	100	SY	$30	$3,000
				Sub-Total	*$3,000*
Utility Relocates					
19	Dry Utility Administration	1	LS	$4,028	$4,028
				Sub-Total	*$4,028*
				Sub-Total for Alternative	$99,801
				Contingency (25%)	$24,950
				Total For Alternative	**$124,752**

OUTYEAR Kiwanis Park Pond

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$6,596	$6,596
2	Mobilization/Demolition (10%)	1	LS	$21,987	$21,987
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$10,994	$10,994
Storm Sewer					
4	18" HDPE	0	LF	$50	$0
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$0*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$0*
Inlets					
15	Pond Release Structure	1	EA	$5,000	$5,000
16	Type R Inlet	0	EA	$4,000	$0
				Sub-Total	*$5,000*
Detention					
17	Detention Volume	5.11	AC-FT	$40,000	$204,400
				Sub-Total	*$204,400*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$10,470	$10,470
				Sub-Total	*$10,470*
				Sub-Total for Alternative	$259,447
				Contingency (25%)	$64,862
				Total For Alternative	**$324,308**

OUTYEAR Wyoming Ave. & Schrader St. Pond

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$5,412	$5,412
2	Mobilization/Demolition (10%)	1	LS	$18,039	$18,039
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$9,020	$9,020
Storm Sewer					
4	18" HDPE	0	LF	$50	$0
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$0*
Manholes					
11	5' Manhole	0	EA	$4,250	$0
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$0*
Inlets					
15	Pond Release Structure	1	EA	$5,000	$5,000
16	Type R Inlet	0	EA	$4,000	$0
				Sub-Total	*$5,000*
Detention					
17	Detention Volume	4.17	AC-FT	$40,000	$166,800
				Sub-Total	*$166,800*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$8,590	$8,590
				Sub-Total	*$8,590*
				Sub-Total for Alternative	$212,860
				Contingency (25%)	$53,215
				Total For Alternative	**$266,075**

OUTYEAR Wyoming Ave. & Schrader St. to Colorado Ave. and Van Buren St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$15,815	$15,815
2	Mobilization/Demolition (10%)	1	LS	$52,715	$52,715
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$26,358	$26,358
Storm Sewer					
4	18" HDPE	175	LF	$50	$8,750
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	60	LF	$70	$4,200
7	36" HDPE	1390	LF	$85	$118,150
8	42" HDPE	490	LF	$110	$53,900
9	48" HDPE	1880	LF	$125	$235,000
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$420,000*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	1	EA	$4,750	$4,750
13	7' Manhole	2	EA	$6,750	$13,500
14	Square Manhole/Vault	2	EA	$14,000	$28,000
				Sub-Total	*$54,750*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	6	EA	$4,000	$24,000
				Sub-Total	*$24,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
					$0
Asphalt Patch					
18	6" Asphalt Patch	110	SY	$30	$3,300
				Sub-Total	*$3,300*
Utility Relocates					
19	Dry Utility Administration	1	LS	$25,103	$25,103
				Sub-Total	*$25,103*
				Sub-Total for Alternative	$622,040
				Contingency (25%)	$155,510
				Total For Alternative	**$777,550**

OUTYEAR Monroe St.& Taylor St. to Jefferson St. & Taylor St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$1,912	$1,912
2	Mobilization/Demolition (10%)	1	LS	$6,374	$6,374
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$3,187	$3,187
Storm Sewer					
4	18" HDPE	55	LF	$50	$2,750
5	24" HDPE	535	LF	$70	$37,450
6	30" HDPE	0	LF	$80	$0
7	36" HDPE	0	LF	$90	$0
8	42" HDPE	0	LF	$100	$0
9	48" HDPE	0	LF	$110	$0
10	54" HDPE	0	LF	$130	$0
				Sub-Total	*$40,200*
Manholes					
11	5' Manhole	1	EA	$5,000	$5,000
12	6' Manhole	0	EA	$5,500	$0
16	7' Manhole	1	EA	$7,500	$7,500
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$12,500*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	2	EA	$4,000	$8,000
				Sub-Total	*$8,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$3,035	$3,035
				Sub-Total	*$3,035*
				Sub-Total for Alternative	$75,207
				Contingency (25%)	$18,802
				Total For Alternative	**$94,009**

OUTYEAR Monroe St. & Pierce St. to Wyoming Ave. & Pierce St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$3,983	$3,983
2	Mobilization/Demolition (10%)	1	LS	$13,277	$13,277
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$6,639	$6,639
Storm Sewer					
4	18" HDPE	585	LF	$50	$29,250
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	485	LF	$70	$33,950
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$63,200*
Manholes					
11	5' Manhole	1	EA	$4,250	$4,250
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	1	EA	$14,000	$14,000
				Sub-Total	*$18,250*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	3	EA	$4,000	$12,000
				Sub-Total	*$12,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	1100	SY	$30	$33,000
				Sub-Total	*$33,000*
Utility Relocates					
19	Dry Utility Administration	1	LS	$6,323	$6,323
				Sub-Total	*$6,323*
				Sub-Total for Alternative	$156,672
				Contingency (25%)	$39,168
				Total For Alternative	**$195,839**

OUTYEAR Van Buren St. & Lincoln St. to Polk St. & Lincoln St.

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$1,833	$1,833
2	Mobilization/Demolition (10%)	1	LS	$6,111	$6,111
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$3,056	$3,056
Storm Sewer					
4	18" HDPE	110	LF	$50	$5,500
5	24" HDPE	470	LF	$60	$28,200
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$33,700*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$8,500*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	4	EA	$4,000	$16,000
				Sub-Total	*$16,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	0	SY	$30	$0
				Sub-Total	*$0*
Utility Relocates					
19	Dry Utility Administration	1	LS	$2,910	$2,910
				Sub-Total	*$2,910*
				Sub-Total for Alternative	$72,110
				Contingency (25%)	$18,027
				Total For Alternative	**$90,137**

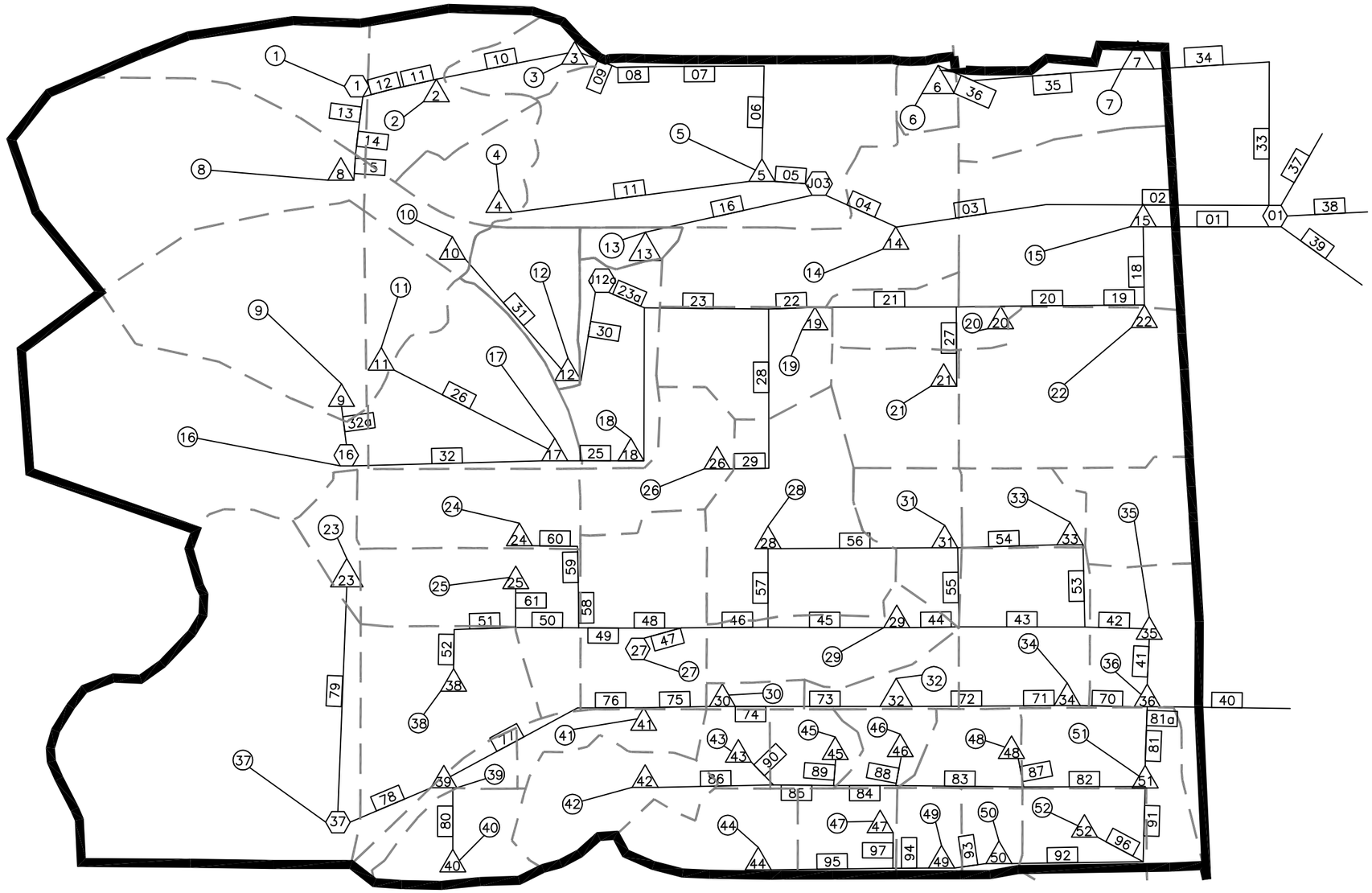
OUTYEAR Jackson St. to Schrader St. Pond to Schrader Interception Channel

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$7,744	$7,744
2	Mobilization/Demolition (10%)	1	LS	$25,814	$25,814
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$12,907	$12,907
Storm Sewer					
4	18" HDPE	370	LF	$50	$18,500
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
				Sub-Total	*$18,500*
Manholes					
11	5' Manhole	1	EA	$4,250	$4,250
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	0	EA	$6,750	$0
14	Square Manhole/Vault	0	EA	$14,000	$0
				Sub-Total	*$4,250*
Inlets					
15	Pond Release Structure	1	EA	$5,000	$5,000
16	Type R Inlet	1	EA	$4,000	$4,000
				Sub-Total	*$9,000*
Detention					
17	Detention Volume	5.12	AC-FT	$40,000	$204,800
				Sub-Total	*$204,800*
Asphalt Patch					
18	6" Asphalt Patch	310	SY	$30	$9,300
				Sub-Total	*$9,300*
Utility Relocates					
19	Dry Utility Administration	1	LS	$12,293	$12,293
				Sub-Total	*$12,293*
				Sub-Total for Alternative	$304,608
				Contingency (25%)	$76,152
				Total For Alternative	**$380,760**

OUTYEAR **Snowy Range Road & Adams St. Outfall**

Item No.	Description	Quantity	Unit	Unit Price	Extension
1	Traffic Control (3%)	1	LS	$44,911	$44,911
2	Mobilization/Demolition (10%)	1	LS	$149,704	$149,704
3	Material Management (environmental remediation and disposal) (5%)	1	LS	$74,852	$74,852
Storm Sewer					
4	18" HDPE	0	LF	$50	$0
5	24" HDPE	0	LF	$60	$0
6	30" HDPE	0	LF	$70	$0
7	36" HDPE	0	LF	$85	$0
8	42" HDPE	0	LF	$110	$0
9	48" HDPE	0	LF	$125	$0
10	54" HDPE	0	LF	$140	$0
10a	60" HDPE	570	LF	$150	$85,500
10b	14'(w)x5'(h) Concrete Box Culvert	1520	LF	$860	$1,307,200
				Sub-Total	*$1,392,700*
Manholes					
11	5' Manhole	2	EA	$4,250	$8,500
12	6' Manhole	0	EA	$4,750	$0
13	7' Manhole	1	EA	$6,750	$6,750
14	Square Manhole/Vault	1	EA	$14,000	$14,000
				Sub-Total	*$14,000*
Inlets					
15	Pond Release Structure	0	EA	$5,000	$0
16	Type R Inlet	4	EA	$4,000	$16,000
				Sub-Total	*$16,000*
Detention					
17	Detention Volume	0	AC-FT	$40,000	$0
				Sub-Total	*$0*
Asphalt Patch					
18	6" Asphalt Patch	635	SY	$30	$19,050
				Sub-Total	*$19,050*
Utility Relocates					
19	Dry Utility Administration	1	LS	$71,288	$71,288
				Sub-Total	*$71,288*
				Sub-Total for Alternative	$1,766,504
				Contingency (25%)	$441,626
				Total For Alternative	**$2,208,130**

Appendix D –Technical Appendices



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ROUTING SCHEMATIC
WEST LARAMIE MDP
WEST LARAMIE, WY

Name	CUHP Area	Dist. To Centroid	Length	Slope	Impervious %	Pervious Depression Storage	Impervious Depression Storage	Initial Infiltration Rate	Horton Decay Rate	Final Infiltration Rate	Coefficient Ct	Coefficient Cp	Time of Conc.
B01	0.027	0.14	0.22	0.023	41.2	0.35	0.1	1.76	0.002	0.29	0.186	0.301	16.56
B02	0.028	0.18	0.21	0.015	5.7	0.35	0.1	2.83	0.002	0.47	0.284	0.183	16.29
B03	0.011	0.11	0.2	0.01	2	0.35	0.1	2.94	0.002	0.49	0.409	0.172	15.76
B04	0.015	0.09	0.13	0.023	9	0.35	0.1	2.73	0.002	0.46	0.323	0.158	13.82
B05	0.087	0.11	0.3	0.014	6.5	0.35	0.1	3.17	0.002	0.49	0.197	0.214	18.78
B06	0.007	0.05	0.09	0.005	63.8	0.35	0.1	1.09	0.002	0.18	0.255	0.337	12.53
B07	0.026	0.13	0.24	0.017	15.5	0.35	0.1	3.59	0.002	0.49	0.239	0.171	17.17
B08	0.072	0.33	0.51	0.014	40.2	0.35	0.1	1.79	0.002	0.3	0.138	0.339	24.82
B09	0.058	0.2	0.37	0.017	40	0.35	0.1	1.83	0.002	0.3	0.148	0.326	20.79
B10	0.009	0.09	0.17	0.027	20.6	0.35	0.1	2.38	0.002	0.4	0.316	0.154	11.77
B11	0.015	0.13	0.19	0.014	42.8	0.35	0.1	1.75	0.002	0.29	0.223	0.285	15.54
B12	0.018	0.15	0.2	0.017	19.8	0.35	0.1	3	0.002	0.44	0.254	0.17	15.96
B13	0.005	0.07	0.14	0.011	23.5	0.35	0.1	3.44	0.002	0.46	0.362	0.149	14.13
B14	0.047	0.1	0.32	0.001	54	0.35	0.1	1.84	0.002	0.26	0.146	0.408	19.25
B15	0.055	0.19	0.36	0.006	21.9	0.35	0.1	3.35	0.002	0.46	0.176	0.208	20.64
B16	0.074	0.27	0.5	0.018	40.1	0.35	0.1	1.9	0.002	0.31	0.137	0.34	24.8
B17	0.042	0.22	0.26	0.01	20.8	0.35	0.1	3.28	0.002	0.46	0.194	0.195	17.75
B18	0.026	0.16	0.28	0.002	19.9	0.35	0.1	3.26	0.002	0.46	0.228	0.179	18.26
B19	0.025	0.24	0.23	0.004	52.9	0.35	0.1	1.87	0.002	0.27	0.178	0.367	16.79
B20	0.015	0.11	0.18	0.002	54.5	0.35	0.1	1.8	0.002	0.26	0.206	0.347	15.36
B21	0.022	0.08	0.2	0.003	48.3	0.35	0.1	1.63	0.002	0.26	0.19	0.335	15.95
B22	0.052	0.19	0.42	0.007	63	0.35	0.1	1.71	0.002	0.26	0.135	0.458	22.31
B23	0.008	0.1	0.14	0.013	40	0.35	0.1	2.57	0.002	0.35	0.269	0.244	14.19
B24	0.027	0.17	0.27	0.008	55.9	0.35	0.1	1.49	0.002	0.23	0.171	0.385	17.82
B25	0.034	0.13	0.29	0.009	45	0.35	0.1	1.99	0.002	0.3	0.17	0.338	18.65
B26	0.02	0.1	0.23	0.002	54	0.35	0.1	1.4	0.002	0.23	0.189	0.36	16.62
B27	0.036	0.04	0.2	0.005	53.7	0.035	0.1	1.99	0.002	0.27	0.158	0.391	15.99
B28	0.048	0.06	0.14	0.004	52.6	0.35	0.1	1.82	0.002	0.26	0.146	0.402	14.23
B29	0.024	0.16	0.23	0.003	63.3	0.35	0.1	1.65	0.002	0.22	0.172	0.407	16.67
B30	0.004	0.03	0.06	0.008	72.9	0.35	0.1	1.22	0.002	0.16	0.283	0.336	11.79
B31	0.018	0.09	0.11	0.004	44.6	0.35	0.1	1.92	0.002	0.29	0.206	0.305	13.1
B32	0.009	0.03	0.12	0.002	60.6	0.35	0.1	1.77	0.002	0.24	0.232	0.346	13.57
B33	0.014	0.12	0.16	0.005	52.3	0.35	0.1	1.43	0.002	0.24	0.213	0.334	14.67
B34	0.032	0.16	0.15	0.018	65.2	0.35	0.1	1.49	0.002	0.2	0.155	0.433	13.43
B35	0.018	0.1	0.25	0.009	54.8	0.35	0.1	1.67	0.002	0.25	0.197	0.356	17.4
B36	0.028	0.08	0.23	0.023	74.7	0.35	0.1	1.13	0.002	0.15	0.156	0.451	13.98
B37	0.12	0.3	0.4	0.008	40	0.35	0.1	2.25	0.002	0.33	0.118	0.364	21.69
B38	0.04	0.3	0.29	0.004	55.8	0.35	0.1	1.72	0.002	0.25	0.152	0.407	18.63
B39	0.008	0.13	0.26	0.003	61.1	0.35	0.1	1.75	0.002	0.23	0.248	0.336	17.55
B40	0.017	0.07	0.09	0.006	40	0.35	0.1	2.7	0.002	0.36	0.215	0.271	12.71
B41	0.012	0.13	0.19	0.003	68.6	0.35	0.1	1.41	0.002	0.19	0.208	0.382	15.62
B42	0.023	0.04	0.12	0.006	60	0.35	0.1	1.8	0.002	0.24	0.175	0.394	13.44
B43	0.008	0.08	0.08	0.005	59.5	0.35	0.1	1.82	0.002	0.24	0.245	0.334	12.21

Name	CUHP Area	Dist. To Centroid	Length	Slope	Impervious %	Pervious Depression Storage	Impervious Depression Storage	Initial Infiltration Rate	Horton Decay Rate	Final Infiltration Rate	Coefficient Ct	Coefficient Cp	Time of Conc.
B44	0.019	0.11	0.23	0.007	55.1	0.35	0.1	2.02	0.002	0.27	0.191	0.362	16.8
B45	0.01	0.04	0.1	0.005	57.1	0.35	0.1	1.93	0.002	0.26	0.233	0.335	12.8
B46	0.009	0.08	0.09	0.004	56.7	0.35	0.1	1.95	0.002	0.26	0.241	0.329	12.79
B47	0.013	0.15	0.16	0.004	49.2	0.35	0.1	2.29	0.002	0.3	0.222	0.315	14.72
B48	0.012	0.06	0.12	0.018	56.7	0.35	0.1	1.95	0.002	0.26	0.22	0.343	13.4
B49	0.009	0.15	0.16	0.005	52.8	0.35	0.1	2.12	0.002	0.28	0.247	0.312	14.73
B50	0.008	0.07	0.08	0.023	50.2	0.35	0.1	2.24	0.002	0.3	0.259	0.296	10.64
B51	0.026	0.15	0.2	0.009	73.5	0.35	0.1	1.19	0.002	0.16	0.161	0.443	15.99
B52	0.015	0.06	0.15	0.01	53.6	0.35	0.1	2.09	0.002	0.28	0.207	0.343	14.41

Name	Link Name	Shape	Roughness	Length ft	Diameter (Height) ft	Conduit Slope
M26	M26	Natural	0.014	1450	2	1.32
M30	M30	Circular	0.014	750	2.5	0.067
M31	M31	Natural	0.014	1100	2	1.773
O1	GrantOutlet	Circular	0.014	10	0.05	0
O3	Kiwanis Outlet	Circular	0.014	10	0.05	0
O4	Wyoming Outle	Circular	0.014	10	0.05	0
O5	Madison Outlet	Circular	0.014	10	0.05	0
O6	Welsh Outlet	Circular	0.014	10	0.05	0
O7	McCue1	Circular	0.014	10	0.05	0
O8	McCue2	Circular	0.014	10	0.05	0
O9	McCue3	Circular	0.014	10	0.05	0
Orifice 4	Wyoming Outle	Circular	0.014	10	0.05	0
Orifice 5	Madison Outlet	Circular	0.014	10	0.05	0
Orifice 6	Welsh Outlet	Circular	0.014	10	0.05	0
Orifice 8	McCue2	Circular	0.014	10	0.05	0
Orifice3	Kiwanis Outlet	Circular	0.014	10	0.05	0
Orifice7	McCue1	Circular	0.014	10	0.05	0
Orifice9	McCue3	Circular	0.014	10	0.05	0
OW	GrantOutlet	Circular	0.014	10	0.05	0
P01	M01	Rectangular	0.014	1000	4	0.25
P02	M02	Circular	0.014	1200	3	0.75
P03	M03	Circular	0.014	870	3	0.75
P04	P04	Circular	0.014	95	1	1
P05	P05	Circular	0.014	100	4	1
P06	P06	Trapezoidal	0.014	740	2	0.541
P07	P07	Trapezoidal	0.014	830	2	0.72
P08	P08	Trapezoidal	0.014	180	2	1.11
P09	P09	Trapezoidal	0.014	270	2	0.74
P10	P10	Natural	0.014	870	2	0.92
P11	P11	Natural	0.014	400	2	0.75
P12	P12	Circular	0.014	210	1.5	0.48
P13	P13	Trapezoidal	0.014	140	2	3.57
P14	P14	Circular	0.014	170	2	3.53
P15	P15	Trapezoidal	0.035	280	2	3.21
P16	M16	Circular	0.014	850	1.5	0.941
P17	P17	Natural	0.014	1700	2	1.512
P18	M18	Circular	0.014	560	4	0.5
P19	M19	Circular	0.014	375	4	0.5
P20	M20	Circular	0.014	845	4	0.5
P21	M21	Circular	0.014	835	4	0.5
P22	M22	Circular	0.014	400	4	0.5
P23	M23	Circular	0.014	770	4	0.5
P24	M24	Circular	0.014	1060	4	0.24
P25	M25	Circular	0.014	420	3.5	0.79
P27	M27	Circular	0.014	480	2	2
Name	Link Name	Shape	Roughness	Length ft	Diameter (Height) ft	Conduit Slope

Name	Link Name	Shape	Roughness	Length ft	Diameter (Height) ft	Conduit Slope
P28	M28	Circular	0.014	1035	3	0.3
P28a	P28a	Circular	0.014	70	1	6.54
P29	M29	Circular	0.014	340	3	0.3
P32	M32	Circular	0.014	1470	3	1
P32a	P32a	Trapezoidal	0.014	250	3	2
P33	P33	Circular	0.014	300	3	0.5
P34	P34	Circular	0.014	500	3	0.07
P35	P35	Natural	0.014	1150	1	1.565
P36	P36	Circular	0.014	50	2	0.4
P37	P37	Circular	0.014	101	2.5	0.1
P38	P38	Circular	0.014	101	2.5	0.1
P39	P39	Circular	0.014	114	4.5	1.14
P40	P40	Circular	0.014	1520	6.5	0.04
P41	M41	Circular	0.014	471	4.5	0.25
P41a	M41a	Circular	0.014	124	4.5	0.19
P42	M42	Circular	0.014	415	4.5	0.5
P43	M43	Circular	0.014	840	4.5	0.5
P44	M44	Circular	0.014	435	4.5	0.5
P45	M45	Circular	0.014	790	4	0.5
P46	P46	Circular	0.014	435	4	0.64
P47	P47	Circular	0.014	265	2	0.5
P48	P48	Circular	0.014	73	4	0
P49	M49	Circular	0.014	390	4	0.5
P50	M50	Circular	0.014	460	4	0.5
P51	M51	Circular	0.014	380	3	0.5
P52	M52	Circular	0.014	410	3	0.25
P53	M53	Circular	0.014	500	2	2
P54	P54	Natural	0.014	1220	1	0.41
P55	M55	Circular	0.014	485	2.5	1
P56	P56	Natural	0.014	1250	1	0.08
P57	M57	Circular	0.014	490	3	1
P58	M58	Circular	0.014	235	2.5	1
P59	M59	Circular	0.014	300	2.5	0.75
P60	M60	Circular	0.014	255	2.5	0.75
P61	M61	Circular	0.014	260	2.5	1
P70	M70	Circular	0.014	450	3.5	0.75
P71	M71	Circular	0.014	450	3.5	1
P72	M72	Circular	0.014	818	3	0.75
P73	M73	Circular	0.014	578	3	0.75
P74	M74	Special	0.014	229	4.417	0.75
P75	M75	Special	0.014	440	4.417	0.3
P76	M76	Special	0.014	575	4.417	0.2
P77	M77	Circular	0.014	820	2	0.92
P78	M78	Circular	0.014	850	1.5	0.24
P79	P79	Trapezoidal	0.014	1600	5	0.625
Name	Link Name	Shape	Roughness	Length ft	Diameter (Height) ft	Conduit Slope

P80	M80	Circular	0.014	500	2.5	0.3
P81	M81	Circular	0.014	525	4	0.5
P81a	M81a	Circular	0.014	45	4	0.23
P82	M82	Circular	0.014	800	3.5	0.5
P83	M83	Circular	0.014	823	3.5	1
P84	M84	Circular	0.014	425	3	0.5
P85	M85	Circular	0.014	550	3	0.5
P86	M86	Circular	0.014	700	3	0.5
P87	M87	Circular	0.014	90	2	2
P88	M88	Circular	0.014	163	1.5	0.61
P89	M89	Circular	0.014	195	3	2
P90	M90	Circular	0.014	50	2.5	2.12
P91	M91	Circular	0.014	550	3.5	0.5
P92	M92	Circular	0.014	865	3	0.5
P93	M93	Circular	0.014	395	3	0.75
P94	M94	Circular	0.014	413	3	0.95
P95	M95	Circular	0.014	386	2.5	0.28
P96	M96	Circular	0.014	525	2	0.4
P97	M97	Circular	0.014	285	2.5	0.71
S01	M01	Natural	0.014	1000	1	0.3
S02	M02	Natural	0.014	1200	1	1.33
S03	M03	Natural	0.014	900	1	0.06
S16	M16	Natural	0.014	850	1	0.65
S18	M18	Natural	0.014	560	1	0.36
S19	M19	Natural	0.014	375	1	1.07
S20	M20	Natural	0.014	845	1	1.18
S21	M21	Natural	0.014	820	1	0.06
S22	M22	Natural	0.014	400	1	0.08
S23	M23	Natural	0.014	770	1	0.81
S24	M24	Natural	0.014	1060	1	0
S25	M25	Natural	0.014	420	1	0.67
S27	M27	Natural	0.014	480	1	0.21
S28	M28	Natural	0.014	1030	1	0.12
S29	M29	Natural	0.014	340	1	0.15
S32	M32	Natural	0.014	1350	1	0.98
S41	M41	Natural	0.014	471	1	0
S42	M42	Natural	0.014	415	2	0.96
S43	M43	Natural	0.014	840	1	1.39
S44	M44	Natural	0.014	435	1	0.07
S45	M45	Natural	0.014	790	1	0.03
S49	M49	Trapezoidal	0.014	390	2	1.08
S50	M50	Trapezoidal	0.014	440	1	0
S51	M51	Natural	0.014	380	1	0.26
S52	M52	Natural	0.014	410	1	0
S53	M53	Natural	0.014	500	1	1.2
Name	Link Name	Shape	Roughness	Length ft	Diameter (Height) ft	Conduit Slope
Weir 8	McCue2	Circular	0.014	10	0.05	0

S55	M55	Natural	0.014	400	1	0.075
S57	M57	Natural	0.014	450	1	0.06
S58	M58	Natural	0.014	235	1	0.21
S59	M59	Natural	0.014	260	1	0
S60	M60	Natural	0.014	255	1	0.2
S61	M61	Natural	0.014	260	1	0
S70	M70	Natural	0.014	450	0.64	0.89
S71	M71	Natural	0.014	450	0.64	0.67
S72	M72	Natural	0.014	818	0.64	0.61
S73	M73	Natural	0.014	578	0.64	0.69
S74	M74	Natural	0.014	230	0.64	0.87
S75	M75	Natural	0.014	440	0.64	0.52
S76	M76	Natural	0.014	530	1	-0.06
S77	M77	Natural	0.014	820	1	0.73
S78	M78	Natural	0.014	850	0.5	0.35
S80	M80	Natural	0.014	350	1	0.57
S81	M81	Natural	0.014	525	1	0.1
S82	M82	Natural	0.014	800	1	0.56
S83	M83	Natural	0.014	823	1	1.34
S84	M84	Natural	0.014	425	1	0.24
S85	M85	Natural	0.014	550	1	0.18
S86	M86	Natural	0.014	700	1	0.14
S87	M87	Natural	0.014	90	1	0
S89	M89	Natural	0.014	50	1	0.256
S91	M91	Natural	0.014	521	1	0.29
S92	M92	Natural	0.014	834	1	0.84
S93	M93	Natural	0.014	395	1	1.27
S94	M94	Natural	0.014	413	1	0.24
S95	M95	Natural	0.014	386	1	0.36
S96	M96	Natural	0.014	100	2	0
S97	M97	Natural	0.014	200	1	0.5
S98	M88	Natural	0.014	50	1	4
W1	GrantOutlet	Circular	0.014	10	0.05	0
W1	M52	Circular	0.014	410	3	0.25
W3	Kiwanis Outlet	Circular	0.014	10	0.05	0
W4	Wyoming Outle	Circular	0.014	10	0.05	0
W5	Madison Outlet	Circular	0.014	10	0.05	0
W6	Welsh Outlet	Circular	0.014	10	0.05	0
W7	McCue1	Circular	0.014	10	0.05	0
W8	McCue2	Circular	0.014	10	0.05	0
W9	McCue3	Circular	0.014	10	0.05	0
Weir 4	Wyoming Outle	Circular	0.014	10	0.05	0
Weir 5	Madison Outlet	Circular	0.014	10	0.05	0
Weir 6	Welsh Outlet	Circular	0.014	10	0.05	0
Weir 7	McCue1	Circular	0.014	10	0.05	0

Weir1	GrantOutlet	Circular	0.014	10	0.05	0
Weir3	Kiwanis Outlet	Circular	0.014	10	0.05	0
Weir9	McCue3	Circular	0.014	10	0.05	0

SEH **MEMORANDUM**

TO: City of Laramie & WYDOT

FROM: George Walton

DATE: May 11, 2009

RE: Grant Street Pond, Temporary Outfall
SEH No. 106814 Laramie Fire Station

Introduction

The West Laramie Drainage Master Plan (Master Plan) is currently being finalized. This Master Plan includes proposed drainage improvements for all of Section 31 in Township 16 N, Range 73 W. The purpose of this correspondence is to provide sufficient information to obtain a WYDOT Utility License Agreement for a temporary connection between proposed City of Laramie storm drainage facilities and the existing Snowy Range Road storm drain system. It is our understanding the WYDOT owns the existing Snowy Range Road storm drainage system and the City of Laramie maintains the existing system.

Construction of the Master Plan improvements will require a phased, multi-year construction program. Construction of the infrastructure is generally anticipated to start at the identified permanent outfalls and work upstream. However, the West Laramie Fire Station #3 is located well upstream of the planned permanent outfalls and is scheduled to be constructed during the summer of 2009. In order to reduce piecemeal construction projects, street and drainage improvements adjacent to Fire Station #3 will also be constructed in 2009, thus the reason for the need of a temporary outfall to the Snowy Range Road storm drain system. Based on current funding scenarios, we anticipate that the temporary outfall will be in place for approximately five to ten years.

The remainder of this Memo provides the hydrologic and hydraulic basis for this request and design drawings that indicate the proposed work.

Based on aerial topographic mapping, there are three drainage basins tributary to the Grant Street Pond, shown in the attached Drainage Basin Map. The total tributary area to the pond is 21.67 acres. These basins are discussed briefly below. Drainage calculations are included in the attached appendix.

Based on this analysis, the proposed Grant Street detention pond has sufficient capacity for the 10-year runoff event.

Hydrologic Criteria

The City of Laramie (City) has established minimal hydrologic and hydraulic criteria. When necessary, criteria from Denver's Urban Drainage and Flood Control District (UDFCD) were used for this analysis. Rainfall point depths were calculated from the NOAA Atlas, Volume 2, for the State of Wyoming. Rainfall intensities were calculated from equation RA-3 in the UDFCD Drainage Criteria Manual, which determines rainfall intensities from point rainfall depths. Please note that this equation is calibrated for the

Denver region only, and may not be applicable to other areas. However, the hydrologic results from this equation were reasonable, and therefore used.

Once rainfall intensities were known, the Rational Method was used to calculate stormwater runoff. The areas tributary to the Grant Street Pond are hydrologic soil group B, based on the Natural Resources Conservation Service's Web Soil Survey.

Basin One

Basin One is 5.13 acres, and is located between Snowy Range Road and Grant Street, from just north of Jefferson Street to just south of the fire station. Percentage impervious values for this basin were taken from the City's 2008 Master Drainage Plan (MDP). Development in this basin consists mainly of single family residences.

For time of concentration calculations, a basin slope of 1.0% was assumed. Based on survey data, this slope is a conservative estimate of actual basin slopes. The calculated time of concentration for this basin is 13.50 minutes, which results in peak flows of 5.79 cfs and 11.81 cfs for the 10- and 100-year runoff events, respectively.

Flows from this basin will be intercepted by two proposed CDOT 10' Type R inlets at the corner of Jefferson and Grant Streets. These inlets will receive equal discharge by means of a concrete cross pan which transverses Grant Street at the inlet mouths. For this reason, flows from Basin One have been split equally between the two inlets. Inlet sizing calculations, per UDFCD, are also included in the appendix.

Basin One flows will be conveyed via a 24" HDPE pipe from the proposed inlets to a manhole at the intersection of Grant Street and Monroe Street. At this manhole, a 48" HDPE pipe from the west that will convey flows from Basin Two combines with the flows from Basin One. These flows are conveyed downstream to the Pond in a 48" HDPE pipe.

Basin Two

Basin Two is located between Snowy Range Road and Grant Street west of the Pond and south of the fire station. The basin is 6.06 acres. Since this basin is currently undeveloped, these calculations used 10% impervious for basin calculations. Typically, 2% impervious is used for undeveloped land, but, given the basin is surrounded by developed land, it was assumed that a portion of the basin was developed at some time. For example, Basin Two may have had some development in the past that is not allowing infiltration to occur.

Once again, a basin slope of 1.0% was assumed for time of concentration calculations, which is slightly conservative, based on survey data. The time of concentration used for this basin is 12.68 minutes, which results in peak flows of 3.91 and 11.18 cfs for the 10- and 100-year runoff events, respectively.

Flows from this basin will sheet flow to design point 2, where they will be intercepted by a proposed 48" HDPE storm sewer stub to the west. A minimal amount of grading will occur on this lot in order to allow flows to enter the storm sewer stub. From this point, flows will be conveyed east into the Grant Street Pond.

Future development within this basin will require onsite detention to keep release rates at levels established by this hydrology.

Basin Three

Basin Three is the largest basin tributary to the Pond, at 8.25 acres, and is located between Grant Street and Johnson Street, from Snowy Range Road north to approximately Jefferson Street. A percent impervious value of 48% was once again taken from the MDP for this basin.

A basin slope of 1.0% was assumed for time of concentration calculations, which is slightly conservative, based on survey data. The calculated time of concentration for this basin is 15.47 minutes, which results in peak flows of 8.74 and 17.83 cfs for the 10- and 100-year runoff events, respectively. These flows were seen to be appropriate.

Flows from this basin will sheet flow directly into the Grant Street Pond.

Fire Station Site

Also tributary to the Grant Street Pond is the proposed West Laramie Fire Station, located at Grant and Jefferson Streets. The fire station site is approximately 1.2 acres in size, and is almost entirely hardscaped. Flows from the site will be collected and conveyed to an on-site detention pond, located at Jefferson Street and Snowy Range Road. Flows from the fire station site will be conveyed by the 24" HDPE storm sewer on Grant Street to the Pond. Flows from the site which are released undetained (fire station offsite flows) are included in Basin One of this analysis. Fire station flows are included in the sizing for the Pond, to ensure there is adequate volume.

Fore more information on the fire station, please refer to the Final Drainage Report for Fire Station #3, by S.E.H., dated April 2009.

Pond Sizing

The total tributary area to the pond is 21.67 acres. For detention calculations, a weighted percent impervious of 40.2% was used. The FAA method was used for pond sizing. UDFCD empirical methods were also checked, but were found to be less conservative than the FAA method. The calculated detention volume for the Pond is 0.88 ac-ft for the 10-year runoff event, and 1.84 ac-ft for the 100-year runoff event. The total pond volume provided for the Grant Street Pond project is 1.71 acre-feet.

Typically, per UDFCD, pond release rates are set at a percentage of the area, in cfs. Ten year release rates for a type B soil, per UDFCD, should be set at 0.23*A cfs, where A is area in acres. For the 100-year runoff event, the release rate should be 0.85*A cfs.

However, since this pond does not currently gravity drain, and will be temporarily pumped until the outfall is constructed, these release rates would require large pumps, for which the cost was not justified. As a result, the decision was made to lower these release rates to take full advantage of the pond detention volume.

The release rates were set at 0.06 cfs per acre for the 10-year runoff event, and 0.21 cfs per acre for the 100-year runoff event. This equates to Pond releases of 1.3 and 2.6 cfs for the 10- and 100-year runoff events, respectively. Since the 100-year required pond volume is 1.84 ac-ft, and the total proposed pond volume is 1.71 ac-ft, there is a chance that this pond will overflow during the 100-year runoff event. There is sufficient volume for the 10-year runoff event at these pumping rates.

Pump Sizing

Two 5 hp pumps will be provided, in addition to a sump pump, for the Grant Street Pond. Each of the pumps is sized to discharge at 1.32 cfs (for a total of 2.6 cfs) at 10 feet total dynamic head.

Connection to Existing Runoff event Sewer

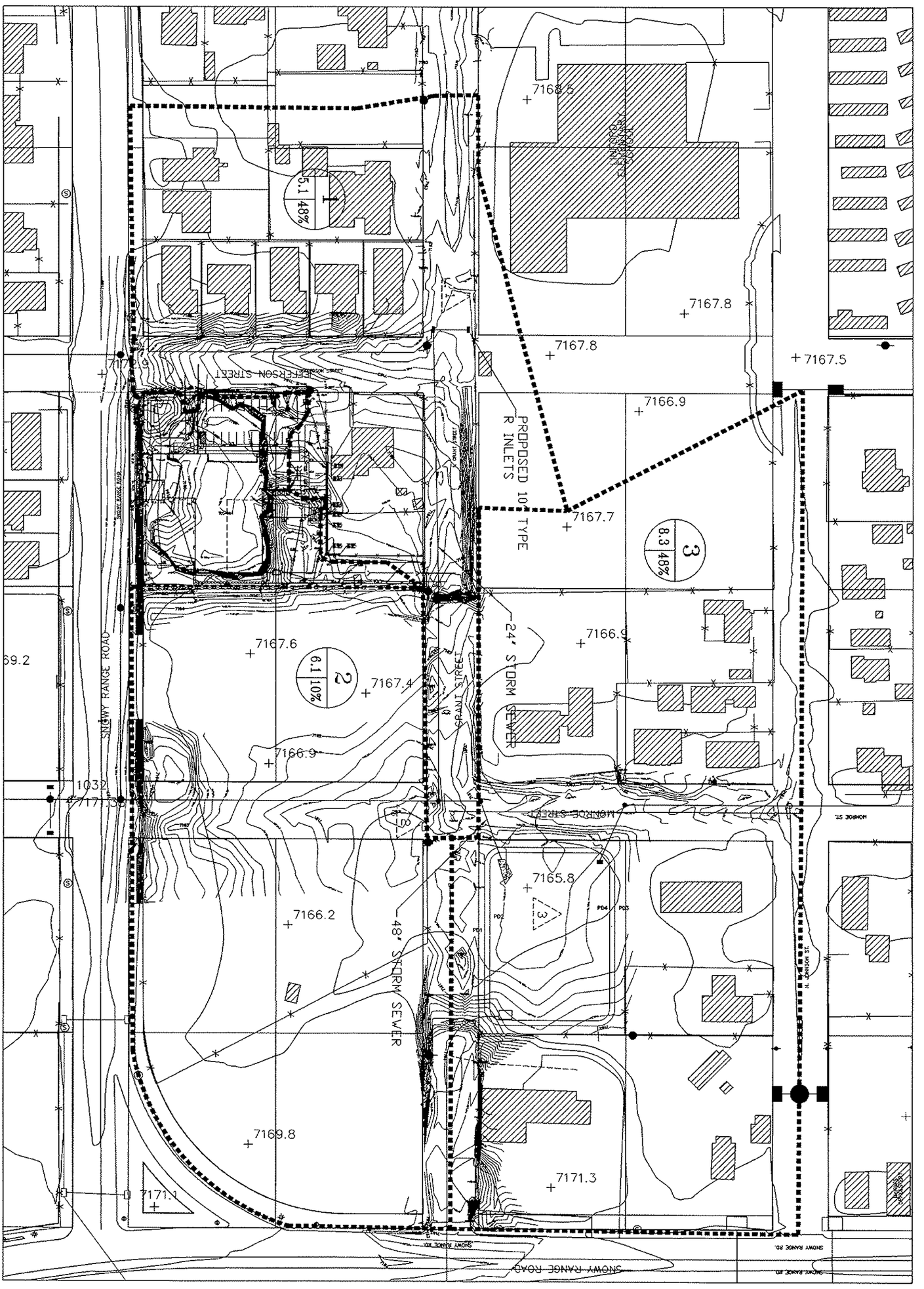
Initially, the outfall from the Pond was to be routed through an existing inlet on the northwest corner of Snowy Range Road and Grant Street. This inlet has a 12" CMP outlet that conveys flows south and ties into an existing 34"H x53"W HERCP (horizontal elliptical reinforced concrete pipe) located on the south side of Snowy Range Road. It was determined that the 12" CMP does not have the capacity to carry either the 10- or 100-year runoff events. Therefore, the outfall will continue across Snowy Range Road and tie directly into the 34"H x53"W HERCP. Please see the attached Pond Outfall Plan and Profile.

No cleanouts will be installed in the Pond outfall. It is anticipated that the pipe will be drained and the pumps winterized each winter season. Additionally, a small sump pump for the Pond will be installed to take care of small, incidental flows (such as seasonal groundwater) into the Pond and keep it dry.

Attachments:
Drainage Basin Map
Pond Outfall Plan and Profile

Appendices:
Hydrologic Calculations
Pump Sizing Calculations
Pond Sizing calculations

tgm
s:\kot\laramie\106814\drainage\drainage memo - final 051109.doc



CXXX

SHEET CONTENTS
GRADING AND EROSION CONTROL PLAN

SEH FILE NO.	LARYD 105557
ISSUE DATE	NOVEMBER 13, 2009
DESIGNED BY	JK
DRAWN BY	JK
PROJECT MGR	RZ

NEW CONSTRUCTION FOR:
CITY OF LARAMIE
FIRE STATION NO. 3
LARAMIE, WY

MARK	DATE	DESCRIPTION

35% DESIGN DEVELOPMENT
NOT FOR CONSTRUCTION

Short Elliott Hendrickson Inc.
Colorado Center Tower One, Suite 6500
2000 South Colorado Boulevard
Denver, CO 80222-1900
720.540.6800 main | 720.540.6601 fax
800.490.4966 toll free | www.sehinc.com

SEH

REVIEW SET IN PROGRESS PRINT DATE: 10.14.2009

201+00
202+00
203+00
204+00
205+00
POT 200+00.00
SEE SHEET R202 FOR AWWA C900 10" PVC PRESSURE PIPE PROFILE
Grant St.
Monroe St.
SEE SHEET R102 FOR PUMP STATION, VAULT AND UTILITY PAD DETAILS
UTILITY PAD
CLASS 1 RIPRAP
202+91.36, 54.67 EL 7157.90
203+32.37, 64.48 EL 7154.34
203+78.43, 42.08 EL 7160.66
203+78.36, 54.67 EL 7157.29
204+24.36, 61.03 EL 7154.85
203+32.37, 74.29 EL 7157.61
203+78.36, 62.80 EL 7154.58
203+78.36, 70.93 EL 7157.29
204+24.36, 67.39 EL 7156.97
204+84.88, 42.28 EL 7160.63
202+72.01, 41.87 EL 7162.67
202+86.38, 54.67 EL 7157.93
204+70.35, 54.67 EL 7156.65
204+62.76, 86.41 EL 7156.50
202+91.36, 77.59 EL 7157.90
203+61.85, 89.58 EL 7157.40
204+02.68, 89.58 7157.12
204+66.69, 86.41 EL 7155.19
203+07.64, 98.47 EL 7157.78
204+67.95, 118.15 EL 7155.37
202+72.26, 120.08 EL 7161.57
203+78.36, 118.15 EL 7157.29
204+38.50, 104.33 EL 7156.63
204+84.51, 120.12 EL 7160.22
202+86.38, 118.15 EL 7157.93
203+38.33, 133.09 EL 7157.52
204+70.35, 118.15 EL 7156.17
203+64.46, 157.39 EL 7157.16
204+65.37, 118.15 EL 7156.23
203+08.42, 156.71 EL 7157.78
204+10.92, 160.81 EL 7156.57
204+53.06, 153.06 EL 7156.12
202+86.38, 181.64 EL 7157.93
204+70.35, 181.64 EL 7155.69
202+72.51, 198.31 EL 7162.03
204+35.62, 181.64 EL 7156.11
203+38.05, 181.64 EL 7157.30
203+78.32, 198.13 EL 7160.89
203+78.36, 181.64 EL 7156.81
204+84.15, 197.96 EL 7160.72
48" MIN.
10'
2:1
24"
GEOTEXTILE SEPARATION FABRIC
RIPRAP d50=12"
ST
SA
W
P
T
S

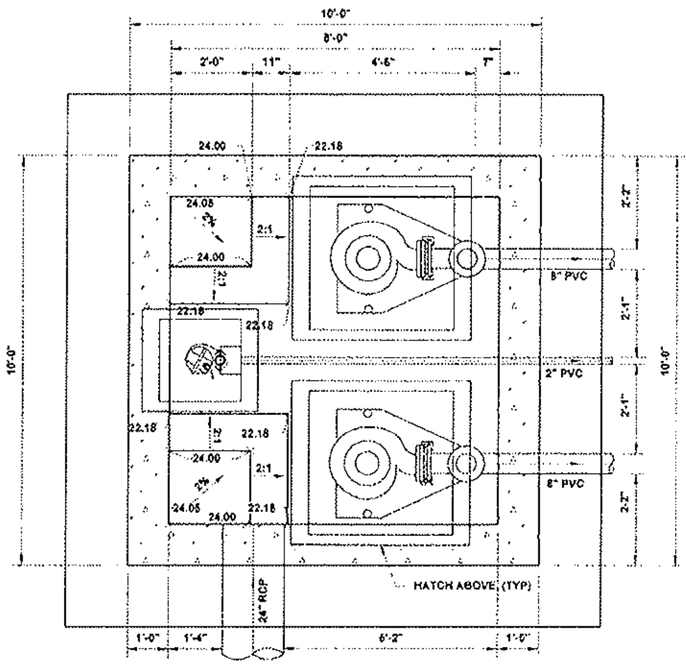
Short Elliott Hendrickson Inc.
Colorado Center Tower One, Suite 6000
2000 South Colorado Boulevard
Denver, CO 80222-1500
720.540.6900 main | 720.540.6901 fax
800.450.4960 toll free | www.sehinc.com

CONSTRUCTION DOCUMENTS

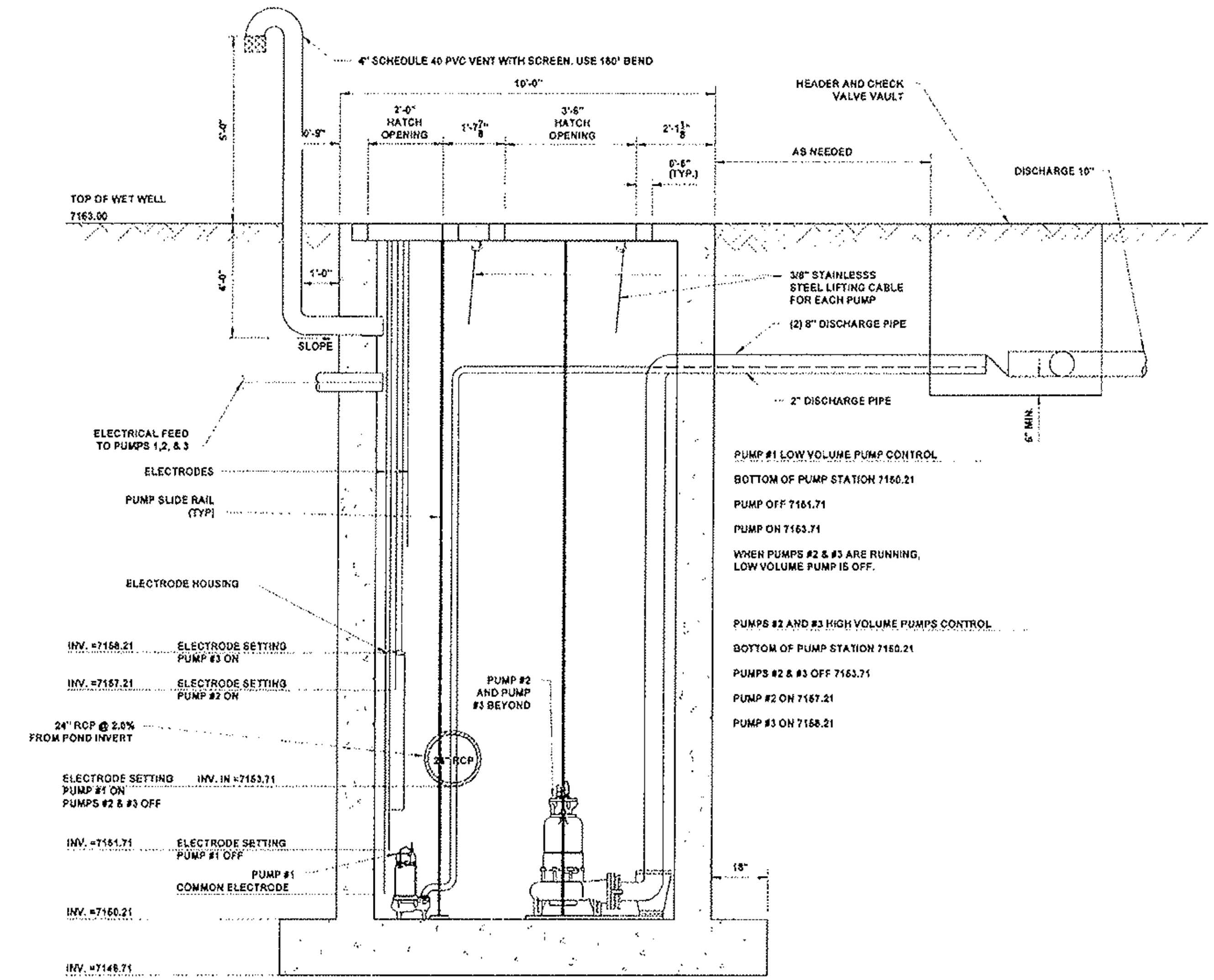
NEW CONSTRUCTION FOR:
CITY OF LARAMIE
FIRE STATION NO. 3
LARAMIE, WY

SHEET CONTENTS
GRADING PLAN

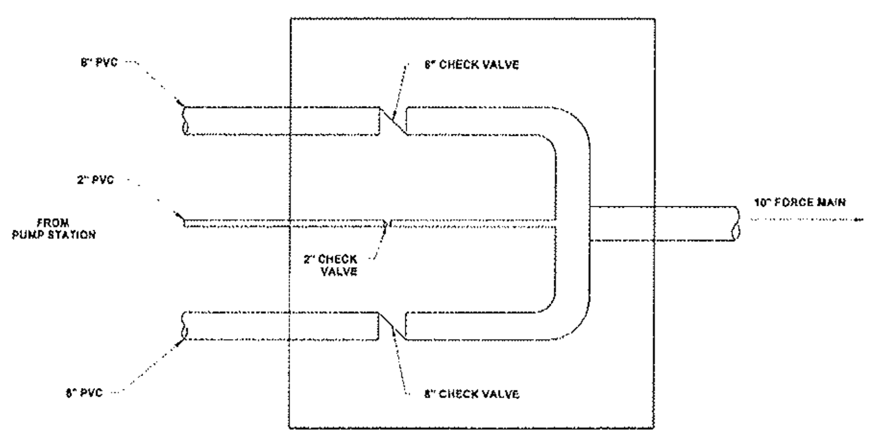
R101



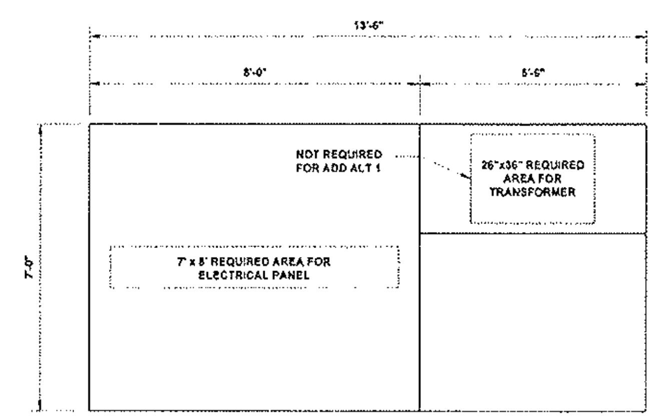
STORM WATER LIFT STATION PLAN



LIFT STATION SECTION



HEADER & CHECK VALVE PLAN



6-INCH CONCRETE UTILITY PAD

NOTES :

1. PROVIDE ISOLATION BETWEEN CONDUITS AND PAD
2. REINFORCE UTILITY PAD WITH #4 @ 16" O.C. B.W.
3. FOR ADD ALT 1 ROTATE PUMP 90° TO ALLOW FOR A MINIMUM 6" CONCRETE CLEARANCE ALL AROUND
4. COORDINATE HATCH LOCATION WITH PUMP LOCATION AND PUMP REMOVAL SYSTEM
5. FOR LOW VOLUME PUMP USE HYDROMATIC SD50 - SUMP/EFFLUENT PUMP OR APPROVED EQUAL
6. FOR HIGH VOLUME PUMPS USE HYDROMATIC S8F - STANDARD NON-CLOG SEWAGE PUMPS OR APPROVED EQUAL
7. FOR PUMP CONTROL PANEL USE HYDROMATIC NOVUS 2000 CONTROL PANEL OR APPROVED EQUAL

SEH

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Denver, CO 80222-1900
720.540.6800 main | 720.540.6801 fax
800.490.4966 toll free | www.sehinc.com

CONSTRUCTION DOCUMENTS

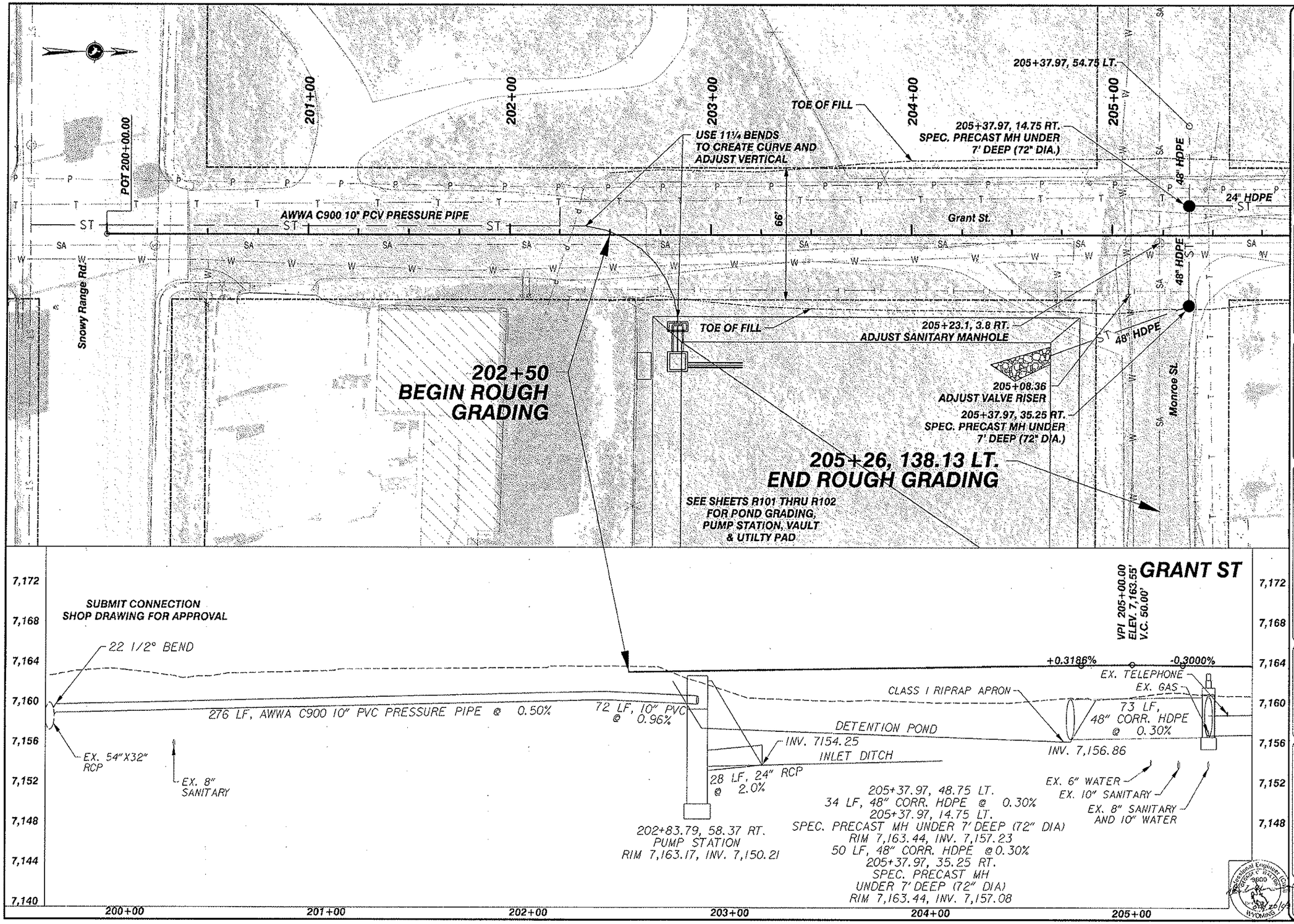
MARK	DATE	DESCRIPTION

NEW CONSTRUCTION FOR:
CITY OF LARAMIE
FIRE STATION NO. 3
LARAMIE, WY

SEH FILE NO.	LARFD 105557
ISSUE DATE	4/21/2009
DESIGNED BY	KC
DRAWN BY	WB
PROJECT MGR	GW
FILE	F:\LE\003B_FS_0807PumpVaultDetails.dgn
TIME	1:15:30 PM

SHEET CONTENTS
LIFT STATION DETAILS

R102



SEH
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CONSTRUCTION DOCUMENTS

NEW CONSTRUCTION FOR:
CITY OF LARAMIE
FIRE STATION NO. 3
LARAMIE, WY

SHEET CONTENTS
STREET PLAN AND PROFILES

R202

PRE-CONSTRUCTION NOTIFICATION FOR
U.S. DEPARTMENT OF THE ARMY
NATIONWIDE PERMIT NO. 43 –
STORMWATER MANAGEMENT FACILITIES

FOR
WEST LARAMIE DRAINAGE MASTER PLAN & STREET PAVING PROJECT
ALBANY COUNTY, WYOMING

August 7, 2009

Prepared For:

City of Laramie
PO Box C
Laramie, WY 82073

Prepared By:

P.O. Box 96
Laramie, WY 82073

INTRODUCTION

This Pre-Construction Notification (PCN) for Nationwide Permit (NP) 43 – Stormwater Management Facilities is being submitted for the City of Laramie (City), Wyoming. Ms. Katharine Trowbridge, Project Manager, can be contacted at P.O. Box C, Laramie, WY 82073, phone (307) 721-5272, or email: KTrowbridge@ci.laramie.wy.us.

The City is proposing to construct a storm sewer system using a forebay structure. The project encompasses portions of Sections 31 and 32, T16N, R73W, Albany County, Wyoming, as shown on Figure 1. The purpose of the project is to convey storm water collected west of I-80 to the McCue Wetlands located east of I-80, via a forebay structure as shown on Figure 2. Section A-A on Figure 2 shows a cross-section of the structure.

Direct and indirect adverse environmental effects of the project will be minimal. A wetland delineation (Appendix A) completed by Hydro Logic, LLC, in December 2008, show wetlands in the vicinity of the forebay structure location. The final design completed by SEH, Inc., shows that impacts to wetlands will be minimal; 0.057 acre of permanent impacts, as shown on Figure 2. NP 43 states that discharge into wetlands must not cause the loss of greater than 0.5 acre of non-tidal waters of the United States and that wetland mitigation is required should impacts exceed 0.1 acre permanent impact. This project will not surpass those limits. No other COE permits will be used in conjunction with this project.

The McCue Wetlands currently serve as an outfall for offsite storm drainage and have developed into a low quality saline wetland influenced by hydrology from the Laramie River. The increased water supply from this project will benefit plant and animal life as well as recharge the groundwater supply.

BACKGROUND INFORMATION

Forebay Structure

A forebay structure is a water quality device that acts as a settling pond. The structure essentially consists of a storage area that would be formed by constructing a berm downstream of the storm drainage outfall. The berm has one or more small diameter outlet pipes. This configuration allows a pool of water to form behind the berm which allows sediment to drop out of detained water. The small outlet pipes slowly drain the area as storm drainage flows diminish. In this way, the forebay structure combines two highly desirable water quality characteristics, sediment removal and no standing water during dry periods of weather (SEH, Inc., 2009).

The proposed berm would be constructed using riprap and engineering fabric. After construction of the riprap, the entire berm would be thoroughly covered with topsoil. The entire length of the berm has

been designed to have level top. This will help dissipate high flow events as the flow will be spread out over the entire length of the berm (rather than concentrating the flow at one or more distinct points). The forebay is designed to overflow even during minor runoff events such as the 1- or 2- year storm. These type of "first flush" events are typically the most laden with pollutants. The proposed forebay structure also has an 8 ft concrete pad along the upstream toe of the berm to facilitate removal of accumulated sediment and a topsoil covered riprap apron at the downstream toe of the berm to reduce erosion potential (SEH, Inc., 2009).

During the peak 100-year runoff event, storm water flows would be released at a rate of approximately 201 cubic feet per second (cfs). During the peak 10-year runoff event storm water flows would be released at a rate of approximately 163 cfs. The total volume of water discharged during the 100-year and 10-year events is approximately 2,947,000 cubic feet and 1,602,000 cubic feet, respectively (SEH, Inc., 2009).

Federally-Listed Threatened or Endangered Species and Historic Properties

A search for Federally-listed threatened or endangered species of Albany County was conducted via the U.S. Fish and Wildlife Service website for the Mountain-Prairie Region. The website listed (September 2008) several species that are threatened or endangered, however none listed pertain to the project area. Appendix B contains the list.

A search for historic properties listed in or eligible for listing in the National Register of Historic Places was conducted via the Wyoming State Historic Preservation Office (SHPO) website. Only one historic property was located in the surrounding area; the Wyoming Territorial Penitentiary located about one-half mile from the project area. This project will not impact the penitentiary.

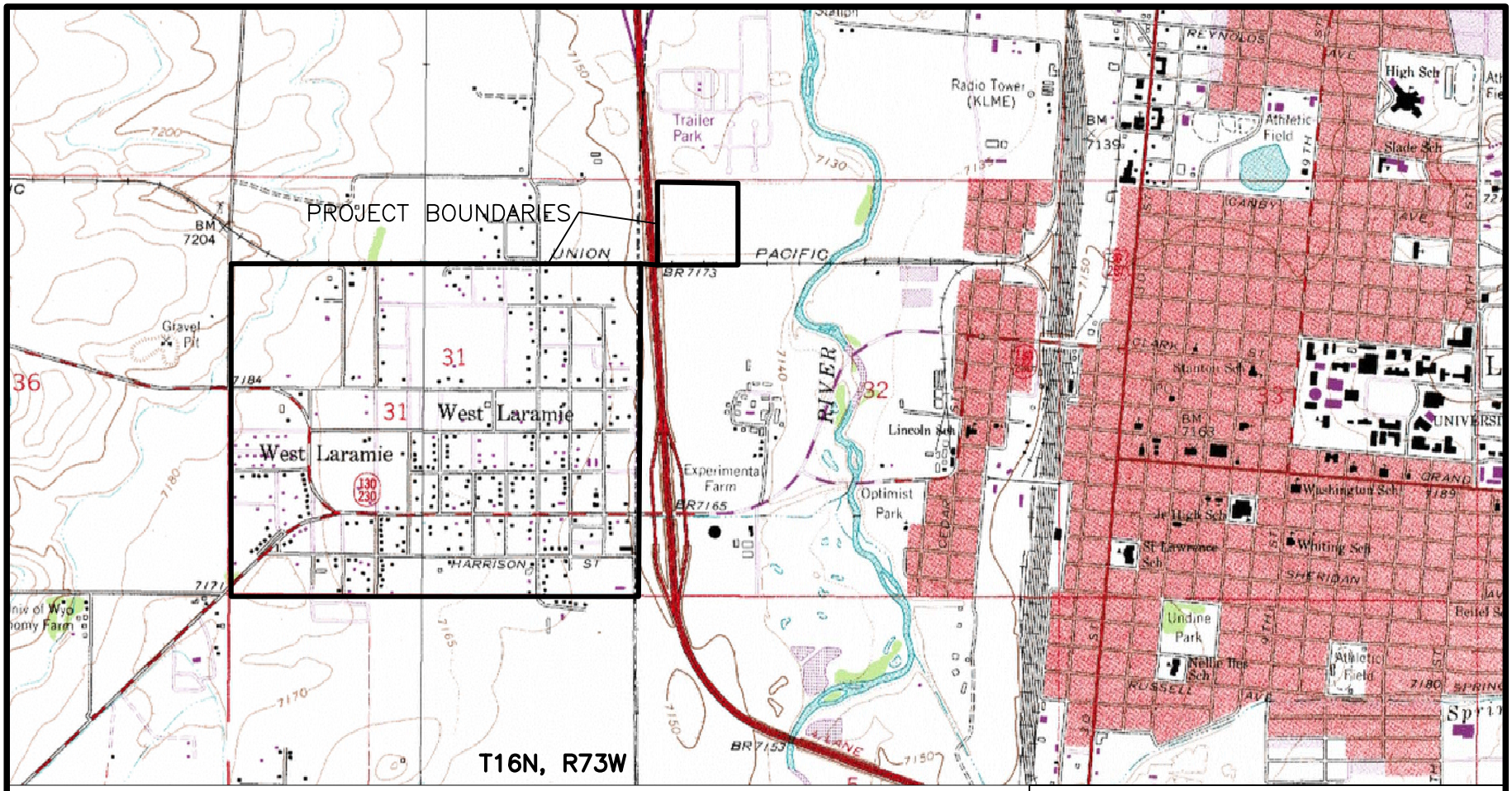
SUMMARY

Presented in this PCN and supporting documentation is information regarding the proposed project. The project will comply with all conditions required for Nationwide Permit 43 as outlined in the Nationwide Permit General Conditions (Appendix C). Permanent impacts to wetlands will be minimal (0.057 acre) and below the 0.10 acre threshold required for wetland mitigation. No mitigation is planned for this project.

REFERENCES

SEH, Inc., (August, 2009). Personal Communication.

FIGURES



SOURCE: USGS QUADRANGLES, LARAMIE, WYO (1963)
AND LARAMIE SW, WYO (1963)

0 2000 FT.
SCALE

FIGURE 1

GENERAL LOCATION MAP
WEST LARAMIE MASTER PLAN & STREET PAVING PROJECT

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC

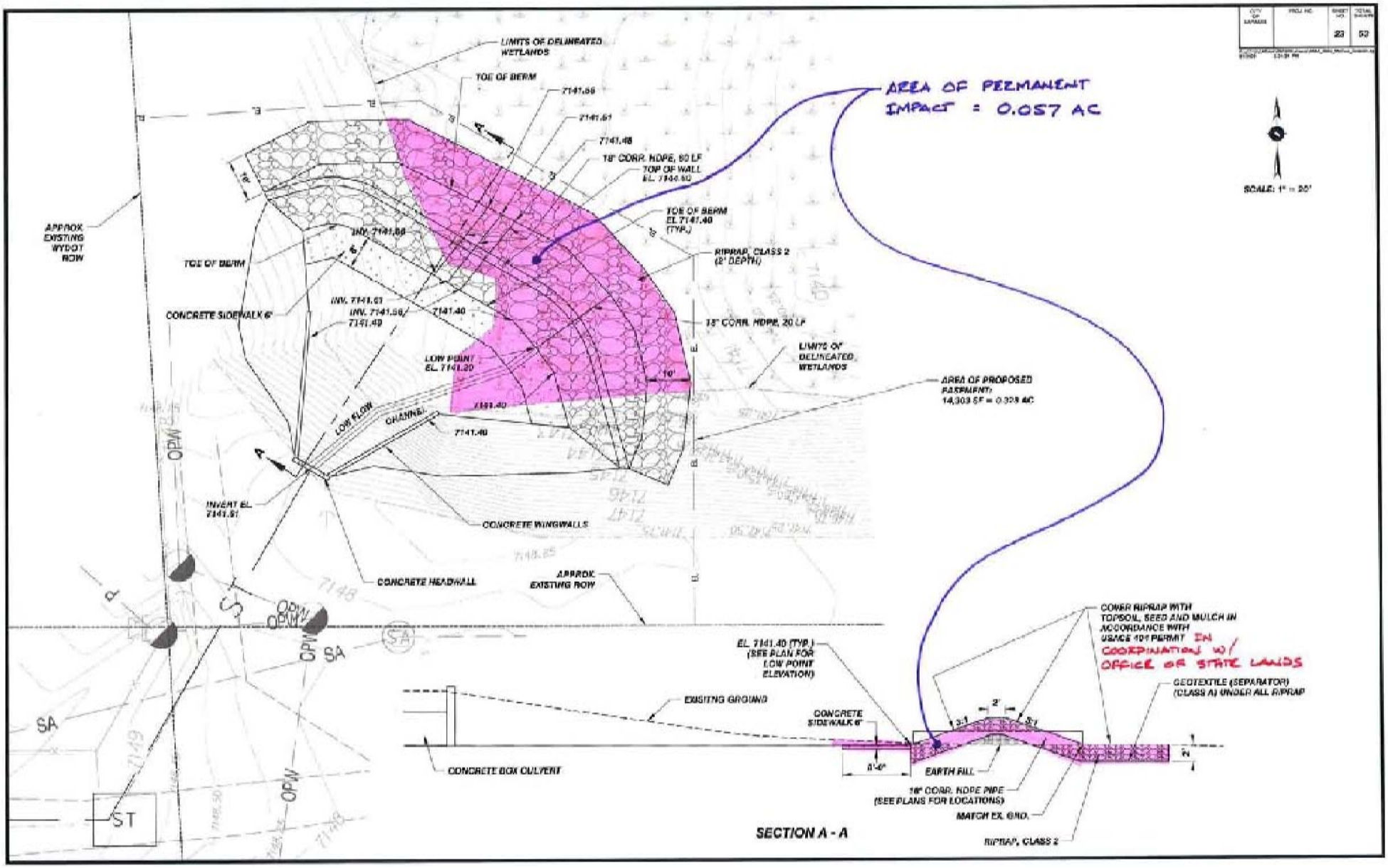


Figure 2. Wetland Impacts for the West Laramie Drainage Master Plan & Street Paving Project, City of Laramie, Wyoming.

APPENDIX A

WETLAND DELINEATION AND OTHER SURFACE WATERS OF THE U.S. REPORT

WETLAND DELINEATION AND OTHER WATERS OF THE US REPORT FOR McCUE WETLANDS AND SECTION 31, T16, R73W (WEST LARAMIE DRAINAGE MASTER PLAN & STREET PAVING PROJECT) ALBANY COUNTY, WYOMING

December 22, 2008

Prepared For:

City of Laramie
PO Box C
Laramie, WY 82073

Prepared By:

Hydro Logic, LLC

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INTRODUCTION

The City of Laramie, Wyoming, has contracted with Hydro Logic, LLC, of Laramie, Wyoming, to conduct a wetland delineation for the West Laramie Drainage Master Plan & Street Paving Project. Plans are being designed to construct a storm sewer system for West Laramie, conveying the water into the McCue Wetlands using a forebay structure. The project will encompass portions of Sections 31 and 32, T16N, R73W, Albany County, Wyoming, as shown on Figures 1 and 2.

The U.S. Army Corps of Engineers (Corps) is authorized under Section 404 of the Clean Water Act (33 U.S.C. 1344) to regulate the placement of dredged and fill material into wetlands and other waters of the United States. The term 'waters of the United States' includes all waters that were, are, or could be used in interstate commerce such as rivers, streams (including ephemeral streams), reservoirs, lakes, and wetlands adjacent to those areas.

The wetland delineation was performed by Hydro Logic, LLC, on November 18, 2008. The purpose of the survey was to delineate potential wetlands and waters of the US that currently exist within the proposed forebay construction area and portions of Section 31 within the project area. Upon completion of the final forebay design, wetland impacts will be calculated and a Nationwide Permit 43 – Stormwater Management Facilities will be submitted to the Corps if necessary.

BACKGROUND AND SITE DESCIPTION

The majority of the project area is located west of I-80 in Section 31, as shown on Figure 1; encompassing the majority of the West Laramie. Landuse consists of residential and developed commercial property with some open spaces.

The forebay structure will be constructed in the southwest corner of the McCue Wetland area. This area was used as a borrow source 10+ years ago and has since developed into a low quality saline wetland influenced by hydrology from the Laramie River.

This report is based on information collected from both a review of existing documentation and a field survey. A review of existing documentation included internet searches of the Wyoming GIS Coordination Structure's (WGCS) website, WetLandMAPS.com, and the U.S.D.A. Natural Resources Conservation Service's (NRCS) soil survey database for Albany County.

Figure 3 shows the 2002 Color Infrared map of the project. Figure 4 shows WetLandMAPS.com's US Fish and Wildlife Service's (FWS) National Wetlands Inventory map in which PEMC (palustrine emergent, seasonally flooded), PEMCx (palustrine emergent, seasonally flooded, excavated), PEMF (palustrine emergent, semipermanently flooded), and U (Upland) wetland classification types occur within the surveyed area.

The NRCS soil survey (See Attachment) shows the McCue Wetlands to be comprised of two soil map units: 121 – Bosler, wet substratum-Urban land complex, 0 to 3 percent slopes, and unit 150 – Delphill-Blazon complex, 3 to 20 percent slopes. Neither soil is listed on the NRCS's Hydric Soils List for Wyoming.

METHODS

The field survey follows the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (U.S Army Corps of Engineers, 2008). Seven data points were taken within the wetland area. Data points are located in areas that typify the surrounding wetlands and uplands. Only the immediate area for the proposed forebay structure was surveyed (Figure 5) using a Nikon Total Station unit; the remainder of the area's wetlands are estimated. Attachments include wetland determination data forms, color photos and soils information documenting the current conditions of the project area.

SURVEY RESULTS

The Corps requires that all three parameters of hydrophytic vegetation, wetland hydrology and hydric soil be present to be defined as a jurisdictional wetland. Figure 5 shows the location and extent of surveyed wetlands, data points and photo points established during the field investigation. Table 1 below lists information regarding the survey results. See attached wetland determination data forms for details. Figure 6 shows the survey area for Section 31. It includes a small fenced detention pond and the Pioneer Canal. Both sites were inaccessible at the time of the survey. The project is not expected to impact either site.

Table 1. Wetland Areas Within The McCue Wetlands Near the Forebay Construction Area.

Data Point No.	Wetland Determination
1	Emergent Wetlands
2	Emergent Wetlands
3	Non-Wetland
4	Emergent Wetlands
5	Non-Wetland–used to determine boundary
6	Emergent Wetlands
7	Non-Wetland–used to determine boundary

FUNCTIONS AND QUALITY

The wetland areas investigated within the project area are emergent (wet meadow/shallow marsh) type wetlands. These areas are capable of aiding in groundwater recharge, dissipation of erosive forces from surrounding uplands, sediment trapping and nutrient retention and removal. Wetlands within the project corridor are considered fair quality due to their low vegetation diversity.

SUMMARY

A total of 7 data points were established to characterize wetlands in the McCue Wetland area and in particular, within the proposed forebay structure location. It also included those wetlands between I-80 and McCue Street. Wetland impacts will be calculated once a final design has been determined. If necessary, a NWP 43 will be submitted to the Corps at that time.

REFERENCES

GretagMacbeth. 2000. *Munsell Soil Color Charts*.

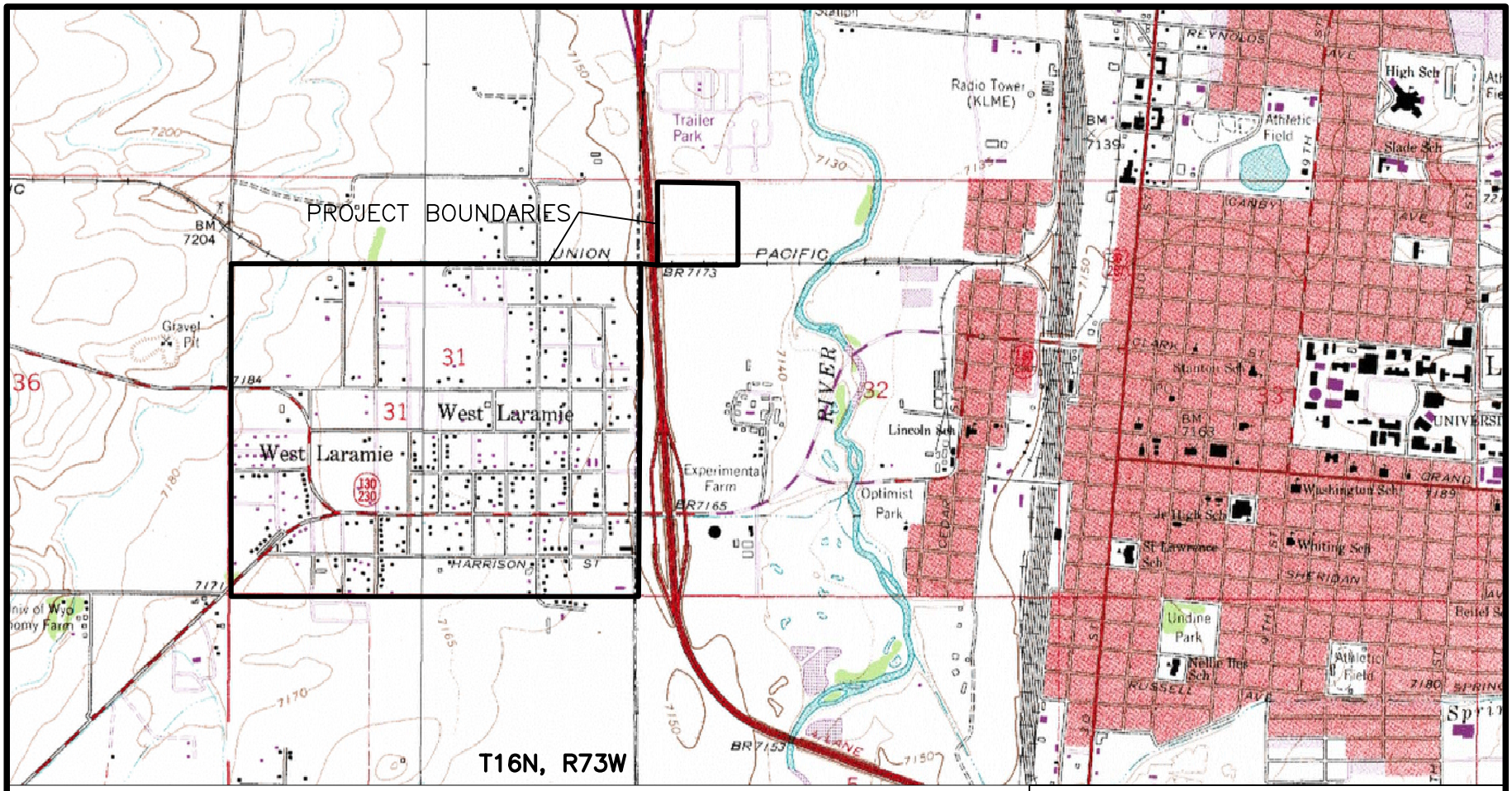
U.S. Army Corps of Engineers. 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0),*ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

USDA, NRCS. 2008. The PLANTS Database (http://plants.usda.gov, 17 December 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S.D.A. Natural Resources Conservation Service. 2008. Web Soil Survey website: http://websoilsurvey.nrcs.usda.gov/app/

U.S.D.I. US Fish and Wildlife National Wetlands Inventory. Internet search using: http://wetlandsfws.er.usgs.gov/NWI/index.html

Wyoming Geographic Information Advisory Council's website, 2007. http://wgiac2.state.wy.us/html/index.asp



SOURCE: USGS QUADRANGLES, LARAMIE, WYO (1963)
AND LARAMIE SW, WYO (1963)

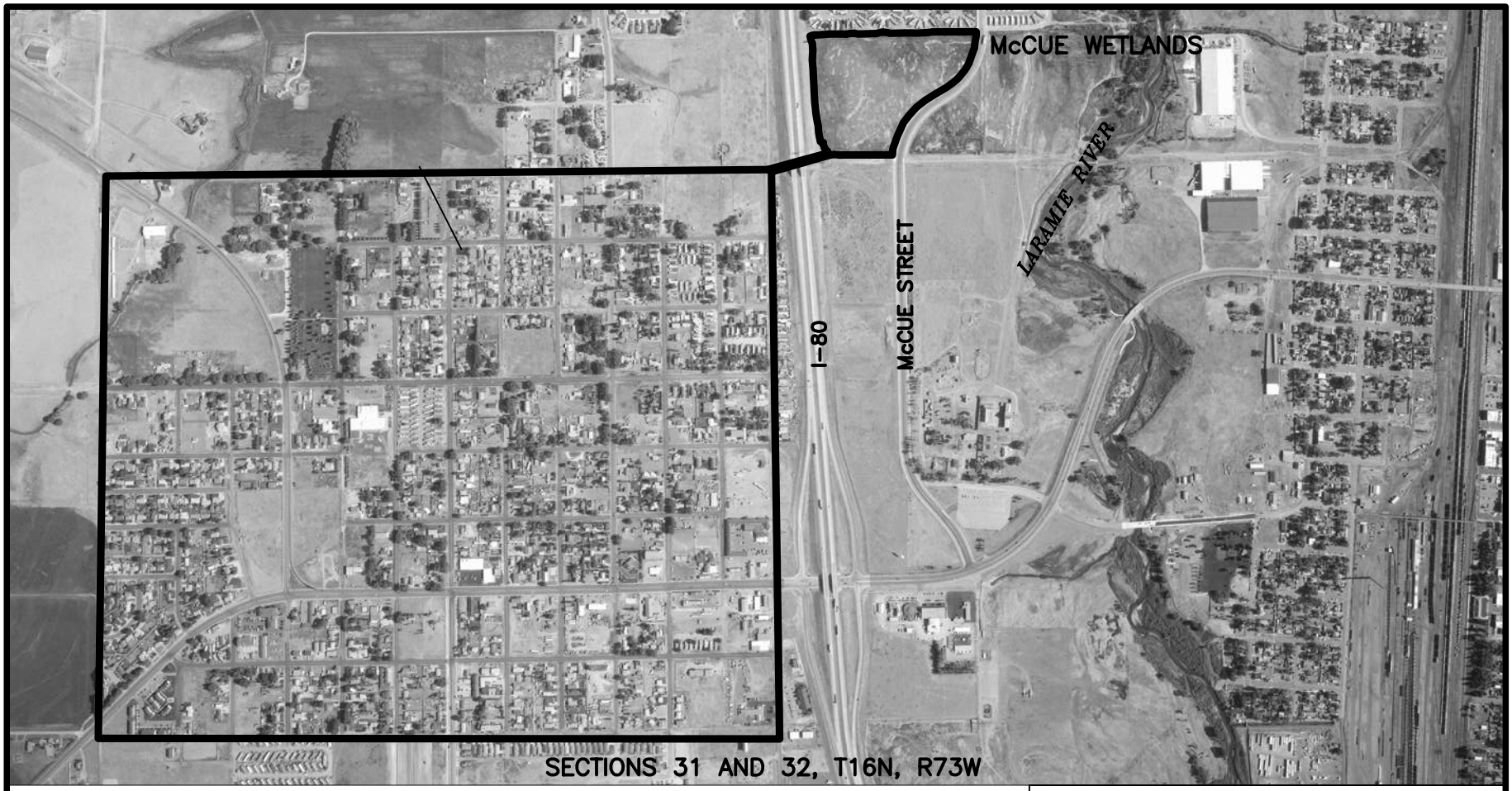
0 2000 FT.
SCALE

FIGURE 1

GENERAL LOCATION MAP
WEST LARAMIE MASTER PLAN & STREET PAVING PROJECT

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC



MAPPING SOURCE: CITY OF LARAMIE, WYOMING

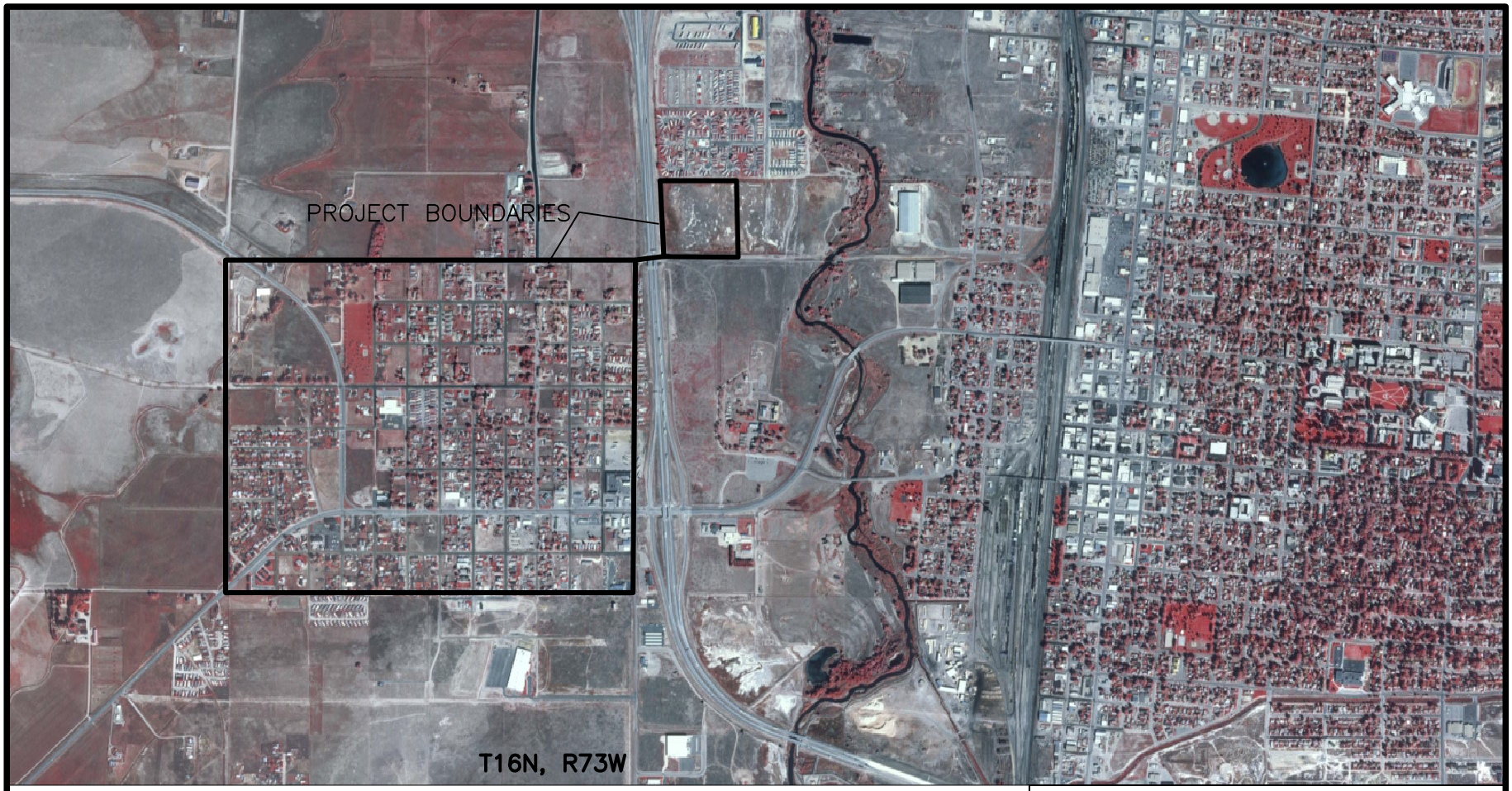
0 1200 FT.
SCALE

FIGURE 2

PROJECT BOUNDARIES
McCUE WETLANDS AND
SECTION 31, T16N, R73W

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC



SOURCE: USGS QUADRANGLES, LARAMIE, WYO (1963)
AND LARAMIE SW, WYO (1963)

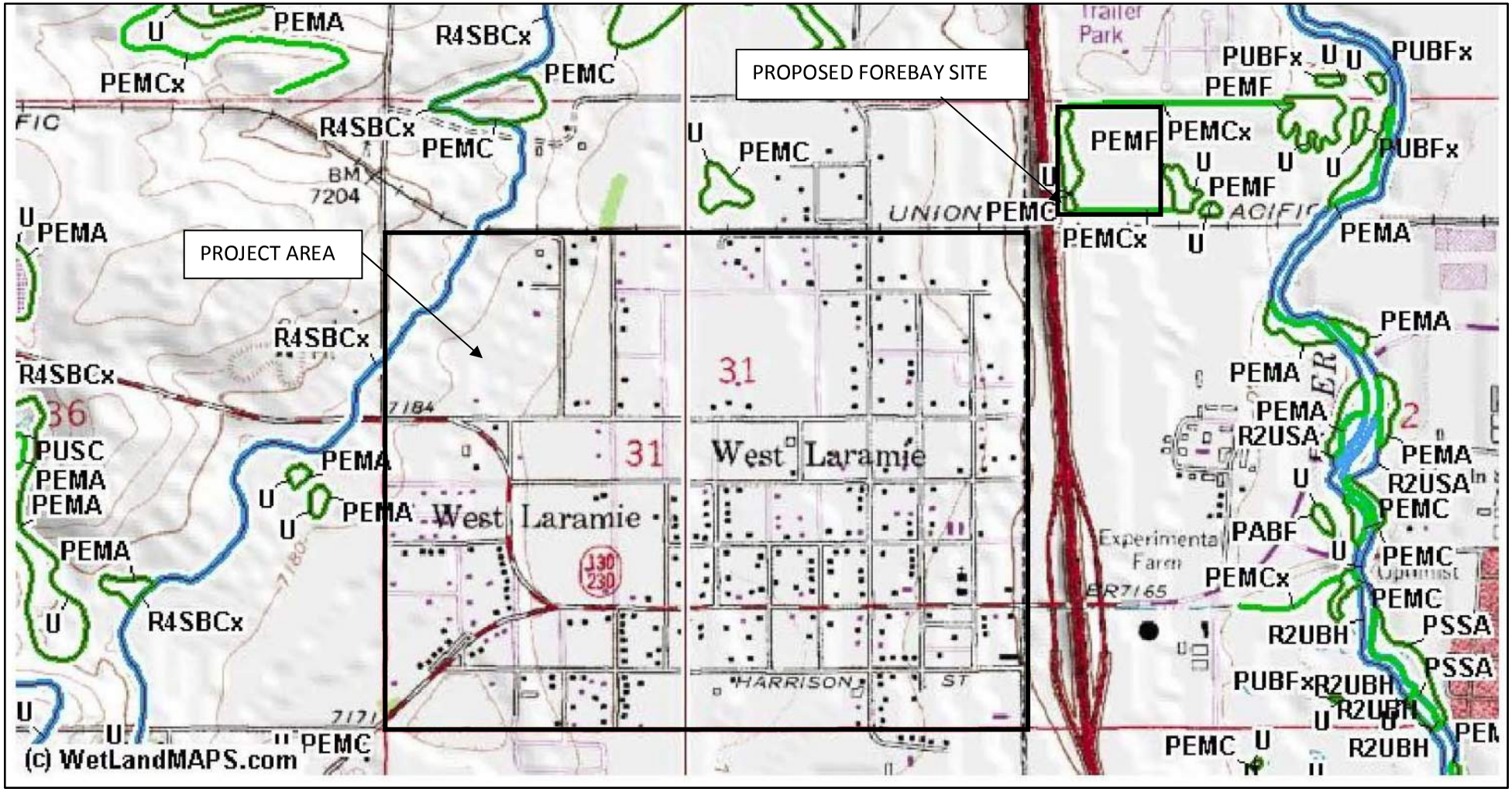
0 2000 FT.
SCALE

FIGURE 3

2002 COLOR INFRARED MAP
WEST LARAMIE MASTER PLAN & STREET PAVING PROJECT

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC

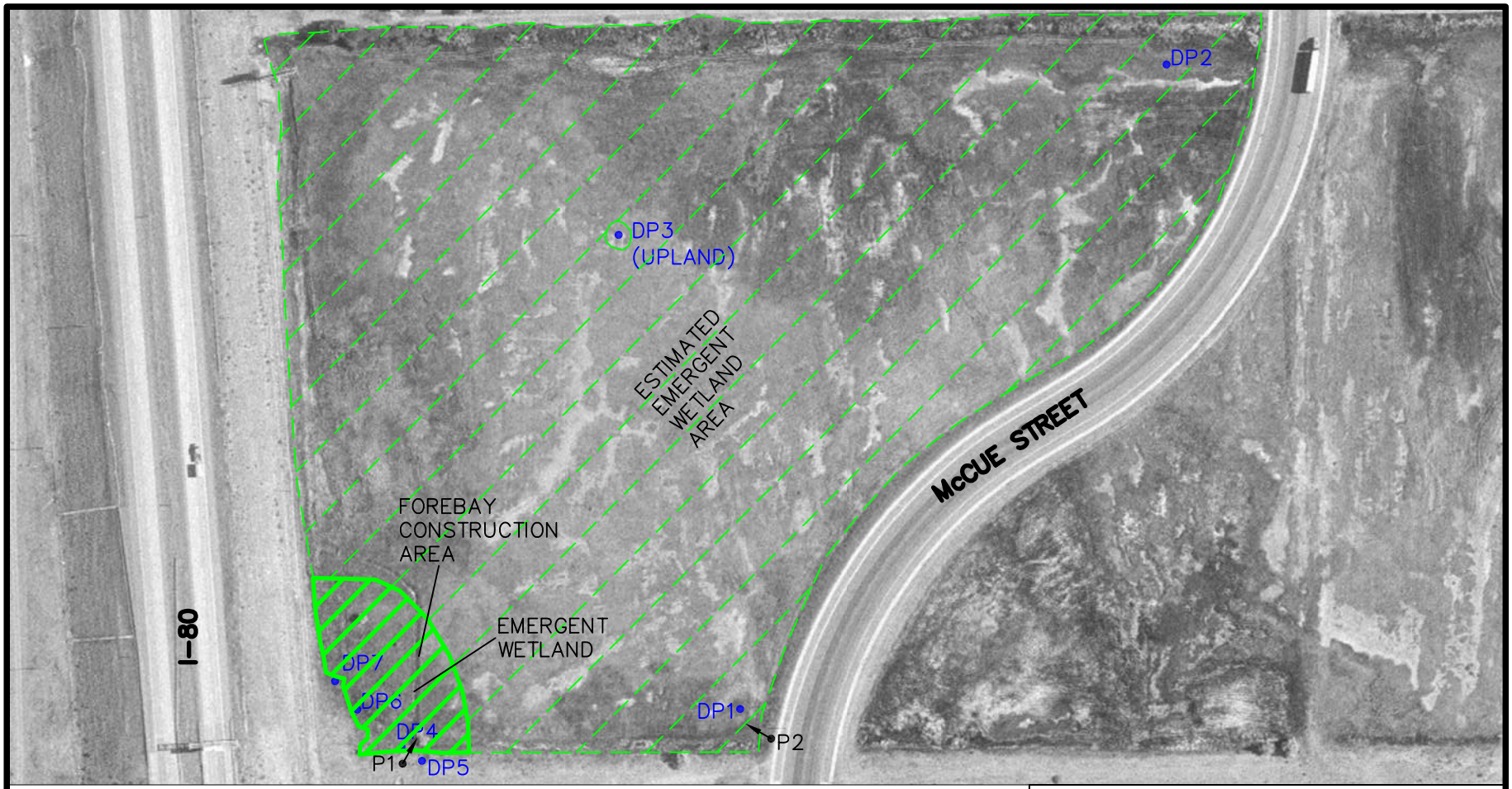


Sections 31 and 32, T16N, R73W

LEGEND

PEMC – Palustrine emergent, seasonally flooded.
PEMCx – Palustrine emergent, seasonally flooded, excavated.
PEMF – Palustrine emergent, semipermanently flooded.
R4SBCx - Riverine intermittent, streambed, seasonally flooded, excavated (Pioneer Canal)

Figure 4. Wetlands as defined by the US Fish and Wildlife Service's National Wetlands Inventory Map using WetLandMAPS.com© - West Laramie Drainage Master Plan & Street Paving Project, City of Laramie, Wyoming.



MAPPING SOURCE: CITY OF LARAMIE, WYOMING

LEGEND

- SURVEYED WETLAND BOUNDARY
- ESTIMATED WETLAND BOUNDARY
- DP2 DATA POINTS
- P2 PHOTO LOCATION/DIRECTION

0 200 FT.

SCALE

FIGURE 5

WETLAND DELINEATION RESULTS
McCUE WETLANDS

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC

MAPPING SOURCE: CITY OF LARAMIE, WYOMING

0 500 FT.
SCALE

FIGURE 6

SURVEY RESULTS FOR
SECTION 31, T16N, R73W

CITY OF LARAMIE
LARAMIE, WYOMING

Hydro Logic, LLC

ATTACHMENTS

COLOR PHOTOS
WETLAND DETERMINATION DATA FORMS
ALBANY COUNTY SOILS INFORMATION

Photo 1 – Northerly panoramic view of wetland area near proposed forebay structure location.

Photo 2 – Northwesterly panoramic view of wetland area near Data Point 1.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP1

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'04.8" Long: -105°36'44.5" Datum: NAD83

Soil Map Unit Name: Delphill-Blazon complex, 3 to 20% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Juncus balticus*	90	Yes	FACW+
2. *Phleum pratense*	10	No	FAC-
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-9	10YR 3/2	100	----	----	----	----	sandy clay loam	
9-14	10YR 4/3	60	----	----	----	----	sandy clay loam	
14-18	10YR 3/2	97	10YR 3/6	3	C	M	sandy clay loam with small rocks	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0-16+

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP2

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'13.2" Long: -105°36'37.0" Datum: NAD83

Soil Map Unit Name: Delphill-Blazon complex, 3 to 20% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Phleum pratense*	90	Yes	FAC-
2. *Puccinellia nuttalliana*	10	No	FACW+
3.			
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 4/2	80	10YR 3/4	20	RM	M	sandy clay loam	
7-18	Gley 1 4/10Y	90	10YR 3/3	10	RM	M	silty clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- X Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0-16+

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP3

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'10.8" Long: -105°36'46.4" Datum: NAD83

Soil Map Unit Name: Delphill-Blazon complex, 3 to 20% slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Small upland area within McCue Wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Thinopyrum intermedium*	75	Yes	NL/UPL
2. *Puccinellia nuttalliana*	10	No	FACW+
3.			
4.			
5.			
6.			
7.			
8.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	95	10YR 3/4	5	RM	PL	sandy clay	
4-18	10YR 3/3	100	-----	----	----	----	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): -----

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP4

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'04.7" Long: -105°36'50.6" Datum: NAD83

Soil Map Unit Name: Bosler, wet substratum-Urban land complex, 0 to 3% slopes NWI classification: PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Juncus balticus*	50	Yes	FACW+
2. *Phleum pratense*	40	Yes	FAC-
3. *Schoenoplectus pungens*	5	No	OBL
4.			
5.			
6.			
7.			
8.			
	95 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 2/2	100	----	----	----	----	silt loam	
4-11	10YR 4/2	50	10YR 5/2	50	RM	M	sandy loam with small rocks	
11-18	10YR 2/2	20	10YR 5/2	80	RM	M	sandy loam with small rocks	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes X No _____ Depth (inches): @18

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0-18+

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP5

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'04.6" Long: -105°36'49.7" Datum: NAD83

Soil Map Unit Name: Bosler, wet substratum-Urban land complex, 0 to 3% slopes NWI classification: PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Upland/Wetland data point.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Pascopyrum smithii*	70	Yes	FACU
2. Weeds	20	Yes	UPL
3. *Juncus balticus*	10	No	FACW+
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 3/3	100	----	----	----	----	silt clay loam	
5-16	10YR 4/4	20	MIXED SOIL – RAILROAD FILL					

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): -----

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP6

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'05.1" Long: -105°36'51.0" Datum: NAD83

Soil Map Unit Name: Bosler, wet substratum-Urban land complex, 0 to 3% slopes NWI classification: PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Juncus balticus*	45	Yes	FACW+
2. *Phleum pratense*	40	Yes	FAC-
3.			
4.			
5.			
6.			
7.			
8.			
	85 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species _____	x 2 = _____
FAC species _____	x 3 = _____
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: _____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No _____

Remarks:

SOIL

Sampling Point: DP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 3/2	100	----	----	----	----	sandy clay loam	
8-16	10YR 5/4	100	----	----	----	----	sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 0-18+

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: McCue Wetlands Project City/County: Albany Sampling Date: 11/18/08

Applicant/Owner: City of Laramie State: WY Sampling Point: DP7

Investigator(s): Hydro Logic, LLC (Rumsey) Section, Township, Range: Section 32, T16N, R73W

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): None Slope (%): 1%

Subregion (LRR): D Lat: 41°19'05.0" Long: -105°36'51.3" Datum: NAD83

Soil Map Unit Name: Bosler, wet substratum-Urban land complex, 0 to 3% slopes NWI classification: PEMC

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation No, Soil No, or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation No, Soil No, or Hydrology No naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

Upland/Wetland data point.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. None			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1. None			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. *Ambrosia acanthicarpa*	60	Yes	NI/UPL
2. *Juncus balticus*	35	Yes	FACW+
3. *Phleum pratense*	5	No	FAC-
4.			
5.			
6.			
7.			
8.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1. None			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species _____	x 1 = _____
FACW species 35	x 2 = 70
FAC species 5	x 3 = 15
FACU species _____	x 4 = _____
UPL species 60	x 5 = 300
Column Totals: 100 (A)	385 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No X

Remarks:

SOIL

Sampling Point: DP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 2/2	100	----	----	----	----	sandy loam	
8-16	10YR 5/2	60	7.5YR 4/6	40	RM	PL	sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): -----

Water Table Present? Yes _____ No X Depth (inches): -----

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): -----

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Aerial photo (CIR) available.

Remarks:

Soil Map
(McCue Wetlands)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:13,900 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Albany County Area, Wyoming
Survey Area Data: Version 6, Feb 21, 2007

Date(s) aerial images were photographed: 7/28/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Albany County Area, Wyoming (WY601)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
119	Bosler fine sandy loam, wet substratum, 0 to 3 percent slopes	34.2	3.0%
120	Bosler-Borollic Camborthids complex, 0 to 8 percent slopes	5.0	0.4%
121	Bosler, wet substratum-Urban land complex, 0 to 3 percent slopes	230.2	19.9%
150	Delphill-Blazon complex, 3 to 20 percent slopes	38.9	3.4%
151	Diamondville-Cushool complex, 3 to 15 percent slopes	50.7	4.4%
163	Forelle loam, 0 to 6 percent slopes	134.9	11.7%
164	Forelle-Urban land complex, 0 to 3 percent slopes	101.4	8.8%
165	Forelle-Diamondville association, 3 to 15 percent slopes	22.4	1.9%
195	Pits, mine	10.6	0.9%
203	Redrob, frequently flooded-Grenoble-Redrob complex, 0 to 3 percent slopes	38.2	3.3%
204	Redrob, frequently flooded-Redrob loams, 0 to 3 percent slopes	94.4	8.2%
205	Redrob, frequently flooded-Redrob-Urban land complex, 0 to 3 percent slopes	13.3	1.1%
216	Rock River sandy loam, 2 to 6 percent slopes	87.6	7.6%
218	Rock River-Urban land complex, 0 to 6 percent slopes	146.4	12.7%
228	Stunner sandy loam, 2 to 8 percent slopes	18.5	1.6%
231	Stunner-Urban land complex, 0 to 6 percent slopes	127.5	11.0%
Totals for Area of Interest		**1,154.2**	**100.0%**

APPENDIX B

US FISH AND WILDLIFE SERVICE DATA

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
5353 Yellowstone Road, Suite 308A
Cheyenne, Wyoming 82009

Federal Endangered and Threatened Species and Designated Critical Habitats that Occur in or may be Affected by Projects in ALBANY County, Wyoming
Last Updated September 2008

Species/Critical Habitat	Scientific Name	Status	Habitat
Black-footed Ferret	*Mustela nigripes*	Endangered	Prairie dog towns
Black-footed Ferret	*Mustela nigripes*	Non-essential/ Experimental	Shirley Basin
Blowout Penstemon	*Penstemon haydenii*	Endangered	Sand blowouts or dunes
Canada Lynx	*Lynx canadensis*	Threatened	Montane forests
Platte River Species (Interior Least Tern, Pallid Sturgeon, Piping Plover, Western Prairie Fringed Orchid, Whooping Crane)	*Sternula antillarum* *Scaphirhynchus albus* *Charadrius melodus* *Platanthera praeclara* *Grus americana*	Endangered Endangered Threatened Threatened Endangered	Downstream riverine habitat of the Platte River system*
Platte River Species Critical Habitat	Designated for whooping crane in Nebraska in riverine habitat of the Platte River system*		
Ute Ladies'-tresses	*Spiranthes diluvialis*	Threatened	Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation
Wyoming Toad	*Bufo baxteri*	Endangered	Laramie River valley

U.S. Fish and Wildlife Service (Service) biologists have used the best scientific information available to formulate this list, which is updated annually or soon after listing changes occur. The purpose of a species list is to help provide information on endangered and threatened species that may be present in a project area.

*If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Platte River System, there may be impacts to threatened and endangered species inhabiting the downstream reaches of this river system. For more information on how to seek ESA coverage for water-related activities through the Platte River Recovery Implementation Program, please visit our web site at: http://www.fws.gov/platteriver.

A current version of this species list fulfills the Service's requirement, under section 7(c) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.), to provide a list of endangered and threatened species upon request for federal actions and National Environmental Policy Act (NEPA) compliance. Federal agency responsibilities under section 7 of the Act, including an outline of the section 7 consultation process and information needed in a biological assessment may be found at the following link: http://endangered.fws.gov/consultations. Non-

Federal entities who believe that their projects or activities may affect listed species may contact the Service regarding the potential need for a section 10 permit, under the Act.

Measures may also be required for the project to protect migratory birds under the Migratory Bird Treaty Act, 16 U.S.C. 703 and the Bald and Golden Eagle Protection Act, 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Additional information that may be important for project planning concerning other important fish and wildlife resources is available from the Service's Wyoming Ecological Services office.

For additional information, please call the Wyoming Ecological Services Field Office at 307-772-2374.

APPENDIX C

NATIONWIDE PERMIT 43 – STORMWATER MANAGEMENT FACILITIES

AND

NATIONWIDE PERMIT GENERAL CONDITIONS

NATIONWIDE PERMIT 43

STORMWATER MANAGEMENT FACILITIES

Discharges of dredged or fill material into non-tidal waters of the United States for the construction and maintenance of stormwater management facilities, including the excavation of stormwater ponds/facilities, detention basins, and retention basins; the installation and maintenance of water control structures, outfall structures and emergency spillways; and the maintenance dredging of existing stormwater management ponds/facilities and detention and retention basins.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States, including the loss of no more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds this 300 linear foot limit is waived in writing by the district engineer. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters. This NWP does not authorize discharges of dredged or fill material for the construction of new stormwater management facilities in perennial streams. (Section 404)

Notification: For the construction of new stormwater management facilities, or the expansion of existing stormwater management facilities, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. Maintenance activities do not require pre-construction notification if they are limited to restoring the original design capacities of the stormwater management facility.

Contents adapted from Part II of the *Federal Register* (Volume 72, Number 47) published on March 12, 2007. Copies of the *Federal Register* are available upon request or by visiting the Wyoming Regulatory Office web site at https://www.nwo.usace.army.mil/html/od-rwy/Wyoming.htm.

Nationwide Permit General Conditions

To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer.

1. ***Navigation*****.** (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. ***Aquatic Life Movements*****.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

3. ***Spawning Areas*****.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. ***Migratory Bird Breeding Areas*****.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. ***Shellfish Beds***. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

6. ***Suitable Material*****.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. ***Water Supply Intakes*****.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. ***Adverse Effects From Impoundments*****.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. ***Management of Water Flows*****.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. ***Fills Within 100-Year Floodplains*****.** The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. ***Equipment*****.** Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. ***Soil Erosion and Sediment Controls*****.** Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. ***Removal of Temporary Fills*****.** Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. ***Proper Maintenance*****.** Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

15. ***Wild and Scenic Rivers*****.** No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

16. ***Tribal Rights*****.** No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

17. *Endangered Species.* (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

18. *Historic Properties*. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

19. *Designated Critical Resource Waters*. Critical resource waters include NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

20. *Mitigation*. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

20. *Mitigation*. (continued)

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

21. *Water Quality*. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

22. *Coastal Zone Management*. *Not Applicable.*

23. *Regional and Case-By-Case Conditions*. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination. **(Refer to list of Regional Conditions for authorized activities in Wyoming dated 11 May 2007)**

24. *Use of Multiple Nationwide Permits*. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

25. ***Transfer of Nationwide Permit Verifications*****.** If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:
"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

26. ***Compliance Certification*****.** Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

27. ***Pre-Construction Notification*****.** Refer to separate instructions on pre-construction notification procedure.

28. ***Single and Complete Project*****.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

Contents adapted from Part II of the *Federal Register* (Volume 72, Number 47) published on March 12, 2007. Copies of the *Federal Register* are available upon request or by visiting the Wyoming Regulatory Office web site at https://www.nwo.usace.army.mil/html/od-rwy/Wyoming.htm.

Appendix E – Hydraulic Analysis of McCue Wetlands

Hydraulic Analysis of the McCue Wetlands

Laramie, Wyoming

This document prepared for:
City of Laramie
405 Grand Avenue
Laramie, Wyoming 82073

Prepared by:
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July 2010

SEH No. ALARM0801.00

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Introduction

The McCue Wetlands area (study area) is approximately 50-acres and is located at the northern boundary of the Wyoming Territorial Prison property. Approximately 41.3 acres of the 50-acres have been delineated as wetlands in accordance with U.S. Army Corps of Engineers delineation techniques.

As part of the West Laramie Drainage Master Plan, a proposed 4'x 5' box culvert and a 36" pipe would outfall in the southwest corner of the study area. As a result, the western study area would also be used for stormwater detention storage.

At the request of the Wyoming Office of State Lands and Investments Board, a hydrologic and hydraulic study has been undertaken by SEH to estimate water levels and drawdown time for the west parcel due to the proposed discharge of stormwater into the study area.

Existing Conditions

The study area is bounded by City of Laramie Open Space and the Laramie River on the east and Interstate 80 on the west. To the north, the study area is bordered by an existing trailer park (Sunny Meadows Village). To the south, the study area is bounded by an abandoned railroad grade. The study area is bisected, in a north to south direction, by McCue Street which was constructed in 2002.

McCue Street effectively separates the study area into two basins, the west basin which is approximately 21.5 acres and the east basin which is approximately 28.7 acres. The two basins currently do not have any structural or functional improvements. The land east of the Wyoming Territorial Prison property is currently owned by the City of Laramie and is used as open space, with a series of recreational trails existing near the river. Please see Figure 1 on the following page.

McCue Street acts as an embankment between the two basins, detaining stormwater discharges mostly to the western side of the wetlands. Three culverts convey overland flow from the western basin to the eastern basin. Near the northern end, there are two existing 30" RCP pipes crossing McCue Street, which are currently approximately half full of silt. At the southern end, there is a 54" RCP pipe which crosses McCue Street. This pipe is also approximately half full of silt.

The trailer park on the north side of the study area is elevated, with a low point elevation of approximately 7140.6. For this reason, it was conservatively assumed that the overflow elevation of the McCue Wetlands is 7140.00, which is below the low point of the trailer park. Table 1 below, provides a stage-storage curve relationship for the western basin developed from recent ground topography. For this study, storage below the 10-year floodplain elevation was not evaluated.

A Flood Insurance Study (FIS) for the City of Laramie, dated October 16, 1996, lists discharges for the Laramie River near the McCue Wetlands. Based on this study, the 10-

FIGURE 1
McCUE OUTFALL

N

SCALE 1" = 300'

LARAMIE

SEH

STATE OWNED

CITY OWNED

PRIVATELY OWNED

SUNNY MEADOWS VILLAGE

CULVERTS

CULVERT

WESTERN BASIN

McCUE STREET

AREA OF PROPOSED EASEMENT

EASTERN BASIN

CULVERT

ABANDON RR GRADE (SOUTH LIMIT OF STUDY AREA)

McCUE OUTFALL

MADISON STREET

INTERSTATE 80

LARAMIE RIVER

VAN BUREN STREET

TAYLOR STREET

ADAMS STREET

POLK STREET

SNOWY RANGE ROAD

year discharge of the Laramie River drainage basin is 2,027 cfs, and the 100-year discharge is 3,758 cfs.

Table 1. Western Basin Detention Volume

Elevation	Area		Volume
(ft)	(ft2)	(acres)	(cum ac-ft)
7137	7,626.92	0.18	0.00
7138	288,302.94	6.62	6.75
7139	563,866.44	12.94	16.54
7140	801,452.47	18.40	32.21

Proposed Discharge

As part of the West Laramie drainage improvements, a proposed 4'x 5' box culvert and a proposed 36" pipe would discharge approximately 221 cfs and 58 cfs, respectively, into the western basin during the 100-year runoff event. The area tributary to this outfall is approximately 0.8 square miles. See Exhibit One for a map of the tributary drainage area.

Hydrologic modeling of the drainage area was completed with the use of XP-SWMM, a computer modeling program, which calculates both runoff quantities and rates. From XP-SWMM results, the peak runoff volume, during the 100-year runoff event, routed to the study area is approximately 5,700,000 cubic feet, or 130 acre-feet.

Flood Plain Considerations

Since the drainage tributary area to the study area is much smaller than the area tributary to the Laramie River, the peak flow discharged to the study area will arrive to this location earlier than discharge from the Laramie River. As a result, it is not appropriate to use the 100-year event for both the river and stormwater discharge in evaluations.

The ratio of river tributary area to the study area tributary area is approximately 1,000. This ratio was applied to Federal Highway Administration Hydraulic Engineering Circular-22 Table 7-3 which indicates that the design storms to be used for the two basins are the 100-year storm for the drainage area and the 10-year floodplain for the river, and vice-versa.

The FIS, and all related flood maps, were developed based on the NVGD 1929 datum. The ground survey performed for this study was developed based on the NAVD 1988 datum. In order to convert between the two datums, the survey is lowered by 3.33 feet for a comparative analysis, or the flood related data raised by 3.33 feet.

From review of the current FIRM for the area, the 100-year floodplain water surface elevation is shown between 7135 and 7136 at the approximate location of the pond outlets. According to the FIS, the base flood elevation (BFE) near the project site is 7135.1, with a datum-corrected (NAVD 1988) elevation of 7138.4. It is expected that the 10-year floodplain will be significantly lower (>1') than the 100-year floodplain. At the time this report was prepared, not enough information was available to determine the exact 10-year floodplain elevation.

For this analysis, it has been conservatively assumed that the 10-year floodplain elevation is approximately 7137.4, one foot lower than the 100-year floodplain. The pond outlet pipes as shown on the recent site survey are shown at elevation 7134.5-7135.0. Based on the information above, the Laramie River water surface elevation will be above the pipe outfalls (7134.5-7135) during both the 10- and 100-year storms, causing a tailwater effect on the outlet pipes from the study area.

Modeling Results

Based on results from XP-SWMM, during the 100-year runoff event, the maximum water surface elevation of the western basin is 7139.47. Due to the tailwater condition caused by the 10-year water surface elevation of the Laramie River, a fixed backwater elevation of 7137.4 was set at the outlet of all three western basin outlet pipes.

It was noted above that the existing culvert pipes which cross McCue Street are approximately half full of silt. In order to model this condition, the area of the conduits was reduced by half. Modeling results show that in this condition, the maximum 100-year water surface elevation is 7139.90.

Based on results from XP-SWMM, during the 10-year runoff event, assuming a 100-year runoff event in the Laramie River, the maximum water surface elevation of the western basin is 7139.71. Due to the tailwater condition caused by the 100-year water surface elevation of the Laramie River, a fixed backwater elevation of 7138.4 was set at the outlet of all three western basin outlet culverts.

Again, if the existing culverts are half full of silt, modeling results show that the maximum 100-year water surface elevation is 7139.98.

Since the maximum containment elevation for the Wetlands is 7140.00, these modeling results indicate that the study area will not overtop during either 100-year runoff event scenario.

The drawdown time (i.e., the time it takes for the western basin to drain after a storm) is approximately nine (9) hours during the 100-year runoff event, assuming unblocked pipes. With the outfall pipes half silted in, the drawdown time is approximately 18 hours.

Summary

In summary, the Laramie River floodplain, as outlined in the FIRM for the area of interest, will have minimal effect on the McCue Wetlands pond during a 100-year runoff event in West Laramie. From XP-SWMM modeling, water surface elevations will not cause inundation to the nearby trailer courts.

Exhibit One
Tributary Area to McCue Wetlands

EXHIBIT ONE: TRIBUTARY AREA TO MCCOE WETLANDS

N.T.S.

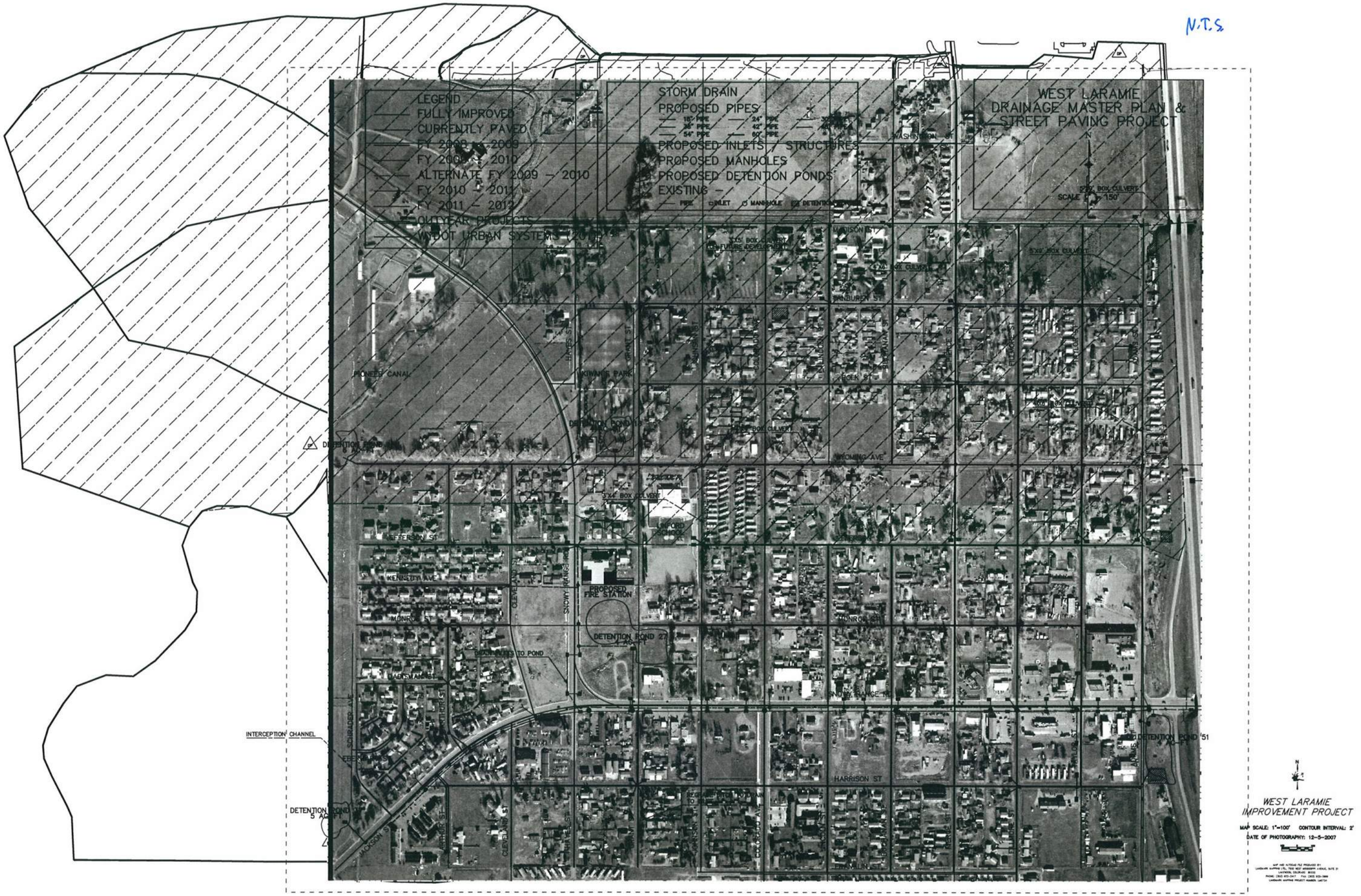
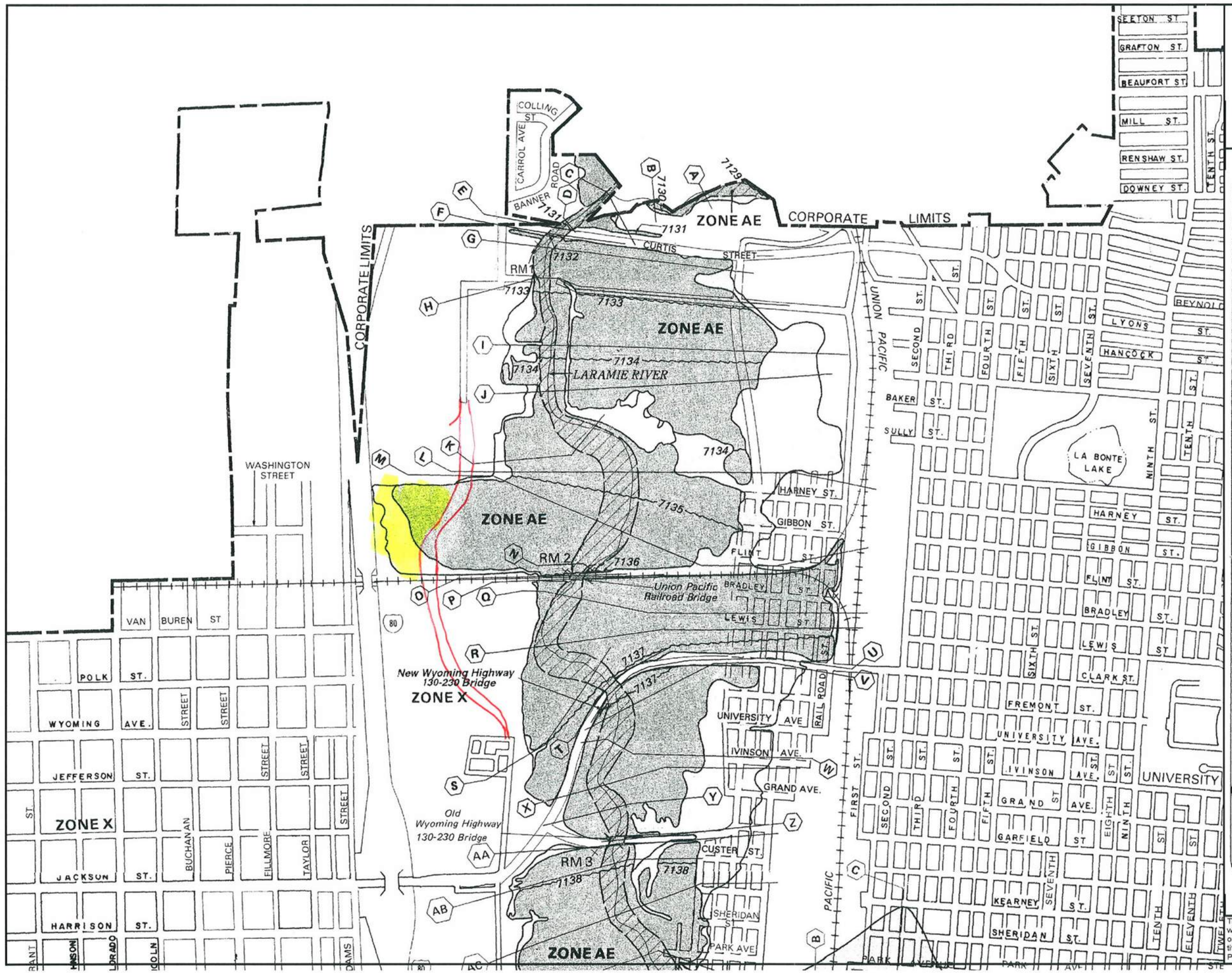


Exhibit Two
Floodplain Map



N

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF

LARAMIE, WYOMING

ALBANY COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
560002 0005 D

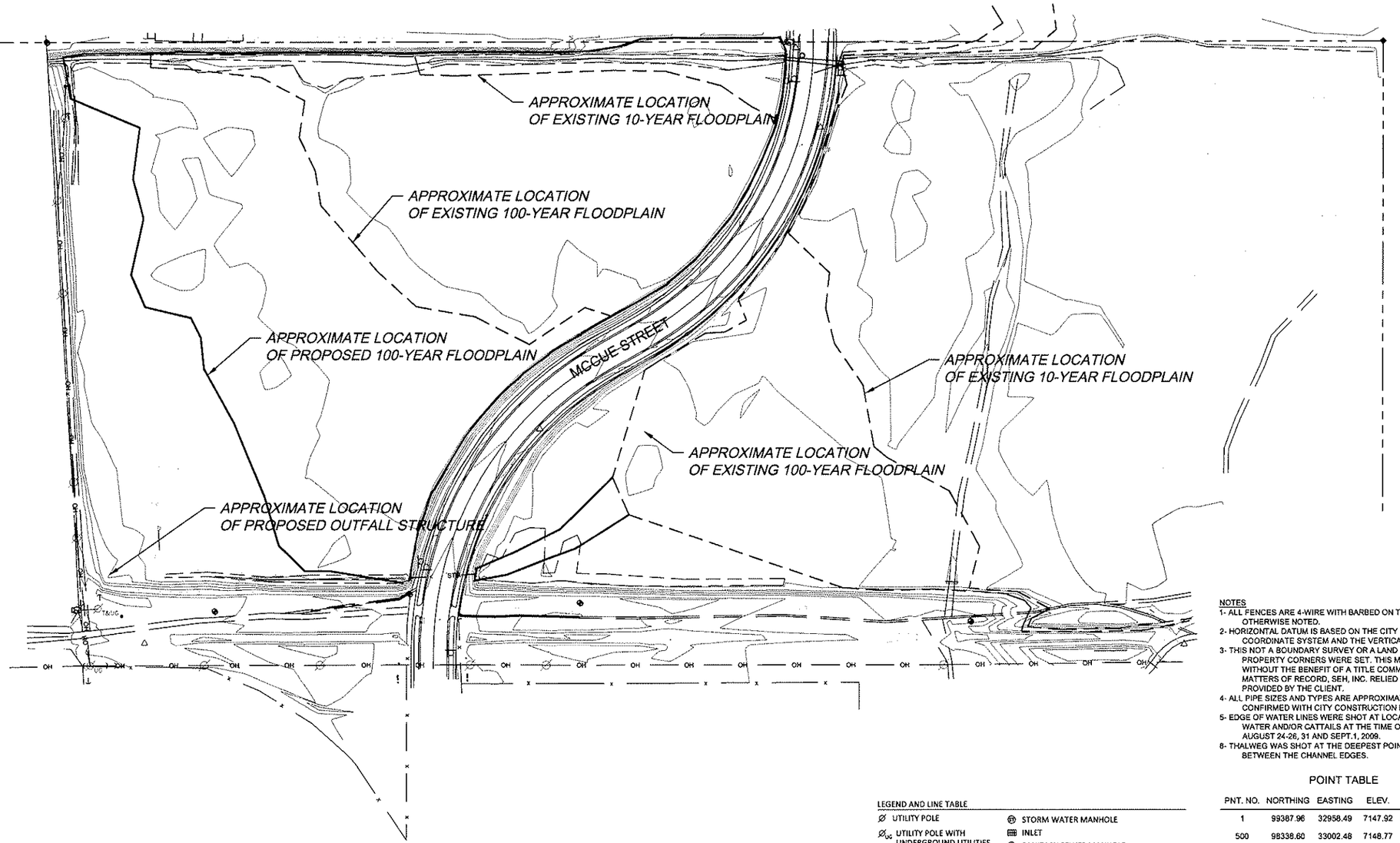
MAP REVISED:
OCTOBER 16, 1996

Federal Emergency Management Agency

Exhibit Three
Existing and Proposed Water Surface Elevations

NORTH

1"=100' scale 100 0 100 200 feet



LEGEND AND LINE TABLE

UTILITY POLE	STORM WATER MANHOLE
UTILITY POLE WITH UNDERGROUND UTILITIES	INLET
UTILITY POLE WITH UNDERGROUND UTILITIES & TRANSFORMER	SANITARY SEWER MANHOLE
GUY WIRE	SIGN
TELEPHONE PEDESTAL	WATER VALVE
ELECTRIC BOX	WATER MANHOLE
PROPERTY CORNER	EDGE OF GRAVEL
SECTION CORNER	FENCE LINE
FIRE HYDRANT	OVERHEAD UTILITIES
	SECTION LINE

NOTES
1- ALL FENCES ARE 4-WIRE WITH BARBED ON TOP UNLESS OTHERWISE NOTED.
2- HORIZONTAL DATUM IS BASED ON THE CITY OF LARAMIE LOCAL COORDINATE SYSTEM AND THE VERTICAL DATUM IS NAVD88.
3- THIS NOT A BOUNDARY SURVEY OR A LAND SURVEY PLAT. NO PROPERTY CORNERS WERE SET. THIS MAP WAS PREPARED WITHOUT THE BENEFIT OF A TITLE COMMITMENT. FOR ALL MATTERS OF RECORD, SEH, INC. RELIED UPON INFORMATION PROVIDED BY THE CLIENT.
4- ALL PIPE SIZES AND TYPES ARE APPROXIMATE AND SHOULD BE CONFIRMED WITH CITY CONSTRUCTION DOCUMENTS.
5- EDGE OF WATER LINES WERE SHOT AT LOCATIONS OF STANDING WATER AND/OR CATTAILS AT THE TIME OF THE FIELD SURVEY AUGUST 24-26, 31 AND SEPT.1, 2009.
6- THALWEG WAS SHOT AT THE DEEPEST POINT IN THE STANDING WATER BETWEEN THE CHANNEL EDGES.

POINT TABLE

PNT. NO.	NORTHING	EASTING	ELEV.	DESCRIPTION
1	99387.96	32958.49	7147.92	REBAR W/PLASTIC CAP
500	98338.60	33002.48	7148.77	SPIKE
501	98314.85	33493.92	7148.15	SPIKE
550	98693.55	34189.70	7145.40	REBAR W/PLASTIC CAP
551	99226.08	34683.13	7140.89	SPIKE
552	99366.71	34639.77	7140.10	REBAR W/PLASTIC CAP
553	99375.47	33319.05	7146.91	2IN. ALUM. CAP
565	98314.18	35325.43	7139.36	RR SPIKE
566	101856.30	35151.25	7139.06	SPIKE
567	101810.18	34777.98	7143.65	SPIKE
568	98593.07	35492.40	7148.21	SPIKE
569	98960.13	35861.02	7145.50	SPIKE
3447	98353.87	34949.80	7144.70	3.25IN ALUM CAP

COLORADO LAW (SENATE BILL 93-155) REQUIRES PERSONS TO NOTIFY THE UTILITY NOTIFICATION CENTER OF COLORADO 2 BUSINESS DAYS PRIOR TO MAKING OR BEGINNING AN EXCAVATION. NOTIFICATION MAY BE MADE BY CALLING: 1-800-922-1987

SEH
PHONE: (303) 586-5800
390 UNION BOULEVARD
SUITE 630
LAKEWOOD, CO. 80228

McCue Fields
McCue Street near Madison Street
W/2 of SEC. 32, T16N, R73W
LARAMIE

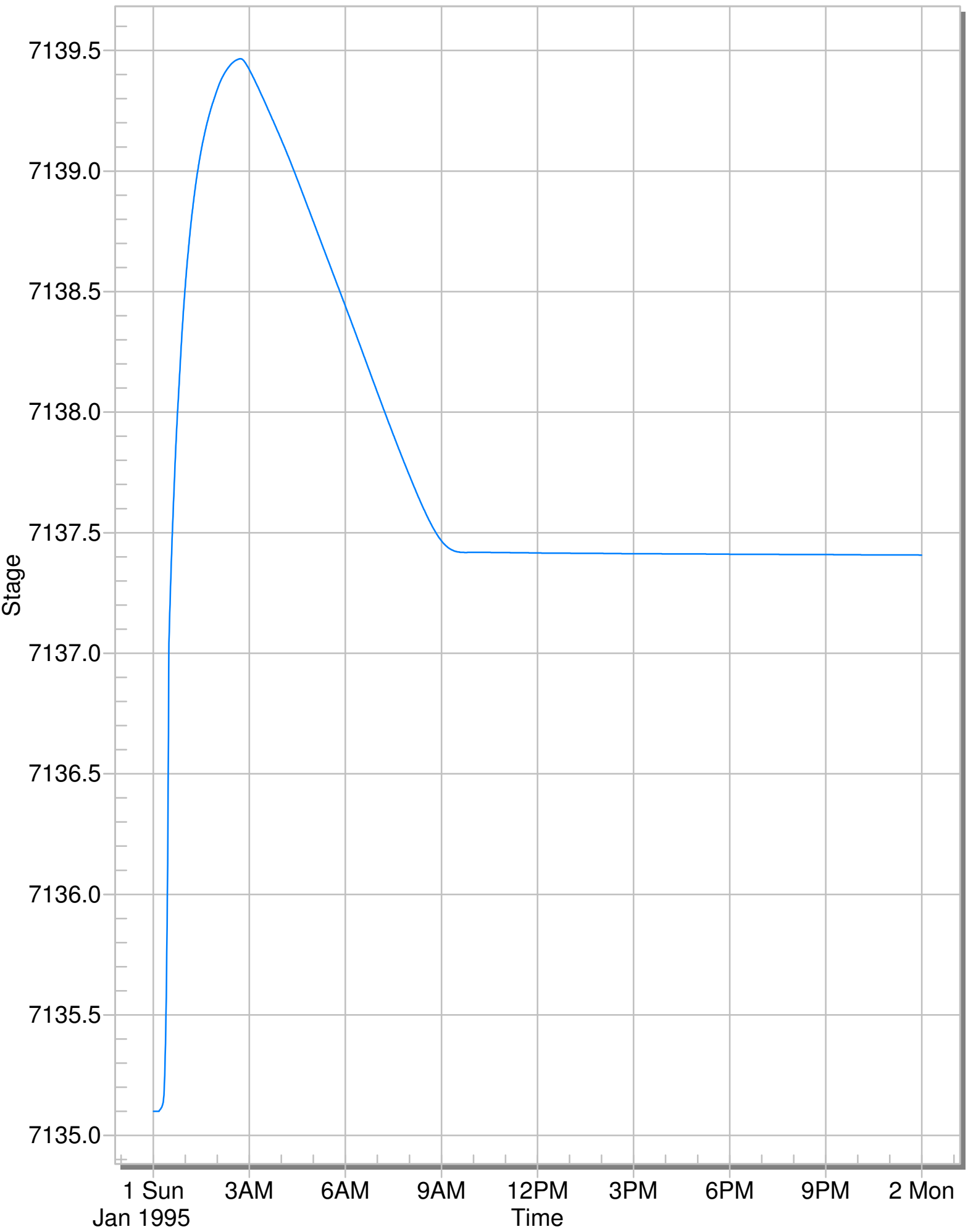
JOB NO: ALARM0801.00
SURVEYED BY: WCH
DRAWN BY: WCH
CHECKED BY: JPM
DATE: SEPT. 2 ,2009
SHEET NO: 1

SHEET 1 OF 1

C:\Documents and Settings\tmartin\My Documents\108259 Laramie\dwg\090902 Tin and BNDRY_V2004.dwg9/15/2009 12:01 PM

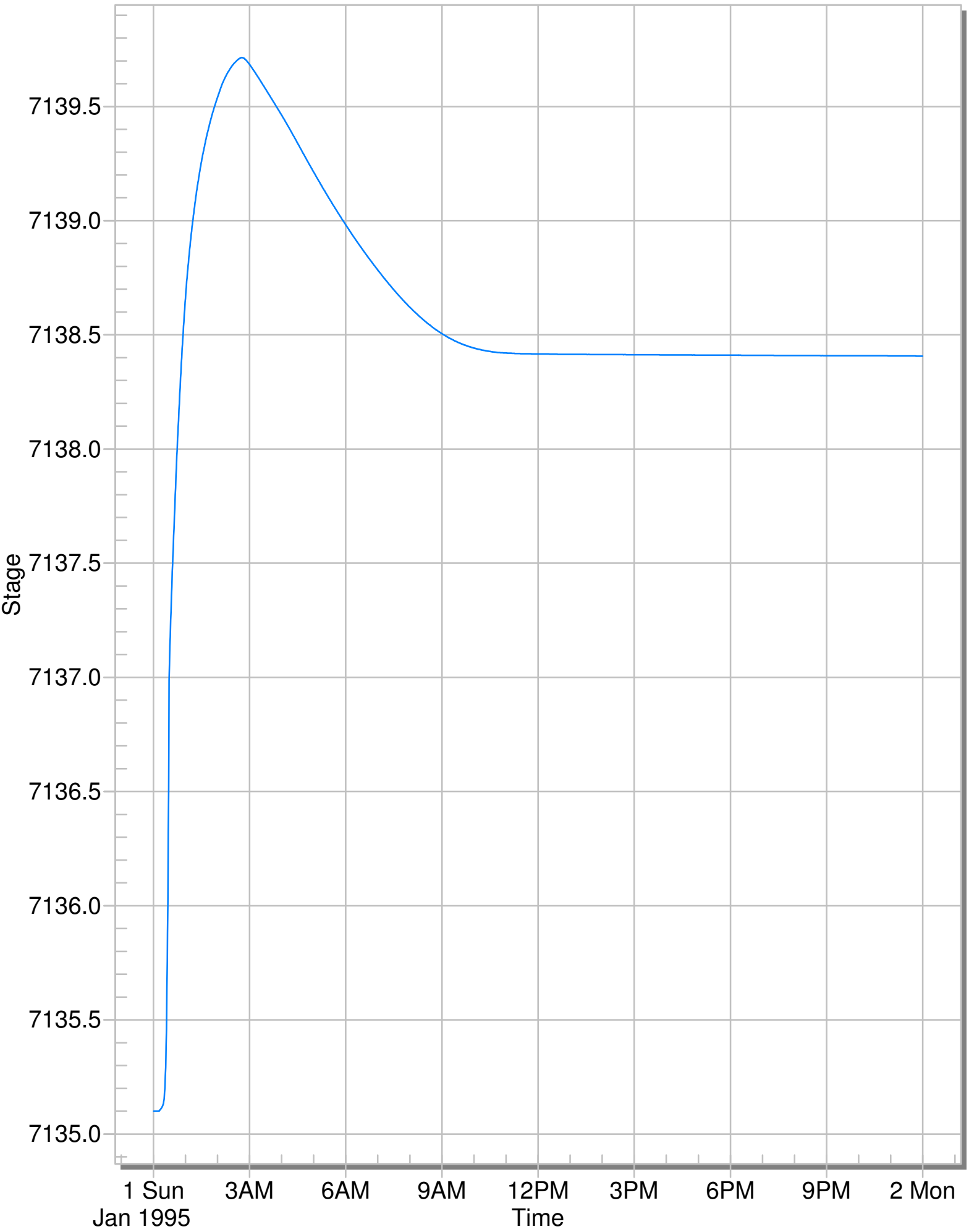
Node - J01

100[Max7139.47]



Node - J01

10[Max 7139.71]



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