August 1, 2017

Riverside Drive Hillside Movement

Stabilization and Mitigation Measures Neighborhoods Committee



Background

January 2017 data from the Area 1 inclinometers indicated accelerated movement in this western area (Area 1). DOTE notified the Administration and affected utilities that a potential emergency situation existed, and action to protect critical infrastructure was needed.

Specifically, GCWW, MSD, and Duke Energy all have significant infrastructure located in Riverside Drive, which will be affected by this earth movement. GCWW has two water mains (60" diameter and 54" diameter), Duke Energy has a 20" diameter gas main, and MSD has several mains and outfalls in the area.





Area 1 - Current Work

In January 2017, DOTE engaged Terracon Consultants, a local geotechnical firm, to assist in the evaluation of the situation and to advise on potential mitigation strategies. DOTE and GCWW also consulted with local and national design-build contractors that specialize in landslide stabilization. Based on these evaluations and consultations, 3 stabilization methods & locations were considered:

- Stabilization methods above the existing railroad tracks,
- A pier wall south of the existing railroad tracks, or
- A pier wall just north of the Riverside Drive sidewalk.



Area 1 - Current Work

Through an emergency procurement, DOTE and GCWW solicited design-build proposals and ultimately selected Goettle Construction. Goettle proposed constructing a pier wall in Area 1 composed of 4' diameter piers spaced 5.5' on center, with a grade beam anchored into rock. The 1140' long wall is located 20' south of the railroad line on private property.

At this time, all 209 piers, the grade beam, and the tieback anchors are complete. Installation of 40 horizontal under drains to remove ground water from the hillside began in mid-July.

Initially the wall design left a minimal portion of the grade beam and tiebacks exposed. To reduce soil weight and provide an additional factor of safety, earth below the wall will be removed and re-graded to expose the upper portion of the grade beam.











Area 1 - Current Work

Final costs are yet to be determined, but construction costs have been negotiated at a \$7.9 million "not to exceed" price. Total project costs including real estate, geotechnical consultants, and other factors are estimated at \$10 million.

To date, these costs have been predominately born by GCWW to quickly protect their water mains, but given the protection afforded to all infrastructure by the wall, cost sharing measures are being proposed.

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Area 2 – Next Steps

Unfortunately the hillside movement in Area 2 has not abated and critical infrastructure is still at risk. With Terracon, DOTE, GCWW, and MSD have evaluated a series of options that afford varying degrees of protection. Options include construction of:

- Option A An additional pier wall within the north right of way of Riverside, or
- Option B An additional pier wall located within private property north of Riverside Drive such that overhead utilities would not have to be removed.
- Option C A set of pier walls staggered above and below the railroad tracks (due to access and property considerations).



Area 2 West, Area 1, Area 2 East



Area 2 – West 310' Area 1 – 1140'

Area 2 - East 920'



Area 2 – East





Area 2 – West



Area 2 - Next Steps

Based upon an evaluation of property impacts, constructability, costs, and levels of protection for the various stakeholders, Option C (a set of pier walls staggered above and below the railroad tracks) was determined to be most advantageous to most stakeholders. This is also the least expensive option with an estimated cost of \$7.8 million for Area 2 – East and \$2.3 million for Area 2 – West for construction and real estate.

With soft costs, the total cost for both Area 2 East and West is \$10.5 million.

GCWW is also exploring the relocation of the 60" diameter water main as a long term option.



Area 2 - Next Steps

In order to expedite the process, property and topographic surveys and access discussions are currently underway. Terracon is obtaining additional subsurface information to perform final stability analyses to evaluate wall alternatives and develop wall design parameters. Contractors for the wall construction has not yet been procured pending the outcomes of on-going discussions.

The extension of the current wall construction to the west (Area 2-West) is estimated at approximately \$2.3 million.



Cost Sharing

Given the mutual benefits of the Area 1 and 2 wall construction, the project stakeholders (GCWW, MSD, Duke Energy) are considering some form of cost sharing. Cost sharing scenarios include proportional participation based upon replacement value of the protected assets, or a simple division of the costs shared across the stakeholders.





QUESTIONS?



Area 2-West & Area 1 Detail



Area 2- East Detail

