GILLETTE MADISON PIPELINE PROJECT (GMPP)
TECHNICAL MEMORANDUM #12
Water System Conditions/ Operation Review With COG Staff
Final

TO:	Mike Cole, P.E., City of Gillette
FROM:	Dan Korinek, P.E.
DATE:	July 30, 2010
JOB NO.:	BMcD # 54332
RE:	Water System Condition / Operation Review
CC:	Darin Brickman, P.E., BMcD Carl Anderson, P.E., MMI Casey Hanson, P.E. MMI Jaime Tarver, Tarver Consulting Bryan Clerkin, P.E., WWDC

ATTACHMENTS:

☐ **Urgent** ☒ **For Review** ☒ **Please Comment** ☐ **Please Reply** ☐ **For Your Use**

EXECUTIVE SUMMARY

The preliminary phase scope of work for the Gillette Madison Pipeline Project (GMPP) includes a Water System Plan. As part of that plan it is the desire of the City of Gillette (COG) that the design team meets with their operations staff to discuss condition and operational requirements for the water system. The first step in this progress began during the December 17, 2009, Meeting 3 (Progress Meeting 1) held at the City of Gillette offices. During that meeting our team visited with several members of the City's operations staff to discuss current issues and desires for the future systems. This Technical Memorandum starts off with a *Discussions to Date*

section which describes much of the items that have been shared to date. It is our intent to hold a day long meeting at the City of Gillette's offices on May 12, 2010 with the COG operational staff to dig deeper into the preferences to be used as the basis for design of major components of this project including the Pump Station(s), Storage Reservoir(s), and Water Transmission Pipeline facilities. We have included a section in this TM titled *Pre-Design Checklist & Questionnaires* which outlines items for the City staff to be thinking about for the meeting. During the meetings we will go through these lists and add to them as the conversations dictate. Meeting minutes from that meeting will be utilized to finalize this TM #12, which will be included in the draft Preliminary Design Report.

DTD (Discussions to Date)

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Scott Sorenson: Below Ground Facility Responsibility

- Inter-ties between the existing Madison transmission line and the proposed line - The rehabilitation project has made it evident that they could use a couple tie-in points to allow the existing line to be taken out of service.
- The GRMP report had called for a major number of these connections which the team discussed would be very expensive. Mike felt at this time that he was fairly certain that the interconnects would be done later since there was currently not funding for them and there is not a clear advantage to doing them now.

1. *Comments and Discussions:*
   A. *The inter-connections were discussed yesterday during the 5/11/10 meeting discussions on TM 9. The regional users will be considered when locating the connection points per that memorandum.*
   B. *For the scope of this project stub-outs will be provided with appropriate sizing and valves for future connections. The concept should consider capabilities to feed from both the old and new Madison lines*

Scott Green: Above Ground Facility Responsibility (i.e. Donkey Creek PS)

- The City wants to evaluate the use of horizontal split-case pumps for the new pump station at Donkey Creek. It will be necessary to evaluate how they would operate with the existing vertical turbine pumps however.
- The City wants to look into the use of hypochlorite in lieu of chlorine gas. Currently chlorine gas is used.

2. *Comments and Discussions:*
   A. *Anthony Beeson has already performed some research regarding the use of horizontal split-case pumps which is discussed later when he goes through his checklist and conceptual layouts. In summary however, the design criteria for this project may not be conducive to the use of the horizontal split-case pumps.*
   B. *It was re-iterated that based on TM 13 presented in the 5/11/10 meeting, the project design will move forward to implement on-site sodium hypochlorite generation for disinfection. Although it may be utilized in the interim, the goal is to eventually get away completely from the use of the existing chlorine gas system.*

Dustin Hamilton: DEQ permit requirements

- Dustin reiterated that DEQ had permitting authority for the wells. He contacted DEQ regarding permitting jurisdictions for the other project component including the treatment facilities, transmission piping, pumping facilities and storage tanks. Since that meeting, all indications are that we will run everything through DEQ and in fact involve them throughout the project as they desire.

Rick Lock: Electrical Power Distribution and I&C

- Donkey Creek currently has load limitations.
- The City is evaluating 3 power distribution alternatives for Donkey Creek as follows:

    - 69 kVA from WYODAK to Donkey Creek (new service).
    - 25 kVA distribution extension from the City of Gillette
    - 69kVA from Powder River Energy (new service)

  The 69 kVA from WYODAK currently has the most promise. The City would need to obtain easements from private owners along the alignment from WYODAK to Donkey Creek.

  The schedule for the implementation of this system has not been tied down. Once the construction begins it should be completed in 3 to 4 months. Rick indicated that a ballpark cost to implement the distribution requirements is $3M to $4M. Bryan Clerkin clarified that the distribution is an eligible cost for funding.
- Serving the Madison electrical need, will be simple as they can just add on to the existing system. However, if the City were to implement an onsite hypochlorite generation system proper power requirements would have to be considered further.
- Once the designs are further along the City will need the load requirements of the systems from Burns & McDonnell.
- Regarding backup power, the City feels that the reliability they would get if they implement the 69kVA source would eliminate the need for it.

3. *Discussions and Comments:*
   A. *Rick indicated that they had made a decision to pursue a new 69kVA service from Powder River Energy, for the Donkey Creek Pump Station. Per Rick, Powder River Energy has 69kVA facilities located two miles north of the Donkey Creek Pump Station.*
   B. *He also thought the COG could rebuild the existing substation and have 2 branches to serve the new wells. This would include 2 to 3 feeders and potentially 2 substation transformers.*
   C. *It was discussed that the sodium hypochlorite generation system will require a high load.*
   D. *The team discussed who would be performing the designs of the systems. Mike Cole indicated that the City of Gillette would perform the design of the substations and distribution systems up to the meters. The design team would then take everything from the meters. Rick indicated that this plan would be fine and that one of the questions they would need to answer internally was whether to design overhead or underground.*
   E. *Rick indicated that they would need a rough idea on the loading. Casey Hanson said that he will have a good idea on the wells real soon. It was agreed that once we get into further into the 10% and 50% designs we will have a separate meeting to coordinate anticipated loads at the various facilities.*

Dan Bridges: Telemetry and Controls (SCADA)

- The City is assessing whether or not to utilize fiber optics. Currently they have a good microwave link to both the Madison and Donkey Creek sites. These probably need to be replaced every 5 to 10 years and it can cost around $55,000 each time. Since fiber can last around 100 years they need to weigh the cost of its implementation against the ongoing replacement cost of the microwave systems.
- If the City does decide to go with Fiber Optics, we need to discuss whether the fiber could be installed as part of the transmission line construction.
- The possibility of leasing the use of existing public fiber is going to be evaluated by the COG. It is believed that this fiber exists at least between Gillette and Moorcroft. Dan Bridges stated that this was a possibility and he is checking into the extent that this fiber exists and if there are leasing possibilities available.
- The existing pumps are all on VFD's. General control philosophies for the expanded facilities will be further developed as design continues.
- The City is in the process of implementing all new PLC's and they would like to utilize the same PLC's in the new designs so that he can use the same software packages.
- The COG uses standard ladder logic programming techniques.
- The COG wants to get away from switch alarming and utilize transducers. They want no mechanical switches because they have found them to create maintenance problems.
- The COG has had good luck with the Askawa VFD's and they have been very user friendly.
- The COG prefers that the new facilities have a separate MCC room. The room should have cooling but they would like to look into providing cooling to the components in the VFD cabinets rather than cooling the entire room.
- In regards to agency building review, since some of the facilities will be in Crook County, the state would need to provide reviews since the county would not have a fire marshal to provide reviews. Mike Cole indicated that he would get with Ken Rogers in their building department to look into this.
- The staff currently has issues with the chlorine feed system since it was designed to account for the station running continuously. This becomes an issue when the station is shut down for any period of time especially when the chemical is being fed manually. The current system is a vacuum system so after as shut down they are over-chlorinated when they start back up. We need look into this logic for the new system.
- The City's Arc Flash Protection program issues need to be addressed.

4. *Discussions and Comments:*
   A. *In prior meeting it was determined that backup generation would not be required since the new source would be reliable. Dan Bridges thought however that the COG might consider some sort of transfer system to an exterior junction box that could possibly allow a mobile unit to hook up in the event of an emergency. (Since our 5/12/2010 "Operations Review" meeting with B&M and MMI, Mike Cole has had the opportunity to discuss backup power generation with Mike Muirhead, Gillette City Administrator. On 5/13, 2010, Mike Muirhead told Mike Cole that he would really like to see a large back-up power source located at the electrical substation(s) that would be sized to accommodate all reasonable power needs for the Madison site. Mike Muirhead indicated that an agreement could be worked out with Black Hills Power such that we would supply excess power through the back-up generator to the "grid" during peak use periods. It is Mike Muirhead's understanding that we have the ability to accomplish this through our current agreements with Black Hills Power (and Power River Energy?). The cost of a large, single back-*

up generator could be offset by the possible revenue we could receive by providing power to the grid during peak-use periods. Mike Muirhead's preference would be to extend natural gas to the Madison site to supply any back-up generation being considered. Additional discussion among City Staff is necessary).

B. *Rick felt that since the new electrical distribution would be 98.8% reliable that this might not be required.*
C. *Dan Bridges thought that at a minimum the COG may want to have enough backup power to provide for one well, one pump and one train on the hypochlorite generation.*
D. *Mike indicated that in regards to treatment, DEQ will likely require a viable backup power supply. Darin noted that the treatment as currently being considered could have 2 days of storage available.*
E. *Diane thought that in an emergency situation they might be able to make up enough water in town to meet demands if they sent out a potable water only bulletin. She also noted that in cases of emergencies it is FEMA's policy not to provide assistance until after a 72 hour period.*
F. *Dan Bridges added that they do have generators that never run that have been a problem in the past.*
G. *Rick noted that when they have transmission lines down it generally only takes hours and not days to get back up and running. He felt at worst case they might have an outage of up to 20 hours.*
H. *Kendall felt that outages due to wild fires would be a bigger concern. He feels the COG needs to consider the probabilities, evaluate ways to potentially hook up temporary generators based on those considerations and not build Cadillac systems for these remote possibilities.*
I. *It was determined that the COG needs to have internal discussions concerning the need and level of backup generation to be provided. They will get back to the team with a decision.*
J. *In regards to providing Fiber Optics for the project Dan Bridges expressed that, having given it more consideration, he thinks it might be a mistake. The fiber optics would likely get damaged when repairs are made to the pipeline.*
K. *The COG team agreed that we should abandon the fiber optics consideration and proceed with use of microwave. We should use radio control broadband Ethernet at the sites.*
L. *The use of VFD's was discussed and Dan Bridges had concerns about the horsepower of the pumps being considered for the project (600hP or larger). He expressed that the VFD's for such units would be monsters. One of his main concerns was with the latest ARC flash requirements. He stated that as the equipment sizes increase, the requirements for treating personnel protection when working on the units is a concern. Dan stated that they like to avoid medium voltage because of this but he understood that equipment requirements for this project may not be conducive to this. He felt that the cutoff was 400 hP and that the manufacturers are not really caught up on the latest requirements. It was agreed that as the project progresses we will involve Gary Parker (BMcD lead electrical) in conversations with Dan Bridges and his staff to discuss these concerns further.*

Doug Ninas: GIS Manager

- The COG is currently working off of 2003 topography which does not recognize some of the growth that has occurred since then.
- The COG does not plan on a 2010 flight.
- The COG would like to utilize this project to help improve their GIS where possible. Doug would like to be able to inventory appurtenances such as valves, manholes, etc. Mike Cole suggested

that the construction phase of the project would likely provide better opportunities for this as it would provide information of where the final installations are.

Pre-Design Checklist & Questionnaires

PSCL - PUMP STATION PRE-DESIGN CHECKLIST & QUESTIONAIRE

This questionnaire currently assumes that a pump station similar to the existing Donkey Creek Pump Station will be constructed and may potentially include additional space for various uses. These questions are not meant to be a "catch all", they are a starting point for the City to discuss their needs and to provide Burns & McDonnell a better understanding of those needs.

1. Is there a preference for vertical turbine pumps, horizontal split case pumps?

   Scott indicated that the challenge with the existing pumps is that they need to pull them every 5 years. They are difficult to pull and the maintenance is high since the motors must be brought to town and the pumps have to go to Nebraska to be rebuilt. They are really hard to line up when pulling them with the equipment they have to perform this and it takes 4 people to do this safely.

   Howard stated that materials handling is their largest concern. It was discussed that implementation of a bridge crane and adequate vehicle access would help out tremendously with these efforts.

   Anthony Beeson indicated that he has looked into the use of Horizontal Split-case pumps for this application and that the concern is they would operate way out on their curves. In addition they would operate at lower efficiencies that could result in additional power costs of $45,000 to $50,000 per year. He will be evaluating this further however as we proceed.

   Dan Bridges indicated from his standpoint it did not matter if Vertical turbine or Horizontal Split-case pumps are used.

   Howard and Scott indicated that if there was any way possible they would like to be able to service the pumps in-house and not have to send everything out.

2. Is there a preferred list of manufacturers for the pumps or any manufacturers the City prefer not be included?

   The COG indicated that they are fine with Johnson, Floway and Peabody pumps. They indicated that Casper and Cheyenne are alright with Peerless and that they would likely consider them as well

3. What types of pump control are preferred, VFDs, ball valves, diaphragm valves?

   Dan Bridges reiterated that Yaskawa is their preference. There are several sources that can provide them so we can still achieve competition for cost.

4. What types of flow metering devices does the City prefer, i.e. Sonic or magnetic flow meter?

   The COG prefers the magnetic flow meter and does not want any insertion meters.

5. Is there a preferred list of manufacturers for the flow meters or any manufacturers the City prefers not be included?

   They are open to manufacturers such as Endress Hauser, AVP, etc. The City currently has a 30" Macrometer Ultramag meter that will be installed in the next couple weeks. They will let us know how they like the meter once it is in service for awhile. The metering will be very important to the COG in consideration of current discrepancies they have been having compared to their production numbers.

6. Surge will be evaluated and surge suppression systems incorporated? Is the COG satisfied with the surge system that was recently installed?

   Howard indicated that the current system was designed with deep valve vaults outside the building below ground. In the last 6 months the durability, reliability and performance has not been good.

   The COG does not like the confined space entry requirements and the vaults fill up with water. Howard indicated that if vaults are to be considered they need to have larger hatches, better steps and overall better access.

   The system is not user friendly or safe and currently the Donkey Creek system is out of service.

   Steve Peterson added that the only reason they have the surge valves in conjunction with the tanks is that the tanks would have been huge to handle the surge alone and the existing building did not have the space. The inside equipment works fine however.

   Casey thought consideration may be given to looking at maybe 3 or 4 sites along the transmission line for surge consideration. The results of the hydraulic analysis in TM 7will provide more information for this consideration.

7. Does the COG still want a separate electrical room? It is recommended.

   Dan Bridges indicated that they definitely do and we need to consider what will go in the room. Space requirements in front of the switch gear needs to be considered. Dan specifically requested provision of a secured closet for IT equipment

8. What types of communication will be required in this facility? (telephone, intercom, internet, scada, etc)

   Dan Bridges indicated that they will need microwave to take the City's network to the site. Conduits will be needed for Ethernet at the PLC, phone system, etc. In addition they will need an Analog Terminal Adapter (ATA) for a buzzer system. Conduit would also be required for conduit for the door controls and VFD's.

9. What type of site and building security will be required at this facility?

   Dan Bridges provided Anthony Beeson with a plan of a system they use. In general he envisioned the use of card readers and motion detection above the doors to allow personnel out without setting off an alarm. He will talk further with his IT personnel about any needs they may have and he will look into the need for possible CCTV along with Howard.

Scott Green indicated that it will be important to keep everything well lit.

10. Is access to pumps and valves in the existing Donkey Creek Pump Station adequate?

Staff indicated that the existing access is not adequate as conduits and other items are all over the place.

Anthony provided a few conceptual floor plans for staff to look at. Concepts including both vertical turbine and horizontal split-case pumps were used for the layouts. The horizontal split-case plan is about 1300 square feet and much taller that the existing building.

Howard liked the crane concept with the few tiers and open access to the pipe gallery. He asked if consideration could be given for the discharge of water in the case of a catastrophic failure.

Dan Bridges indicated that he would like to see the electrical room and shop closer to the overhead door. He did like that the loading area appeared set up to allow for a truck to be backed in with space. They want to be able to have the truck in the building during cold weather to work on things. He would like double doors to the exterior of the electrical room.

The staff indicated that they would like to see the galleys wide enough to walk through and they would prefer to not have to climb over pipe after pipe.

Diane indicated that her staff's list of needs include the following:

- *Map and record drawing storage (not at Donkey Creek, but at Madison).*
- *Separate bath room for men and women (at both Donkey Creek and Madison).*
- *Closet to hang gear (at both Donkey Creek and Madison).*
- *Separate area for fabrication of brackets, welding, etc. The staff may be losing the current area where they perform this work. Anthony expressed that the welding has a big impact on the design to conform to codes. It requires special consideration for HVAC, power, etc. Howard suggested that the Madison site might be a better place for this area. Darin reminded everyone that eventually the chemical room at the Madison would be an available area for use. Not a huge priority at Donkey Creek – consider a separate area for fabrication at Madison.*
- *Equipment to control humidity (Both Donkey Creek and Madison).*
- *No sky lights (Both Donkey Creek and Madison), (per Mike Cole, glass block in the walls is OK).*
- *No block below grade (Both Donkey Creek and Madison).*
- *No lower level (Both Donkey Creek and Madison).*
- *Mike Cole would like to maximize the use of southern exposure for entrances (Both Donkey Creek and Madison).*
- *No vents facing north (Both Donkey Creek and Madison).*
- *Use weighted louvers and avoid mechanical or electrical operation as they do not work at this site (Both Donkey Creek and Madison).*
- *Provide a bay for service trucks. Anthony indicated that we need to make sure this area is not identified as an area to service vehicles because of code issues. (Not at Donkey Creek, only at Madison).*
- *Mike Cole felt that the City might consider a separate enclosure for storage of equipment such as snow removal trucks (No separate enclosure at Donkey Creek – consider at Madison).*

- *The staff needs a spare parts equipment storage shed since they are so far out of Town. (No shed at Donkey Creek – consider a separate storage enclosure at Madison).*
- *The indoor lighting should use the latest technology (Both Madison and Donkey Creek).*

11. Does the COG desire locker rooms? If so, how many people will use the lockers?

    No locker room is desired. (No lockers at Donkey Creek, Yes – lockers at Madison).

12. Will showers be required? If so, how many people will use the showers concurrently?

    No (Not at Donkey Creek, Yes at Madison. Separate showers (1 stall each) for men/women).

13. If locker rooms are not required, will restrooms be required? If so, will separate men's and women's restrooms be required?

    No locker rooms are needed however separate bathrooms shall be required. (Bathrooms at Donkey Creek (separate men and womens), Locker Rooms with restroom facilities at Madison).

14. Is a lunchroom/break room required? If so, how many people will use the room concurrently?

    No (No break room at Donkey Creek, yes we would like a breakroom at Madison).

15. Will offices be required? If so, how many and what general size?

    No (No office at Donkey Creek, yes one office would be nice at Madison).

16. Is a conference room required? If so, how many people will use the space at one time?

    No (No Conference room at Donkey Creek – a multi-purpose break room/conference room at Madison would be nice).

17. Will space for maintenance activities or vehicle storage be required? If so, what type of maintenance will be performed?

    Yes, however it will not be classified as a service area.

18. Will welding be performed in the maintenance area?

    Not at Donkey Creek however it may be considered at Madison at a later time.

19. What type and how many vehicles do you want to park inside at one time?

    The pump station itself will allow for one vehicle, however as noted above if a separate vehicle storage building is provided, there would be space for other storage.

20. What other types of storage may be required? (parts, flammables, etc.)

    Per Diane's list above the following are needed:
    - *Map and record drawings*

- *Closet for gear*
- *Fabrication area*
- *Spare parts storage*

21. Are there preferences for certain architectural features of the existing Donkey Creek Pump Station, such as glue laminated beams? Skylights? Natural lighting? Metal roof? Roof slope? Etc?

    No skylights

    Outdoor lights shall not be incandescent bulbs but rather we should look into use of LED lighting. Interior lighting shall be high output compact fluorescent bulbs.

WSCL - TREATED WATER STORAGE RESERVOIR PRE-DESIGN CHECKLIST & QUESTIONAIRE

The majority of the items in the original check list below will be determined as design unfolds. As such a general discussion took place on the items that are critical to the COG as follows:

1. *The tanks shall be welded steel like the other City tanks.*
2. *The tanks shall have a separate inlet and outlet.*
3. *Howard would like to overbuild where drainage is concerned. In particular we should oversize the drainage culverts. Mike Cole indicated that with this said we should get as much drainage easement as possible. The runoff from the building should take into consideration where access is and avoid it.*
4. *In regards to surfacing, Howard indicated that currently they have asphalt to gravel. There are pros and cons to asphalt and concrete as surfaces. Concrete is expensive and asphalt requires repairs. A good all-weather surface will be preferred.*
5. *No ladders are to be placed inside the tank. However provisions should be provided to help divers get out of the tank. Hookups at the man-ways might suffice.*
6. *The hatches at the top of the tank should be beefed up to allow use of tripods.*
7. *The overflow should be outside the tank and not inside the tank.*
8. *Do not use bottom ash for a base material on the tank.*
9. *Talk with Dan Bridges regarding telemetry and mounts for future items such as antennas.*

1. Hydraulics and Capacity. The below information will be determined by the design team based on results of hydraulic evaluations.
   A. Overflow weir elevation_____ft
   B. Outlet elevation_____ft
   C. Capacity_____(gallons)
   D. Dead storage required. (Yes) (_____ feet) (No).
   E. Operational freeboard required. (Yes) (____ feet) (No).

2. Site Factors
   A. Topography cut and fill slopes (max.)
   B. Revegetation and landscaping (required) (not required).
   C. Erosion control plan (during construction) (post construction).
   D. Overflow and drain permits (required) (not required).
   E. Agreements and easements for (overflow) (drain) (required) (not required).
   F. Site legal description (required) (not required).
   G. Benchmark (required establish) (not required).
   H. Archeology (required) (not required) (by client, engineer).

I. Paleontology (required) (not required) (by client, engineer).

J. Parking lot and access drive (required) (not required).

3. Site Reviews and Approvals

A. Public hearings (required) (not required).

B. Community associations (required) (not required).

C. Planning Department (required) (not required).

D. County Commission (required) (not required).

4. Security

A. Site Fence:

1. (Wood posts) (steel posts) (plain wire) (barb wire) (3 wire) (4 wire)(ornamental) (not required)
2. Gate style (_____) and width (____ feet)

B. Tank Fence:

1. Chain link (height ___ feet) (gate widths ____ and number ____) (3 strand barb wire at top [required] [not required]).
2. Extent of fence (around tank) (around site).

C. Site lighting (type-_____) (focus at ground - yes-no).

D. Security intrusion alarms on hatches. (yes) (no)

5. Access Drive

A. Material (gravel) (asphalt _____inches).

B. Cross section (width ___ feet).

C. Drainage culverts (cross drainage as need for construction equipment access) (entrance ditch).

D. Parking lot capacity _____. Vehicle type _____.

6. Telemetry.

A. Type of transmission (hard wire) (telephone).

B. Security at hatches – intrusion alarms.

C. Level (high) (low) (water in valve vault/building) (tank water level) (water in overflow manhole) (valve position).

D. Manufacturer _____.

7. Structure
   A. Tank Type (prestressed) (post-tensioned) (conventional concrete) (welded steel)
   B. Dimensions (slab dimensions ____ feet x ____ feet) (wall height ____ feet).
   C. Floor (slope _____) (finish _____).
   D. Roof (slope) (finish _____).
   E. Washdown piping (required) (not required) (size ____ inches) (outlet no.__).
   F. Washdown pump (required) (not required) (pressure ___ psi) (flow ___ gpm).
   G. Special loads (roof ____ psf LL) (concentrated loads [yes] [no]) (earth ____ feet) (snow load psf) (truck load ____).
   H. Ladder/stair type (aluminum with zinc anodes) (epoxy coated steel with anodes) (fiberglass) (stairs during construction [yes] [no]).
   I. Misc Handrail type (steel angle) .
   J. Safety cage (Yes) (No).
   K. Inlet header (90 bend) (tee).
   L. Baffle walls (Yes) (No).
   M. Construction loads (on floor slab) (on roof).
   N. Roof loads (earth ____ feet) (snow load ____ psf) (live load ____).

8. Overflow
   A. Required capacity (_____) Determined in hydraulic evaluation.
   B. Safety factor (_____).
   C. Alarm with flow (Yes) (No).
   D. Outlet structure (concrete headwall with flapper) (grouted riprap [yes] [no]).
   E. Manhole on overflow/drain for dechlorination.

9. Hatches
   A. Access (number ____) (size ____ feet x ____ feet) minimum ____ inches x ____ inches opening.) (Hatch shall be the single or double leaf type) (scuttle) (flush floor door).
   B. Electric power (110 [yes] [no]) (220 [yes] [no]).
   C. Telemetry security alarm (Yes) (No).
   D. Manways (Describe).

10. Vents
    A. Type (Goose Neck) (Integral with Tank Access Hatch) (Frost proof separated) (Secure-vandal proof) (API vacuum breaker valve).

11. Valve Vault
    A. Valve type (_____) (size ____) (manufacturer _____).
    B. Operation type (manual ____) (electric ____) (manufacturer _____).
    C. Tap for pressure sensing (yes) (no).
    D. Type of access hatch and size (_____).
    E. Separate valve access (yes) (no).
    F. Valve operation through roof (yes) (no).
    G. RTU (yes) (no) see Telemetry above.
    H. Gravity floor drain (yes) (no).
    I. Flexible coupling type (Dresser) (Victualic) (Other _____).
    J. Tap and piping for washdown piping (yes) (no) (in pump station).
    K. Telemetry - water in vault (yes) (no) see Telemetry above.

12. Yard Piping
    A. Material type _____.
    B. Lateral and vertical flexibility required (yes) (no). Type _____.
    C. Encasement under tank (yes) (no).
    D. Welded connections under tank (yes) (no).
    E. Corrosion protection (yes) (no). Type _____.
    F. Inlet size _____. Outlet size _____. Configuration _____.
    G. Pressure testing prior to tank construction (yes) (no).
    H. Flanges on inlet pipe (yes) (no). Blind flange during construction (yes) (no).
    I. Tap on inlet pipe blind flange during construction (yes) (no).
    J. Water source for testing: _____.
    K. If adjacent to a pump station, are baffles required on outlet? (yes) (no)
    L. Yard Hydrants (fire/washdown)

13. General Discussion

TPCL - TRANSMISSION PIPELINE PRE-DESIGN CHECKLIST & QUESTIONAIRE

These questions are not meant to be a "catch all", they are a starting point for the City to discuss their needs and to provide Burns & McDonnell a better understanding of those needs.

Transmission Main Layout

1. The proposed Madison Waterline shall be placed a minimum of 60 feet horizontally from the existing Madison waterline when applicable.

   Mike Cole feels this 60 feet will shrink up in areas

2. The proposed Madison Waterline will be placed within the ROW of existing roads where possible. Placement under the pavement will be minimized.

3. A vertical clearance of 1.5 feet will be provided when crossing other utilities. If there is not adequate clearance the utility crossing (encasement) detail will be required.

4. A horizontal clearance of 10-feet from other utilities will be required.

5. What minimum width of permanent easement is required by the City of Gillette? The existing Madison waterline has 40-foot wide permanent easements.

   Mike Cole indicated that he was not certain the existing easements are 40 feet wide. He thought the actual permanent easements may only be 20 feet wide. He reiterated that he would like to see adjacent overlap of permanent and temporary easements. The location of the pipe within the easement should be 10 to 15 feet from the centerline of the easement where bury depth is shallow. Where the line is deeper it may need to be centered in the easement. (Mike Cole and Mike Muirhead had a recent conversation with Clint Pickrel, after our May 12 meeting. Mr. Pickrel prefers to provide the narrowest width that will accommodate future O&M for the permanent easement, with the understanding that additional "temporary" easement can be secured at any time. Mr. Pickrel prefers a 30-ft wide easement (max) for a permanent easement for a single pipeline. Mr. Pickrel also prefers the permanent easement "abut" the existing permanent easement for o/h power that already exists; he does not want a "strip" of land between permanent easements. This 30-ft width approach for permanent easements might be what we run into with other landowners in the future. Mr. Pickrel is one of the largest (area) property owners for which we will need to negotiate pipeline easements).

6. Waterline will be placed at a minimum depth below frost level. What depth is this typically for Gillette?

   The frost line depth is 6 feet.

Valving

1. Gillette standards call for a valve spacing of 1000 feet for transmission lines. We are proposing a minimum valve spacing of 2000 feet for this project. Is that acceptable.

The 2,000 feet is acceptable until we get closer to Town

2. Are valves required on both sides of a creek or river crossing?

   No a blow-off is adequate.

3. Are valves required on both sides of irrigation ditch crossing?

   No a blow-off is adequate.

4. Are valves required on both sides of a railroad crossing?

   This is not necessary per COG staff.

5. What valving scenario is required at connections to the existing Madison Waterline?

   This will be evaluated during the design. Details will be developed and reviewed

6. Are valves required at regional connections on both the regional outlet and the Madison Waterline?

   Yes, although this project is providing stub outs only we should allow for the option to feed off both the existing and new Madison Pipelines.

7. Does the City of Gillette have a preference regarding Butterfly Valve manufacturers?

   Yes they prefer Mueller or Waterous with no "or approved equals".

8. Are butterfly valves required to be placed in a vault?

   Yes, they want the valves in vaults with a man-way access. They also require that the valves are able to be operated from the top with a key.

9. Does the City of Gillette have a preference regarding Air/Vacuum valves?

   Currently they use Crispin. They would like to consider the ARI plastic type valve but did not think they came in these sizes. Kate will check with Ten Point Sales to see if they are available.

10. Is the standard City of Gillette detail for air/vacuum valves acceptable for this project or can we provide a variation.

    For the vents we need to consider WYDOT requirements. Lower perforated tubes are what WYDOT will have. We can use the COG standard but must consider WYDOT.

11. Since this waterline will mostly be outside of the pavement limits can the air/vacuum discharge come directly up through the vault and not off to the side?

    We can provide a variation and it was agreed that the valve s will be place directly above the pipe.

Connections

1. Should regional outlets be extended to the edge of the ROW or easement?

   No, the scope of this project calls for just stub-outs with valves. It is important to connect the valve right to the main and to provide a stick of pipe with a stub off of it.

2. Will regional outlets require meter?

   No

3. Should meter pits be included in our design?

   No

4. What size connections are required between the existing and proposed Madison pipeline?

   This will come out of the future discussions on regionalization.

5. Are fire hydrants required on this line?

   No, regional users will be required to provide for their own fire flow considerations in their distribution system designs.

Details

1. The utility marker detail indicates that the utility markers will be provided by the City of Gillette. Will that be true for this project?

   No, the contractor will need to provide these for this project. In pastures these will need to be cattle proof. Test stations shall be flush mounted in heavily travelled areas. Dave Galles prefers the post mounted where appropriate. The tracer wire (where used) and cathodic protection wires should be together in the same stations.

2. Bedding is required per the standard detail 6" above and 6" below the waterline. We propose requiring 12" of bedding above the pipeline.

   The COG liked this concept.

3. We propose using restraint joints in lieu of thrust block. Thrust block sizing would be very restrictive and today's technology for restraining systems is very good. Please provide acceptance.

   This is acceptable to the COG as long as the restrained joint length calculations are performed and consideration is given to the soils report.

Pavement Replacement
For all of the items below the COG indicated that the information is in their standards

1. Is there any mill and overlay requirements if the waterline is placed under the pavement?

2. Does the City have an asphalt mix for trench pavement?

3. Does the City have specific information on pavement markings that will require replacement? We will work WYDOT on theirs.

Well Houses (The following discussion was added regarding preferences for these)

1. *Prefer above ground if possible.*
2. *No wood trim shall be used. Metal trim should be used instead.*
3. *The facility should be maintenance free.*
4. *Mike Cole has seen a lot of fiberglass units lately. The more rigid the units the better.*
5. *They should be fenced in with consideration for cattle.*
6. *Mike did not feel aesthetics should be a major issue with these remote locations.*
7. *Grading will be important.*
8. *Doors shall be positioned on the east side to avoid the wind. Southern exposure has been an issue however due to swelling.*
9. *No swamp coolers will be allowed.*