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NATURAL GAS DELIVERY

DEPARTMENTAL CORRESPONDENCE

Subject Explanation of Engineering Study Justifying the need to Replace Existing 12" HP Gas Main with 12" HP Main in Delany Road from Sunset Avenue to Wadsworth Road if LCDOT Road Reconstruction Project Goes Forward in 2012.

Date November 12, 2010

To Torrence Hinton

From Steve Warmington

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To

A detailed description of this project is supplied on memo with subject: 2012 Test Year Rate Case Support - NSG Projects, dated November 12, 2010. (filename: 2012 NSG Rate Case Test Year Project Descriptions.docx)

This explanation refers to a 24 page pdf file (DelanyStonerStudy.pdf) containing the notes and map printouts of the Advantica Stoner simulation that was run to arrive at the decision that a size-for-size replacement of the 12" HP gas main in Delany Road will be necessary if this LCDOT project goes forward in 2012. HP gas main is shown in red on the maps and the numbers represent gas pressure in PSI. The following is an interpretation of these steps.

Overall, three studies were run, each to test the effects of various changes in pipe sizing and the impact of hits on the high-pressure gas main, with or without Edwards Road Station supplying gas to our high-pressure system. Explanations of the steps taken in these studies and references to corresponding pages in the pdf file appear on the following pages.

Study #1 (Pages 1 - 10) Edwards Road Station is On

Delany Base (Pg. 1) / Stoner Map (Pg. 4)

This represents the starting point for the study, showing what the existing conditions are and before any changes were modeled. The HP gas main in Delany Rd. from Sunset Ave. to Wadsworth Rd. is 12". The HP system pressure at Lewis Ave. and Route 173 is shown as 218 PSI. At Green Bay Rd. and Sunset Ave. it is shown as 232 PSI.

Delany A (Pg. 2) / Stoner Map (Pg. 5)

This represents the impact on our system of removing the 12" HP main in Delany Rd. from Sunset Ave. to Wadsworth Rd. It was done to verify whether the HP main is still needed at all, regardless of size (not considering gas main hits). This step showed that there is a general loss of pressure along the HP main running from Lewis Ave at Route 173 to Green Bay Rd. at Sunset Ave. At the northern end the pressure dropped from 218 PSI to 211 PSI, while at the southern end it was decreased from 232 PSI to 220 PSI.

Delany B (Pg. 2) / Stoner Map (Pg. 6)

This represents the system with the 12" HP main segment in Delany Rd. still removed, as from the previous step, and with the simulation of a hit on the 6" HP gas main in Route 173 at Miday Dr. HP system pressures at our two comparison points have further decreased. At the northern point (Route 173 and Lewis Ave.) we now have only 155 PSI. At our southern point (Green Bay Rd. and Sunset Ave.) we have 210 PSI.

Delany B1 (Pg. 2) / Stoner Map (Pg. 7)

This represents the system without the 12" HP main in Delany Rd. and with the hit moved to a location different from the one cited above. In this step the hit was simulated on the 6" HP main in Delany Rd. at Porett Dr., which is south of Sunset Ave. Pressures at our comparison points have now dropped to 159 PSI at the northern end and 145 PSI at the southern end.

Delany C (Pg. 3) / Stoner Map (Pg. 8)

This represents an 8" replacement of the 12" HP gas main in Delany Rd. between Sunset Ave. and Wadsworth Rd. No hits are being simulated in this step. Compared with the original pressures on the base model on page 4 (with the 12" main in place), HP system pressures around the area have not decreased significantly. We see reductions of only about 2 PSI in various spots on the map.

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Delany D (Pg. 3) / Stoner Map (Pg. 9)

This represents the HP system with the 8" replacement from the above step in place along with a hit being simulated on the 6" HP main in Route 173 at Miday Dr. HP system pressures drop from 216 PSI to 173 PSI at the northern comparison point and from 228 PSI to 223 PSI at the southern point.

Delany E (Pg. 3) / Stoner Map (Pg. 10)

This represents the HP system with the 8" main in place and with a hit now being simulated on the 6" HP main in Delany Rd. at Porett Dr. instead of on the main in Route 173 at Miday Dr. Now we have 201 PSI at our northern comparison point and 205 at the southern point. We also have an HP system pressure result of only 198 PSI at Lewis Ave. and 25th St.

Study #1 Conclusion

Without the HP gas main in Delany Rd., a hit on our HP system in areas north or south of the area where the Delany Rd. main currently runs will result in drastically reduced system pressures throughout a large portion of our service territory.

Study #2 (Pages 11 - 18) Edwards Road Station is Off

Delany 1 (Pg.11) / Stoner Map (Pg. 14)

This represents the system with the 12" HP main in place in Delany Rd., but without the feed from Edwards Road Station. Pressures are reduced throughout the entire northern region of our service territory. At our northern comparison point (Route 173 at Lewis Ave.) we have only 176 PSI, compared with 218 PSI on our original base map (page 4) in the first study, which was run with Edwards Road Station on. At our southern comparison point (Green Bay Rd. at Sunset Ave.) we have only 194 PSI, compared with 232 PSI on our base map.

Delany 1A (Pg. 11) / Stoner Map (Pg. 15)

This represents the system without any HP gas main in Delany Rd. from Sunset Ave. to Wadsworth Rd. and without the benefit of the Edwards Road Station feed. The Stoner model goes "infeasible", which can be seen by the negative numbers shown on the map on page 15 for system pressures.

(Continued)

Delany 2 (Pg. 12) / Stoner Map (Pg. 16)

This represents an attempt to model the system with a smaller HP main (8") in Delany Rd. to determine whether 12" is actually necessary. The HP system pressure at our southern comparison point is only slightly changed from 194 PSI to 196 PSI, but at the northern point it drops from 176 PSI to 162 PSI (compared with the map on page 14).

Delany 3 (Pg. 12) / Stoner Map (Pg. 17)

This represents the system with an 8" HP main in place in Delany Rd., with Edwards Road Station off and with a hit simulated on the 6" HP main in Route 173 at Miday Dr. The HP system pressure at the northern comparison point (Route 173 at Lewis Ave.) is now shown as only 143 PSI.

Delany 3A (Pg. 13) / Stoner Map (Pg. 18)

This represents the system with an 8" HP main in place in Delany Rd, with the Edwards Road Station off and with a hit now simulated on the 6" HP main in Delany Rd. at Porett Dr. instead of in Route 173. The Stoner model goes "infeasible", which can be seen by the negative numbers shown on the map on page 18 for system pressures.

Study #2 Conclusion

Downsizing the 12" HP gas main in Delany Rd. would put us at severe risk of compromising our system integrity. Without the benefit of the feed from Edwards Road Station, even with 12" main in Delany Rd. HP system pressures are not actually in the range where we generally like to see them. Reducing the gas main size to 8" leaves us vulnerable to widespread outages if we experience any hits on our HP system in areas north or south of the area where the Delany Rd. main currently runs.

Study #3 (Pages 19 - 24) Edwards Road Station is On

Delany H1 (Pg.19) / Stoner Map (Pg. 21)

This represents the system with the 12" HP main in place in Delany Rd, with Edwards Road Station on and with a hit simulated on the 6" HP main in Route 173 at Miday Dr. Compared with our original base map (page 4), we see a reduction in HP system pressures at both of comparison points. At the southern point (Green Bay Rd. at Sunset Ave.), the pressure decrease is only 3 PSI going from 232 to 229 PSI. At the northern point the pressure decrease is 29 PSI, going from 218 to 179 PSI.

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Delany H2 (Pg. 19) / Stoner Map (Pg. 22)

This represents the system with the 12" HP main in place in Delany Rd, with Edwards Road Station on and with a hit simulated on the 6" HP main in Delany Rd. at Porett Dr. instead of at Route 173 and Miday Dr. At Route 173 and Lewis Ave, the HP system pressure is decreased (compared to our base model on page 4) from 218 to 211 PSI. At Green Bay Rd. and Sunset Ave, the pressure change is from 232 to 222 PSI.

Delany 1 H1 (Pg. 20) / Stoner Map (Pg. 23)

This represents the system with the 12" HP main in place in Delany Rd. and with the same hit modeled in step "Delany H1" above, but without the benefit of the Edwards Road Station feed. Compared with our Edwards Road Station Off base map (page 14), we see HP system pressure reductions at our two comparison points. At the southern point, the decrease is only 1 PSI (195 to 194 PSI), but at the northern point the decrease is 34 PSI, going from 176 to 142 PSI.

Delany 1 H2 (Pg. 20) / Stoner Map (Pg. 24)

This represents the system with the 12" HP main in place in Delany Rd. and with the same hit modeled in step "Delany H2" above, but without the benefit of the Edwards Road Station feed. The Stoner model goes "infeasible", which can be seen by the negative numbers shown on the map on page 24 for system pressures.

Study #3 Conclusion

Even with 12" HP gas main in Delany Rd. from Sunset Ave. to Wadsworth Rd., we are already vulnerable to experiencing significant HP system pressure reductions if any of our 6" HP gas mains in the northern area of our service territory gets hit when Edwards Road Station is not operating.

Overall Conclusion

The results from the engineering study support the decision to replace size-for-size the 12" HP gas main segments that will be in conflict with the LCDOT Delany Rd. road reconstruction project if it should go forward in 2012. A smaller size main would compromise our system integrity in the area.