2016 Sewer Rehabilitation Projects

Addendum 2

Project 2016SRH01

Review and comment have resulted in changes to the specifications for the project. Please note this Addendum 2 on Part V.1. If you have any questions please call Jeff Pecenka at 307-637-6496.

Addendum 2 for the 2015 Sewer Rehabilitation Projects involves changes to the Specifications as follows:

1. New Dry Creek Schedule included that corrects the schedule to Burst in all sewer reaches, adds Epoxy Lane Striping and Curb Paint, adds Manhole Diameters and corrects a unit error.
2. Asphalt on Powderhouse Road will be 6" in depth of City approved mix with Granite Quarry aggregate with the bottom 4" with grading "A" or "B" and the top 2" with grading "D". Powderhouse median paving will be 4" in depth of an approved City Mix.
3. Modeling indicates flows in the Dry Creek 10" sewer are under 300 gpm. The statement that a 600 gpm pump is adequate is accurate. Pebrican will have minimal flows. Andover will have the flows of the houses along the project. 10th Street sewer flows are estimated between 200 gpm and 300 gpm. 17th Street sewer flows are estimated at 300 gpm. Evans sewer flows are estimated at under 200 gpm. These are for the most part eyeball estimates, but a 600 gpm pump should handle all flows for this year's sewer mains being replaced.
4. New Evans Avenue Schedule included that adds a manhole rehab. Manhole 090MH307 is to be rehabilitated, manholes 090MH369 and 090MH306 are to be removed and replaced (R&R).
5. New Andover Drive Schedule included that corrects a unit for Curb and Gutter and a quantity of. Sewer Service Reconnects.
6. Add Sewer Lining Specifications and Sewer Manhole Rehabilitation Specifications.
7. New Sheets for Dry Creek Sewer Project will be placed on the Website.
8. Epoxy Paint Specification included.

1. <u>REHABILITATE MANHOLE</u>

Description. This work consists of Rehabilitating existing manholes in place to a level where the manhole can structurally withstand the loads of the environment the manhole exists in without the host manhole providing any strength. Contractors must be able to dewater at manhole locations for rehabilitation of manholes. No cost will be paid for by the BOPU for dealing with groundwater. It is recommended that Contractors visit the site of this lining project to view conditions before they bid this project. BOPU will assist Contractor with site visits. **Ring and**

Cover will also be replaced on the rehabilitated manhole. Call Jeff Pecenka at (307)-637-6496, or Ted Bade (307)630-2424 for assistance with site visitation.

Materials. Materials will conform to manufacturers standards. Materials will be such that the inner diameter of the manhole will be reduced by no more than 2". All voids will be cleaned and prepared for patching according to the patching material manufacturers recommendations. Patching used will be a calcium aluminate cement mortar with per fused calcium aluminate. The 28 day compressive strength of the patching material will exceed 9,000 psi. Shrinkage will be (0%) as per ASTM C596. Interior coating systems will have compressive strengths that exceed the numbers shown below, and in tensile testing fail the substrate before coming delaminated from the host manhole substrate. Protective coating will meet the following physical requirements:

Compressive Strength	ATSM D 695	>18,000 psi
Tensile Strength	ATSM D 638	> 7,450 psi
Flexural Strength	ASTM D 790	>14,000 psi
Bond	Substrate Failure	
Flexural Modulus	ASTM D 790	>735,000 psi
Chemical Resistance	Severe Municipal Sewer	

Construction Requirements. Contractor will provide a manhole rehabilitation lining system certified by a structural engineer to withstand the loadings the manhole is subjected to without the existing manhole contributing to that structural strength. HS-20 loadings will be used in design of manhole rehabilitation systems. The system will be applied to a manhole interior cleaned by the contractor to a level where the product system will succeed. Patching BOPU engineer must approve and review structural design of rehabilitation system. Patching will be cured to 75% of 28 day strength before adding rehabilitation system. Manhole Rehabilitation System will be warranted against any failure for 10 years from the date of acceptance. Steps will be replaced in all cases. The wall of the resin based liner is to be structurally designed to withstand the hydraulic load generated by the groundwater table the long term (50yr) value of the flexural modulus of elasticity will be utilized to calculate the thickness of the structural liner. The initial flexural modulus of elasticity (short term) of the submitted resin material will be utilized with the long term deformation percentage as determined by ASTM D2990 (in the design equation outlined in ASTM 1216-07b. The value of the long term flexural modulus of the proposed product will be certified by an independent, certified, third party testing lab, independent of the Manufacturer and submitted with the bid package. [The definition of long term value will be identified as initial flexural modulus of elasticity less the reduction in value caused by *Creep over a fifty (50) year minimum period* and *verified by third party DMA testing(ASTM D2990)*.] All design submittals will include this certified third party DMA testing (ASTM D2990) value in their contents.

Any active flows shall be dammed, plugged or diverted as required to ensure that the liquid flow is maintained below the surfaces to be coated. Flows should be totally plugged and/or diverted when coating the invert. All extraneous flows into the manhole or vaults at or above the area coated shall be plugged and/or diverted until the polyurethane has set hard to the touch. As an option, hot air may be added to the manhole to accelerate set time of the coating.

Pipe joint seals will be installed. No leaks may be present prior to commencing and during work.

Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with these specifications.

Temperature of the surface to be coated should be maintained between 50 deg F and 120 deg F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the temperature is falling versus rising (i.e. late afternoon into evening vs. morning into afternoon).

SURFACE PREPARATION. Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify Owner of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair mortar and protective coating.

All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.

Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the polyurethane protective coating to be applied.

Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 3,500 psi to 5,000 psi at 4 gpm. Other methods such as high pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying, solvents (SSPC-SP10 or NACE No.2) or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.

Infiltration shall be stopped by using a material which is compatible with the specified repair mortar and is suitable for topcoating with the specified protective coating.

The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction, shall be grouted with a flexible grout or gel.

(OPTIONAL) Castings can be abrasive blasted and coated to prevent corrosion if desired.

All surfaces should be inspected by the Inspector during and after preparation and before the repair material is applied.

APPLICATION OF REPAIR MATERIALS. Areas where structural steel has been exposed or removed shall be repaired in accordance with the Project Engineer's recommendations.

Repair materials shall meet the specifications herein. The materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. The material thickness shall be specified by the Project Engineer according to Owner's requirements and manufacturer's recommendations.

If using approved cementitious repair materials, such shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.

The repair materials will be to cured in accordance with the manufacturer’s recommendations. Curing compounds should not be used unless compatible with the specified protective coating.

Application of the repair materials, if not performed by the coating certified applicator, should be inspected by the protective coating certified applicator to ensure proper finishing for suitability to receive the specified coating.

After abrasive blast and leak repair is performed, all surfaces shall be inspected for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other approved method. If repair materials are used, refer to these specifications for surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a cementitious repair mortar and prior to application of the approved coating.

All surfaces should be inspected during and after preparation and before the protective coating/lining is applied.

APPLICATION OF PROTECTIVE COATING/LINING. Application procedures shall conform to the recommendations of the protective coating/lining manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.

The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.

The protective coating/lining material must be spray applied by a Certified Applicator of the protective coating manufacturer, or may be a liner applied with pressurized steam or hot water.

Specified surfaces shall be coated by spray application of a solvent-free, 100% solids, polyurethane structural lining as further described herein. Liner systems such as polytriplex or Sprayroq or preapproved equal may be used.

Airless spray application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating. Air assisted spray application equipment may be acceptable. All coatings will be at least 250 mils.

If necessary, subsequent topcoating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this recoat window is exceeded.

A structural manhole rehabilitation designed to meet HS-20 loadings will be required in all manhole rehabilitations. A minimum liner system will be 250 mm when SprayRoq is used and 3/8 inch when polytriplex is used.

TESTING AND INSPECTION

High Voltage Spark Test. After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment. Surface shall first be dried, an induced holiday (area of insufficient thickness) shall then be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday (refer to NACE RPO188-99 or ASTM D5162). All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.

Adhesion Testing. The adhesion tests shall be performed on all rehabilitated structures, or as shown on the Plan and/or specified in the Special Provisions. Adhesion testing shall be conducted after the liner system has cured per manufacturer instruction and in accordance with ASTM D4541 (for metal) or ASTM D7284 for concrete. A minimum of one 20 mm dolly shall be affixed to the lined surface of the structure at the upper section or cone area, mid section and at the bottom, unless otherwise specified in the Special Provisions. Each testing location shall be identified by the Engineer. The adhesive used to attach the dollies to the liner shall be rapid setting with tensile strength in excess of the liner material and permitted to cure in accordance with manufacturer

recommendations. The lining material and dollies shall be adequately prepared to receive the adhesive. Prior to pull test, the Contractor shall utilize a scoring device to cut through the coating until the substrate is reached. Extreme care shall be required while scoring to prevent micro cracking in the coating, since cracks may cause failures at diminished strengths. Failure due to improper dolly adhesive or scoring shall require retesting. The pull tests in each area shall meet or exceed 200 psi and shall include sub-base adhered to the back of the dolly or no visual signs of coating material in the test hole. Pull tests with results between a minimum 150 psi and 200 psi shall be acceptable if more than 50% of the subsurface is adhered to the back of the dolly. A test result can be discarded, as determined by the Engineer, if there is a valid non-statistical reason for discarding the test results as directed by Sections 8.4 and 8.5 of ASTM D4541. If any test fails, a minimum of three additional locations in the section of the failure shall be tested, as directed by the Engineer. If any of the retests fail all loosely adhered or not adhered liner in the failed area, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. If a structure fails the adhesion test, one additional structure or 10% of the initial number of structures selected for testing shall be tested at the discretion of the Engineer and/or as specified in the Special Provisions.

NOTE: The mil thickness will be measured and confirmed with the scored and pulled test samples.

A final visual inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Applicator.

The municipal sewer system may be put back into non-severe operational service as soon as the final inspection has taken place. However, for severe corrosion duty such as high concentrations of acids, bases or solvents, 4 to 6 hours may be necessary prior to returning to service. Consult coating manufacturer for further details.

Method of Measurement. The quantity of Manholes Rehabilitated (REHAB) is by (ea) each manhole rehabilitated. This includes all equipment, materials, labor, transportation and engineering necessary to provide manhole rehabilitation.

Basis of Payment.

Payment will be made under:

Pay Item	Pay Unit
REHAB Manhole 4’<10’	EA
REHAB Manhole 5’<10’	EA
REHAB Manhole 6’<10’	EA
REHAB Manhole 4’(10’–15’)	EA
REHAB Manhole 5’(10’–15’)	EA
REHAB Manhole 6’(10’–15’)	EA
REHAB Manhole 4’>15’	EA
REHAB Manhole 5’>15’	EA
REHAB Manhole 6’>15’	EA

2. CLEAN VIDEO AND ASSESS & LINE SEWER MAIN (CURED-IN-PLACE REHABILITATION)

Description. This item consists of cleaning, grinding, and lining with cured in place pipe and as constructed video inspection of existing sewer mains of various diameters at the locations indicated in the plans and as described in the plans and specifications. This work includes all pumping/bypass pumping, testing, materials, tools, debris disposal, labor and equipment necessary to accomplish this task.

Materials. Materials used in constructing this work will conform to the **Standard Specifications or as specified herein**.

Construction Requirements. Sewerage will be lined in the locations and to the grades established in these Plans and Specifications, and in conformity with the City of Cheyenne & Board of Public Utilities, **Standard Specifications** and as set forth in these specifications.

This work consists of cleaning, video inspection and rehabilitation of pipes as indicated on the plans. This procedure will be done in two phases. As a result of Phase I, the investigative phase, the condition of the pipe will be developed through cleaning and videoing of the pipe. The Contractor and BOPU engineer will meet and determine the results of the investigative phase and if necessary proceed to Phase II, lining phase, where the pipe will be lined and services reestablished.

Specifications included herein or referenced define the operations necessary to perform the work as planned.

A. CURED-IN-PLACE PIPE (CIPP).

1. GENERAL.

a. SCOPE. This project consists of rehabilitating pipelines by the installation of a cured-in-place pipe (CIPP) consisting of a resin-impregnated flexible tube which is inverted into the existing conduit by use of a hydrostatic head. The resin is cured by circulating hot water within the tube or by exposing the resin to UV light. The curing process will result in a continuous and tight-fitting finished liner pipe.

The work shall consist of complete sewer line cleaning, TV inspecting, notification of property owners, locating existing taps to be reestablished, and preparing the sewer for lining, bypass - coupling as required, necessary bypass pumping, installing and curing the reline-impregnated tube, testing the installed CIPP, and reconnecting all service lines.

The work shall consist of furnishing all labor, material, tools, equipment and incidentals necessary to complete the project.

b. CODES AND STANDARDS. Except as otherwise specifically noted on the plans or specified herein, all materials and work for the rehabilitation of sanitary sewers by the installation of a resin-impregnated tube shall conform with the latest edition of ASTM F1216 "Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin Impregnated Tube". Where conflicts exist between the referenced standard and this specification, this specification shall govern.

c. CONTRACTOR LICENSING. To perform sewer rehabilitation work using the Board of Public Utilities' approved Interior Lining Methods of Construction, the Contractor must be licensed by Insituform of North America Inc. to perform the INSITUFORM Method of Construction; or must be licensed by Guildner Pipeline Maintenance Inc.; or must be a licensee of the Inliner USA Process; or must be a licensee of PEC, Inc. process; or must be a licensee of KM Inliner Process; or must be a licensee of Saertex-Liner; or must be a licensee of Civil Construction Services; or must be a licensee of SAK Construction at the time of bid opening. Other liner providers will be considered and if determined to be equivalent through submission and review of engineering specifications will be included as acceptable.

d. SUBSTITUTES OR "OR-EQUAL" ITEMS. It is the intent of these specifications to provide for the installation of a new pipeline within an existing pipeline by means of a proven trenchless process which eliminates or greatly curtails excavation and trenches for the pipe installation and the reconnection of service lines. Bids shall be based on exact materials or equipment specified.

The Engineer shall be the sole judge of acceptability, and no substitute shall be ordered, installed or utilized without the Engineer's prior written approval.

The approval of other processes as equal to that specified will only be made in writing in the form of an Addendum issued by the Engineer.

If an alternate process is approved, the Contractor shall accept the responsibility for the performance of the installation and if it does not meet the intent or standard of the specified process/installer, the Owner reserves the right to have the installation removed and reinstalled, or corrected at the Contractor's expense.

e. SUBMITTALS. The following SUBMITTALS are required prior to start of construction.

1. CHEMICAL RESISTANCE. The Contractor shall certify that the CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. Samples of testing shall be of tube and resin system similar to that proposed for actual construction. It is required that samples with and without plastic coating meet ASTM F1216 chemical testing requirements.

2. HYDRAULIC CAPACITY. The Contractor shall certify that the CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material, taking into consideration its age and condition. The roughness coefficient of the CIPP shall be verified by third party test data.

3. CIPP SYSTEM DATA AND DESIGN CALCULATIONS.
The Contractor shall submit all required design calculations per section 2b "STRUCTURAL REQUIREMENTS", any manufacturers resin data test results, resin enhancer manufacturers data, bond enhancer manufacturers data, and certification of applicability of resin.

4. CIPP FIELD SAMPLES. The Contractor shall submit test results from previous field installations made within the previous 6 months in the USA of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties listed in Table 1 of ASTM F1216 have been achieved in previous field applications.

f. WARRANTY. The Contractor shall warrant the work as specified in the Supplemental Conditions. The performance bond shall remain in full force and effect for a period of two (2) year following completion of the contract and acceptance thereof.

2. **PRODUCTS.**

a. MATERIALS.

1. TUBE. The tube shall consist of one or more layers of flexible needled felt, felt with fiberglass reinforcement, or an equivalent non-woven material meeting the requirements of ASTM F1216, Section 5.1. The tube shall have a uniform thickness that, when compressed at installation pressures, will equal the specified nominal tube thickness. The tube shall be fabricated to a size that, when installed, will tightly fit the internal circumference and length of the original pipe. Allowance shall be made for circumferential stretching during inversion.

The outside layer of the tube prior to inversion shall be plastic coated with a translucent, flexible material that clearly allows inspection of the resin-impregnation (wetout) procedure. The plastic coating shall not be subject to delamination after curing.

The tube shall be homogeneous across the entire wall thickness, containing no intermediate or encapsulated elastomeric layers. No materials shall be included in the tubes that are subject to delamination in the cured-in-place pipe (CIPP).

The wall color of the interior wall surface of the CIPP shall be white or light brown to enhance detailed inspections by closed circuit television equipment.

2. RESIN. A chemical resistant, unsaturated, styrene based, thermoset resin and catalyst system or an epoxy resin and hardener that is compatible with the inversion process shall be used. The resin must be able to cure in the presence of water and the initiation temperature for the cure should be less than 180 degrees Fahrenheit and meet the requirements of ASTM F1216-98, Section 5.2. The resin may also be chemically resistant, unsaturated, UV or heat catalyzed resin with strength to meet pipe design parameters.

b. STRUCTURAL REQUIREMENTS. The CIPP Liner thickness shall be designed by the Contractor in accordance with ASTM Fl216, APPENDIX Xl. The design shall assume no bonding to the original host pipe wall and comply with the following design parameters:

C.I.P.P. DESIGN PARAMETERS

Parameter		**C.I.P.P. System**
Pipe Condition		Fully deteriorated

Soil Type		Saturated/unsaturated
Design Thickness		"Felt" tube formulas: 10" and smaller diameter (all tube types) calculated thickness rounded to next higher multiple of 1.5 millimeters.
Design Thickness		felt carrier tube: 12" and above diameter: calculated thickness plus 10%, then round to the next higher multiple of 1.5 millimeters.
Ovality of Pipe		2% of circumference
Soil Load		125 lbs/ft^3
Traffic Loads Per AASHTO-HS-20-44 Highway Loading		2200psf for R/R loading
Modulus of Soil Reaction		1000 psi
Long Term Flexural Strength		50% of initial (ASTM D-790)
Long Term Flexural Modulus		50% of initial (ASTM D-790) Of Elasticity
Maximum Deflection (vertical axis)		5%
Minimum Safety Factor		2.0
Resin Migration Allowance		5%

The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers cleanly with a pointed probe; nor shall separation of the layers occur during testing as required by this specification.

The design thickness of the CIPP is to be based upon the above design parameters and actual field conditions. Should the Contractor performing pre-installation inspections reveal the sewers to be in substantially different conditions than those evidenced by the design parameter criteria, **the Contractor shall report such differences to the Engineer prior to manufacture of the liner**.

3. **EXECUTION.**

a. INSTALLATION.

1. GENERAL. Except as otherwise indicated, comply with Section 7 of ASTM F1216.

The Engineer or his representative shall at all times have access to the work wherever it is in preparation or progress. The Contractor shall provide proper facilities for such access and for inspection.

The Contractor shall at all times maintain a clean and sanitary work site. Any spillage of wastewater on the ground surface shall be cleaned immediately and the area thoroughly washed down with fresh water.

2. WATER. Water for cleaning and inversion shall be available at the nearest hydrants. The owner will provide a valve and meter setup for operation and backflow prevention upon the receipt of a refundable $1,625.00 deposit and a non refundable $33.00 handling fee by the Contractor. The Contractor shall provide hoses, piping, and fittings required for the installation procedures.

3. CLEANING OF SEWER LINES. The Contractor will be responsible for cleaning the existing sewer line to a level necessary to line the pipe. The Contractor as necessary since the last cleaning shall remove all internal debris, including sedimentation, scale, roots or mineral deposition, from the sewer line. The Contractor will perform all cleaning necessary and all costs of said cleaning shall be paid under bid item “Clean Sewer Main”. The Contractor will use hydraulically powered equipment, high-velocity jet cleaners, and/or mechanically powered equipment, as necessary, to achieve to level of cleanliness required to accomplish the lining process. The Contractor shall haul all debris removed from the sewers during the cleaning operation to the city wastewater plant for disposal. The Contractor shall coordinate the hauling with the on-site BOPU inspector in order to notify the wastewater plant staff at least 24 hours prior to work.

The cleaning operation shall remove any and all debris so that each joint of pipe can be thoroughly inspected and successfully reconstructed. The Contractor is expected to remove all scale, debris, roots, sludge, calcium deposits, and restore the original internal diameter of the pipe before the lining process begins.

All sludge, dirt, sand, rocks, grease and other solid or semi-solid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from one manhole section to another shall not be permitted.

All debris shall be removed from the downstream manhole and the site no less often than at the end of each workday. No debris shall be left at the site unattended by the Contractor. Under no circumstances will the Contractor be allowed to accumulate debris beyond the stated time. In the event the Contractor leaves debris unattended at the site beyond the stated time, the Contractor will not be allowed to proceed with the work until the debris is properly removed.

During all sewer-cleaning operations, satisfactory precautions shall be taken to protect the sewer lines from damage that might be inflicted by improper use of cleaning equipment. Precautions shall be taken to ensure that the cleaning operation will not cause any damage or flooding to public and/or private property being served by the sewer line section involved. The Contractor shall bear full costs associated with any flooding or damage to public or private property.

If line was returned to service temporarily before lining, the line must be re-cleaned.

4. BYPASSING SEWAGE. Bypassing sewage shall be conducted in accordance with the Supplemental Conditions Section 18. The Contractor will prepare a "Installation Plan/Diversion Pumping Plan", which will be submitted to the BOPU for review and approval. No work will commence until the Contractor has an approved pumping/diversion plan. The plan shall describe in detail the methods to be used and shall identify all materials and equipment that will be required. The Contractor's plan shall also identify a contingency plan to be implemented in the event of an equipment failure or other emergency.

The Contractor shall provide for the flow of sewage around the section or sections of pipe designated for repair as required for his lining procedure. The bypass shall be made by plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system. The pump and bypass lines shall be of adequate capacity and size to handle the flow. 100% ready backup pumps will be required on-site during all bypass pumping operations.

The Contractor shall conduct his activities such that no commercial, residential, or industrial establishment has its sewer service interrupted for more than four (4) hours in any one business day. For certain commercial establishments identified by the Engineer the Contractor shall provide individual bypass pumping.

The Contractor shall provide a minimum of 48 hours written notice to all parties whose sewer service will be interrupted by his activities.

5. INSPECTION OF PIPELINES. Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. The Contractor will perform all cleaning necessary and all costs of said cleaning shall be paid under bid item "Video Sewer Main". The interior of the pipeline shall be carefully inspected to determine the location of any conditions which may prevent proper installation of the impregnated tube into the pipelines, and it shall be noted so these conditions can be corrected. A recorded media video and suitable log of the pre-insertion inspection shall be prepared by the Contractor and two copies submitted to the Owner.

6. LINE OBSTRUCTIONS. It shall be the responsibility of the Contractor to clear the line of all obstructions such as solids, roots, and other materials that will prevent the insertion of the resin-impregnated tube.

If pre-installation inspection reveals an obstruction such as a protruding service connection, dropped joint, broken and/or missing pipe(s), or a collapse that will prevent the inversion process, and it cannot be removed by conventional sewer cleaning equipment, but requires repair, the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work, and shall be considered a point repair, which shall be measured by each and paid for at the unit bid cost.

7. PUBLIC RELATIONS. A Public Information and Notification program shall at a minimum require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be done, and when the sewer will be off-line to include the following:

(i) Written notice to be mailed a week in advance or hand delivered to each home or business describing work, schedule, how it affects them and a local telephone number of the Contractor they can call to discuss the project or problems.

(ii) Personal contact on the day of "PreInstallation Inspection" of the sewer. Each lateral shall be verified by having the homeowner run water down their drain. If the homeowner is unavailable, other arrangements shall be made to drain water through the lateral.

(iii) Personal contact and written notice the day prior to the installation of CIPP on the section of sewer to which they are connected.

(iv) Personal contact with any home or business which cannot be reconnected within the time stated in the written notice.

(v) If so required by a served commercial business, portable toilets for their use by their employees will be furnished and serviced by the Contractor. These items are considered to be included in the cost of the CIPP. No additional payment will be made by the City.

8. RESIN IMPREGNATION. The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with an additional 5% to 10% allowance for polymerization shrinkage and the loss of resin through cracks and irregularities in the original pipe wall. A vacuum impregnation process shall be

used to uniformly distribute the resin throughout the tube. (Ref. ASTM F1216.7.2)

9. TEMPERATURE GAUGES. During the curing process, gauges shall be placed to determine the temperature of the incoming and outgoing water from the heat source. Another such gauge shall be placed inside the tube at the remote and to determine the temperature at that location during the cure cycle. Temperature gauges shall be located so they are accessible to the Engineer or his representative.

10. REQUIRED PRESSURES. Before the insertion process begins, the minimum pressure required to hold the tube tight against the existing conduit and the maximum allowable pressure so as not to damage the tube shall be provided by the tube manufacturer. It will be the contractor's responsibility to obtain and submit this information to the Engineer. Once the insertion has started, the pressure shall be maintained between the minimum and maximum pressures until the operation has been complete. If air pressure is used for the operation, the equipment shall be fitted with a pressure gage accurate to 0.01 psi. **Should the pressure deviate from within the range of the minimum and maximum pressures, and the installation fail due to Contractor's inability to maintain sufficient pressure to hold the wetted tube tight against the host pipe wall long enough to completely cure the liner, the improperly installed tube will be rejected and the Contractor will remove and dispose of the tube and properly install a new liner at no cost to BOPU.**

Before the curing process begins, the pressure required to hold the flexible tube tight against the existing conduit shall be provided by the tube manufacturer and submitted to the Engineer prior to any insertion process. Once the cure has started and dimpling for laterals is completed, the required pressure shall be maintained until the cure has been completed. Should the pressure deviate more than 1 psi (2.3 feet of water) from the required pressure during the critical curing period, the tube will be rejected and the Contractor will be responsible for the removal of the CIPP and replacement with new CIPP at no additional cost to BOPU. A complete log of the pressures shall be maintained on the site and shall be furnished to the Engineer after each inversion.

11. REQUIRED HEAT SOURCE. The heat source shall be fitted with suitable monitors to gauge the temperature of the incoming and outgoing heat supply. Another such gauge shall be placed at the remote manhole to determine the temperature at that location during cure. If air pressure and steam are used with styrene based resins, the compressed atmosphere shall be monitored with a Safety Gas Detector to ensure that it does not reach the explosive limit. If UV light and air pressure are used exposure times will be long enough to ensure resins are totally catalyzed and cured to full strength.

12. ALLOWABLE PULLING FORCE (FOR CURED-IN-PLACE PLASTIC LINER). The Contractor shall inform the Engineer as to the maximum allowable force that can be used in pulling the tube into the pipe without rupturing or diminishing the diameter and/or the thickness of the tube. The pulling force shall be monitored at all times during the insertion operation and the tube shall be rejected and removed if the allowable pulling force is exceeded.

13. ALLOWABLE ELONGATION OF FLEXIBLE TUBE (FOR CURED-IN-PLACE PLASTIC LINER). Prior to insertion, the flexible tube shall be measured and marked equal to the insertion run (distance between manholes, less one manhole diameter). After the completion of insertion, the length of the flexible tube outside of the insertion run (face of the manhole to the mark) shall be measured. This length or elongation shall not exceed three percent (3%) of the original length of measured flexible tube. In the event that this length is exceeded, the entire run length may be rejected and permanently discarded, the Engineer may order an additional tube to be inserted at no cost to the owner, or the Engineer may accept the elongated tube but reduce the price paid for the work by five percent (5%) for every percent elongation above the three percent (3%) allowable tolerance. The acceptance of one of these methods will be at the sole discretion of the Engineer.

14. WORKMANSHIP. The finished pipe shall be continuous over the entire length of an inversion and shall be free of dry spots, lifts, and delaminations. If these conditions are present, the Contractor shall remove and replace the CIPP in these areas at no cost to the BOPU.

If the CIPP does not fit tightly against the original pipe at its termination points, the space between the pipes shall be sealed by filling with a resin mixture compatible with the CIPP.

Where the CIPP passes continuous through manholes during an inversion, the top of the CIPP shall be removed cleanly and flush with the manhole shelf. Any gaps between the liner and the trough in the manhole will be sealed with resin mixture compatible with the CIPP.

If CIPP does not cure and has soft spots that are not acceptable because they do not meet the structural specifications listed, the liner will be removed and replaced with a new liner that is installed and cured to a level that meets the structural specification.

15. SERVICE CONNECTIONS. After the CIPP has been installed, all active service connections shall be reconnected without excavation, utilizing a remotely controlled cutting device, monitored by a video TV camera. Following reconnection, service connections shall have a minimum of **95**% of their original capacity.

The Contractor shall certify that he has a minimum of two (2) complete working units plus spare key components on the site before each inversion.

No additional payment will be made for excavations for the purpose of re-opening connections. The Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

16. SEALING AT MANHOLES. The cured-in-place CIPP shall make a tight seal at the manhole opening with no angular gaps. Under all circumstances, the liner shall be sealed to the manhole and host pipe with quick-set epoxy mortar. This procedure shall be completed before proceeding to the next manhole section.

17. SPECIAL CONSIDERATION AT HIGH GROUND WATER LOCATIONS. Some Sewers run along creek drainages. Ground water is near surface at manhole locations. Sewer lining conditions require dealing with as much water above the sewer to be lined as there is soil. Contractors must account for dealing with high groundwater in their bids at these locations. No cost will be paid for by the BOPU for dealing with groundwater. It is recommended that Contractors visit the site of this lining project to view conditions before they bid this project. BOPU will assist Contractor with site visits. Call Jeff Pecenka at (307)637-6496, or Ted Bade(307)630-2424 for assistance with site visitation.

4. TESTING & INSPECTION.

a. CIPP SAMPLES. Samples shall be prepared and tested in accordance with ASTM F1216, Section 8.1 using either method.

For each inversion length greater than 500 feet, the Contractor shall prepare two (2) CIPP testing samples cut from an intermediate manhole or at the termination point as described in Section 8.1.1 of ASTM F1216. For each inversion length less than 500 feet, the Contractor shall prepare one (1) sample. Test results will be made available to the BOPU within 2 weeks of installation. **If sample testing results are not received within 2 weeks of CIPP installation further work will be halted until testing is current. Any delay to the project lining schedule as a result of delinquent test schedule will be the responsibility of the Contractor. No additional time will be awarded to the Contractor for the Contractor's failure to keep current the CIPP testing that results in project stoppage.**

b. LEAKAGE TESTING. Leakage testing of the CIPP shall be performed under a positive head after the CIPP has cooled down to ambient temperature and shall be in accordance with Section 8.2 of ASTM F1216. Leakage shall not exceed 50 U.S. gallons per inch of internal diameter per mile per day. The test shall be conducted for a minimum of one (1) hour.

Products in which the pipe wall is cured while not in direct contact with the pressurizing fluid (e.g., a removable bladder) must be tested by an alternative method approved by the Owner.

c. VISUAL INSPECTION. Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.4. The Contractor shall furnish the owner with a video tape and suitable log for the finished installation.

5. CLEAN-UP AND RESTORATION. Clean-up and restoration shall be in accordance with the City of Cheyenne and the Board of Public Utilities Construction Standards and Specifications dated July 2007 and Amendments.

Any damage to existing facilities such as sidewalks, curb and gutter pavement, buildings, or utilities caused by the Contractor's activities shall be repaired at no expense to the Owner.

Method of Measurement and Payment. The quantity of sewer line to be measured for payment will be by the each linear foot (LF) completed in place and accepted, consisting of all labor materials, tools, equipment, and other incidentals necessary for doing all work involved in furnishing new, disposing of existing, fabricating, transporting, and constructing sewer pipe. Measurement of CIPP installed will be to the nearest foot from center of manhole to center of manhole.

Payment for CIPP will be in accordance with the prices set forth in the bid for the quantity of work performed and shall be full compensation for cured-in-place pipe, including materials, video engineering, installation, bypass pumping, leakage testing, cleaning, disposal of waste materials, clean-up, and such other work as may be specified.

Basis of Payment.

Payment will be made under:

Pay Item	**Pay Unit**
Sewer Video & Assess (VA)	
42” Sewer CVA	LF
36” Sewer CVA	LF
30” Sewer CVA	LF
27” Sewer CVA	LF
24” Sewer CVA	LF
18” Sewer CVA	LF
16” Sewer CVA	LF

15” Sewer CVA	LF
12” Sewer CVA	LF
10” Sewer CVA	LF
9” Sewer CVA	LF
8” Sewer CVA	LF
6” Sewer CVA	LF
4” Sewer CVA	LF

Sewer Clean

42” Sewer CVA	LF
36” Sewer CVA	LF
30” Sewer CVA	LF
27” Sewer CVA	LF
24” Sewer CVA	LF
18” Sewer CVA	LF
16” Sewer CVA	LF
15” Sewer CVA	LF
12” Sewer CVA	LF
10” Sewer CVA	LF
9” Sewer CVA	LF
8” Sewer CVA	LF
6” Sewer CVA	LF
4” Sewer CVA	LF

Cured in Place Pipe Lining (CIPP)

42” Sewer CIPP	LF
36” Sewer CIPP	LF
30” Sewer CIPP	LF
27” Sewer CIPP	LF
24” Sewer CIPP	LF
18” Sewer CIPP	LF
16” Sewer CIPP	LF
15” Sewer CIPP	LF

12” Sewer CIPP	LF
10” Sewer CIPP	LF
9” Sewer CIPP	LF
8” Sewer CIPP	LF
6” Sewer CIPP	LF
4” Sewer CIPP	LF

3. EPOXY CURB PAINT AND LANE STRIPING

Description. This item consists of replacement of EPOXY CURB PAINTING AND LANE STRIPING.

Construction Requirements. Epoxy Curb Paint and Lane Striping will be performed in accordance with “The Standards”**.** All surface preparation is subdidiary to the item.

Materials. The materials for Epoxy Striping Paint will meet the requirements of Section 03340 of the “Standard Specifications”.

Method of Measurement. ~~Units of measurement for Epoxy Curb Paint are by the square foot (SF) satisfactorily placed, cured and accepted~~. Units of measurement for Epoxy Striping are measured be the linear foot (LF) of epoxy striping placed, cured and accepted.

Basis of Payment. Payment will be made under:

Pay Item	**Pay Unit**
~~Epoxy Curb Paint~~	~~SF~~
Epoxy Lane Striping	LF

PART III

BID FORM

BASE BID SCHEDULE

FOR

2016 SEWER REHABILITATION PROJECTS
PROJECT NUMBER 2016SRH01

Schedule 1 Dry Creek Sewer

Item	Quantity	Unit	Unit Cost	Subtotal
Mobilization	1	ls		
Bonds and Insurance	1	ls		
Site Safety	1	ls		
Traffic Control	1	ls		
Storm Water Control	1	ls		
R&R Sewer Main 12"	0	ft		
Burst 14" HDPE SEWER MAIN	1665	ft		
Eliminate Manhole (20' Deep)	1	ea		
R&R Manhole (22 ft) 6' Diam	1	ea		
R&R Manhole (15-20 ft) 5' Diam	1	ea		
R&R Manhole (10-15 ft)	5	ea		
Burst Pits	7	ea		
Asphalt Pavement (7")	350	sy		
Alley Surface Restoration	350	sy		
Landscaping Basic	800	sy		
Import Backfill	750	cy		
Rock Pipe Stabilization	50	cy		
Rock Manhole Stabilization	70	cy		
Concrete Valley Pan	400	sf		
Curb & Gutter	100	lf		
Epoxy Lane Striping	100	lf		
Epoxy Curb Paint	100	lf		
Inspection Overtime	16	hr	$87.50	$1,400.00
Force Account	1	ls	$25,000.00	$25,000.00
Total				

End of Base Bid Schedule

PART III

BID FORM

BASE BID SCHEDULE

FOR

2016 SEWER REHABILITATION PROJECTS
PROJECT NUMBER 2016SRH01

Schedule 5 – Evans Avenue Sewer

Item	Quantity	Unit	Unit Cost	Subtotal
Mobilization	1	ls		
Bonds and Insurance	1	ls		
Site Safety	1	ls		
Traffic Control	1	ls		
Storm Water Control	1	ls		
Clean Sewer Main 8"	177	ft		
Video Sewer Main 8"	177	ft		
Line Sewer 8"	177	ft		
R&R&R 8" Sewer Main	173	ft		
R&R&R 10" Sewer Main	8	ft		
R&R Manhole (10'-15' Deep)	1	ea		
Rehab Manhole (10'-15' Deep)	1	ea		
R&R Manhole (15'-20' Deep) 5'	1	ea		
Asphalt Pavement	500	sy		
Service Reconnect (Line)	2	ea		
Service Reconnect (R&R)	1	ea		
Point Repair	1	ea		
Inspection Overtime	8	hr	$87.50	$700.00
Force Account	1	ls	$10,000.00	$10,000.00
Total				

End of Base Bid Schedule

PART III

BID FORM

BASE BID SCHEDULE

FOR

2016 SEWER REHABILITATION PROJECTS
PROJECT NUMBER 2016SRH01

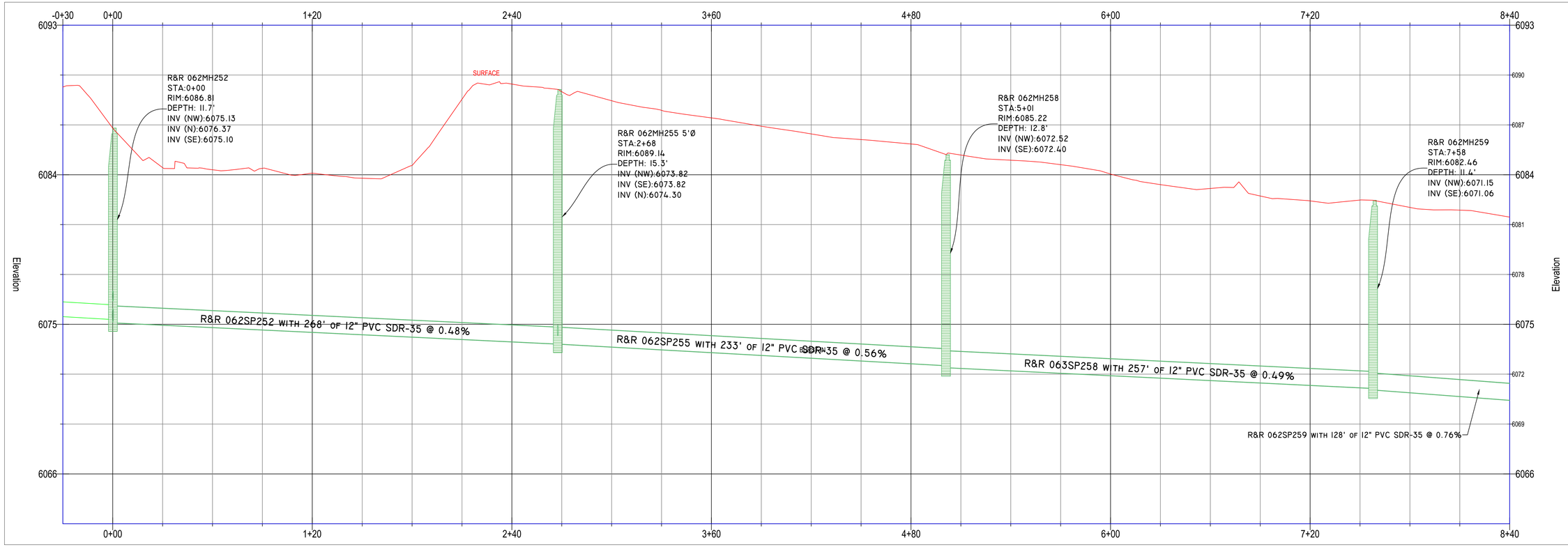
Schedule 2 Andover Drive Sewer

Item	Quantity	Unit	Unit Cost	Subtotal
Mobilization	1	ls		
Bonds and Insurance	1	ls		
Site Safety	1	ls		
Traffic Control	1	ls		
Storm Water Control	1	ls		
R&R&R Sewer Main 8"	749	ft		
Service Reconnect (Construct)	24	ea		
R&R Manhole (10-15 ft)	3	ea		
Add Manhole (5-10 ft)	1	ea		
Asphalt Pavement	1800	sy		
Import Backfill	750	cy		
Curb & Gutter	20	lf		
Inspection Overtime	8	hr	$87.50	$700.00
Force Account	1	ls	$12,000.00	$12,000.00
Total				

End of Base Bid Schedule

2016 SEWER REHABILITATION PROJECTS

DRY CREEK SEWER



City of Cheyenne Board of Public Utilities
Engineering Division
2406 Snyder Avenue
Cheyenne, WY 82001
Phone: (307)-637-6496
FAX: (307)-637-6063

Revision:	1	Date: 11/4/2015
Project File:	DRY CREEK BOPU	Date: 2/1/2016
Project Program:	2016SRH01	
Designed:	JJP	
Drawn:		
Reviewed:	NGE ETAL	Date: 2/1/2016
Approved:	NGE	Date: 11/4/2015

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Vertical Scale: 1 inch = 3 feet
Sheet Series Name: 2016SRH01

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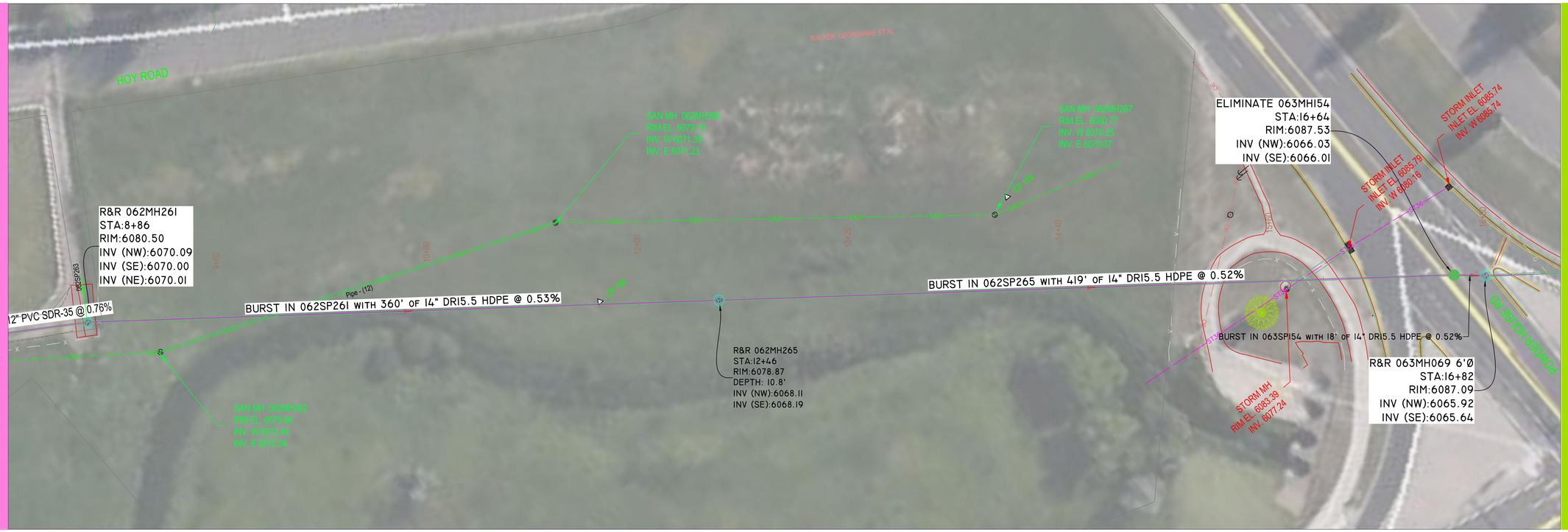
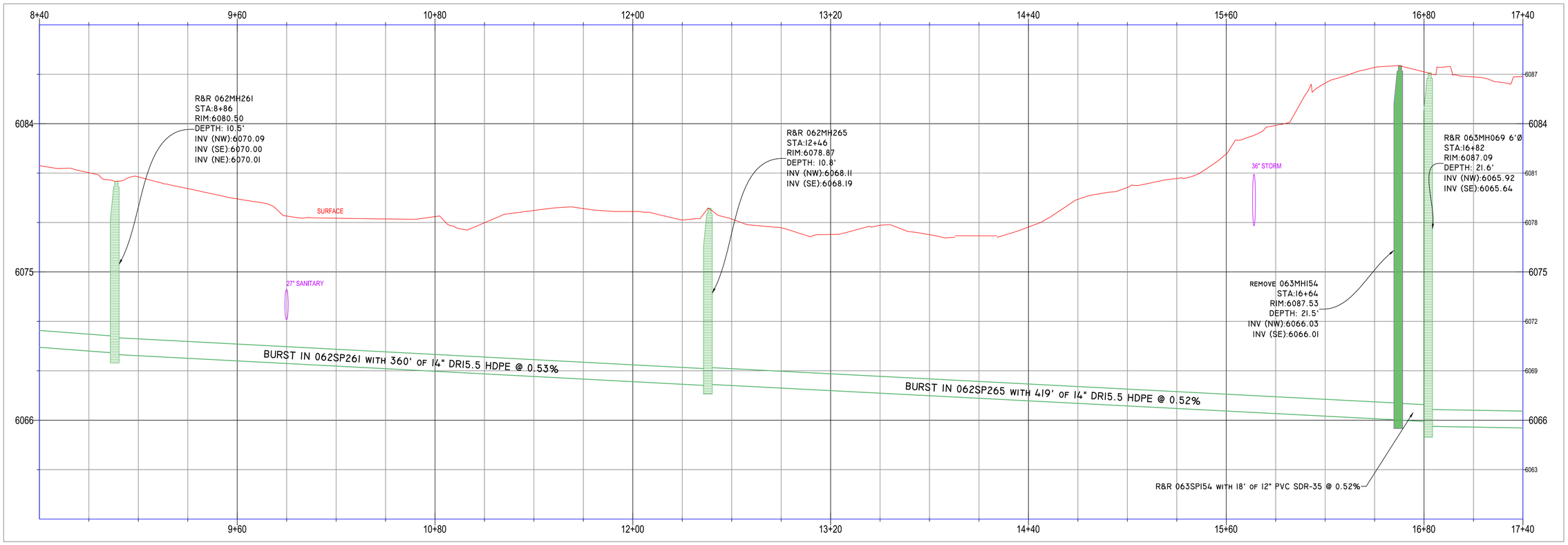
2016 SEWER REHABILITATION PROJECTS



DRY CREEK SEWER



City of Cheyenne Board of Public Utilities
Engineering Division
2406 Snyder Avenue
Cheyenne, WY 82001
Phone: (307)-637-6496
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REVISION:	1	DATE: 11/4/2015
PROJECT FILE:	DRY CREEK BOPU	DATE: 2/1/2016
PROJECT PROGRAM:	2016SRH01	
DESIGNED:	JJP	
DRAWN:	NGE ETAL	DATE: 2/1/2016
REVIEWED:	NGE	DATE: 11/4/2015
APPROVED:		

HORIZONTAL SCALE:	1 INCH = 30 FEET
VERTICAL SCALE:	1 INCH = 3 FEET
SHEET SERIES NAME:	2016SRH01

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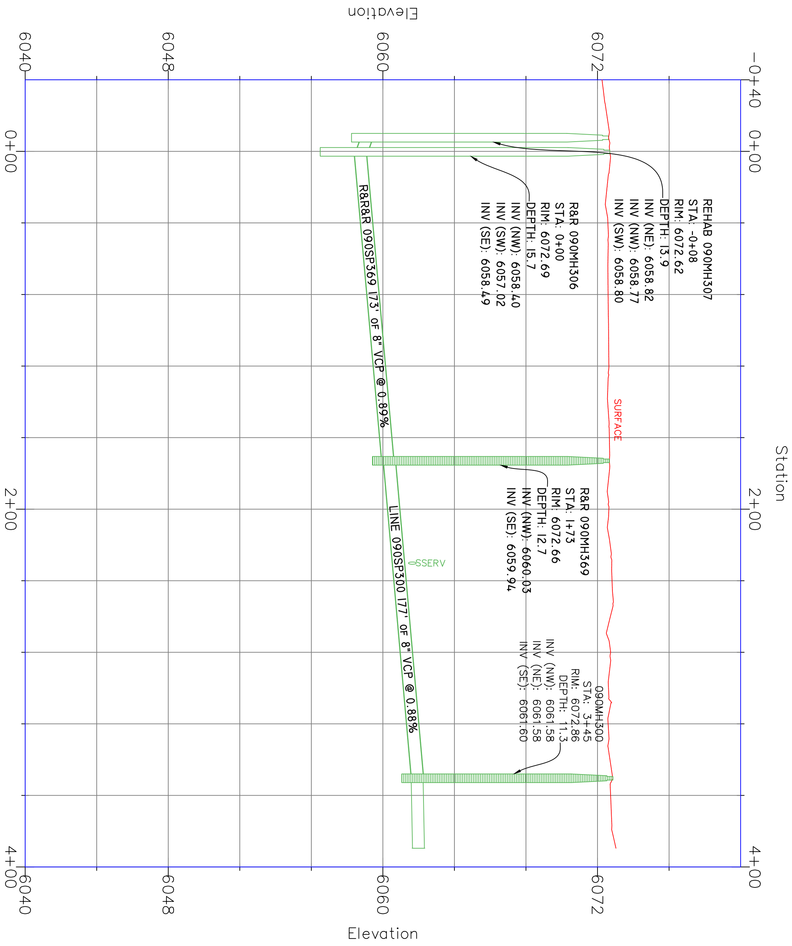

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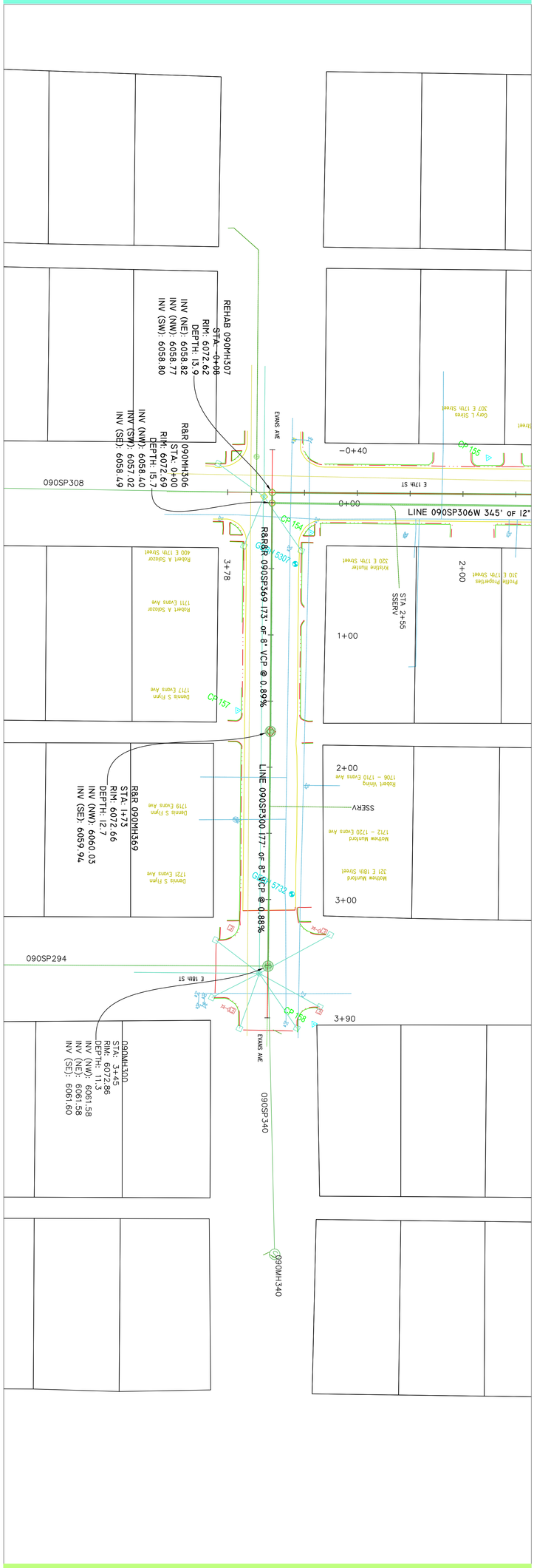

EVANS AVENUE

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Vertical Scale:	1" = 5 Feet		
Sheet Series Name:	2015SRH02		
Page	7	of	8

Revision:	1	Date: 12/21/2014
Project File:	1	Date: 2/1/2016
Project Program:	2015SRH02	
Designed:	JJP	
Drawn:	jjp	
Reviewed:	Noe Etal	Date: 2/1/2016
Approved:	Noe	Date: 12/21/2014

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North