Appendix A.2: Zone of Influence Analysis

ZONE OF INFLUENCE FOR BUILT CONDITION

The Zone of Influence (ZOI) is designated to prevent any damage to or impacts on existing facilities, whether owned by Metro, local jurisdictions, or private parties. Preventing such impacts may result in additional costs to Developer. The ZOI for Built Conditions is intended to prevent forces generated by new buildings and infrastructure from impacting existing facilities, as any additional structure loads from adjacent development are not permitted to be applied to existing Metro structures.

The design of any structures or foundations ("built conditions") must ensure that any and all building weight and/or other forces are transferred below the corresponding ZOI. Piles must be either outside of the Zone of Influence of existing facilities or drilled to an appropriate depth to ensure the weight of the Joint Development is distributed below any existing facilities' influence line. Required depth will be dependent on building design, soil geology, and placement of new structures. A clear design for the required depth of piles and essential geotechnical analysis, considering the soil properties and building design to guarantee structural stability while minimizing potential impacts on existing facilities, will need to be provided to Metro.

The WMATA Manual of Design Criteria and WMATA Standard Specifications must be used for design and construction of the portion of the proposed facility within the WMATA ZOI.

The ZOI boundary is calculated based on an influence line beginning two feet below the lowest point of the facility, continuing upward at a one-to-one slope to grade. Figures 16 and 17 illustrate the typical ZOI resulting from the station cavern and culvert, respectively. The actual ZOI boundaries will vary as the depth of the facilities change across the Site. It is highly likely that development will be built within the ZOI of the Metro facilities and culvert as building in these areas is a requirement for development that maximizes the value of the Site.

Please note that the provided exhibits are for illustrative purposes and based on known information at the time of solicitation. The Developer will be required to conduct their own due diligence and comply with Metro's standards, requirements, and specifications for designing and constructing within WMATA's ZOI. The developer will be responsible for any mitigation measures required to protect Metro facilities during construction.

[NTD: Confirm Prince George's County ZOI standards]

Figure 1: Typical ZOI considerations for Metro's station cavern for the built condition. Actual foundation design, including required depth of pile and any below grade parking, to be determined.

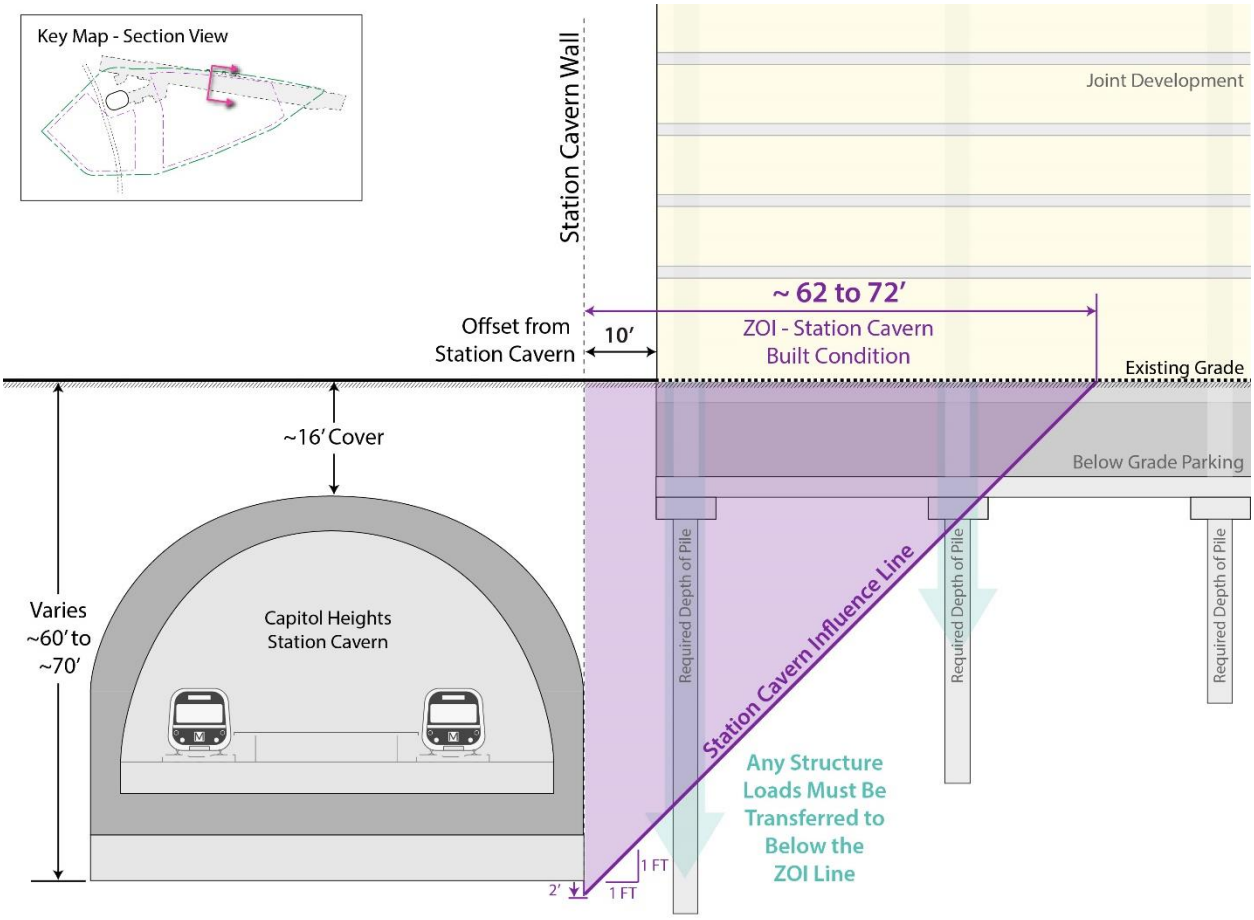
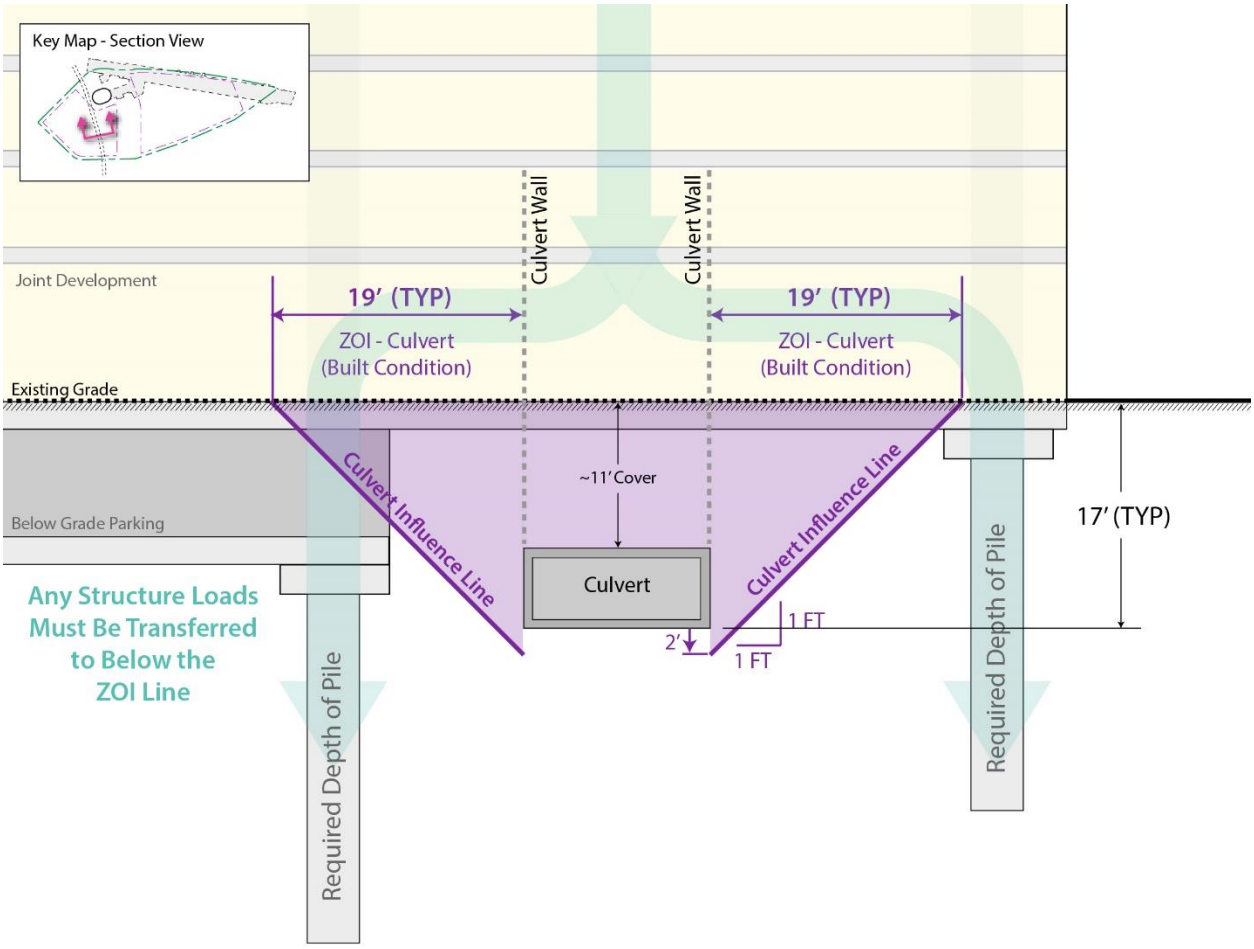


Figure 2: Typical ZOI considerations for the below-grade culvert for the built condition. Actual foundation design, including required depth of pile and any below grade parking, to be determined.



Required Depth of Pile: Any development (including below-grade parking and/or foundations) within any ZOI of Metro or other impacted infrastructure must ensure that all building weight is transferred below the corresponding ZOI. The depth of the piles below the ZOI will be dependent on the geotechnical properties of the soil. The pile length below the ZOI must support the full load.

ZONE OF INFLUENCE FOR EXCAVATION AND CONSTRUCTION

The ZOI for Excavation and Construction is intended to prevent the removal of soil and/or bedrock from impacting existing facilities, as this may result in a loss of structural support for facilities causing them to shift or slide towards the excavated area.

At this Site, the Zone of Influence boundaries are measured both at grade and below grade, based on both Metro facilities (station cavern, tunnel, and entrance passageway) and Prince George's County culvert. Section 3.1 of the Metro ACPM September 21, 2015 (Revision 5A) provides a listing of the four criteria that must be considered in

determining the limits of the Metro ZOI. If any of the four criteria apply, the proposed adjacent construction or excavation is within the Metro ZOI.

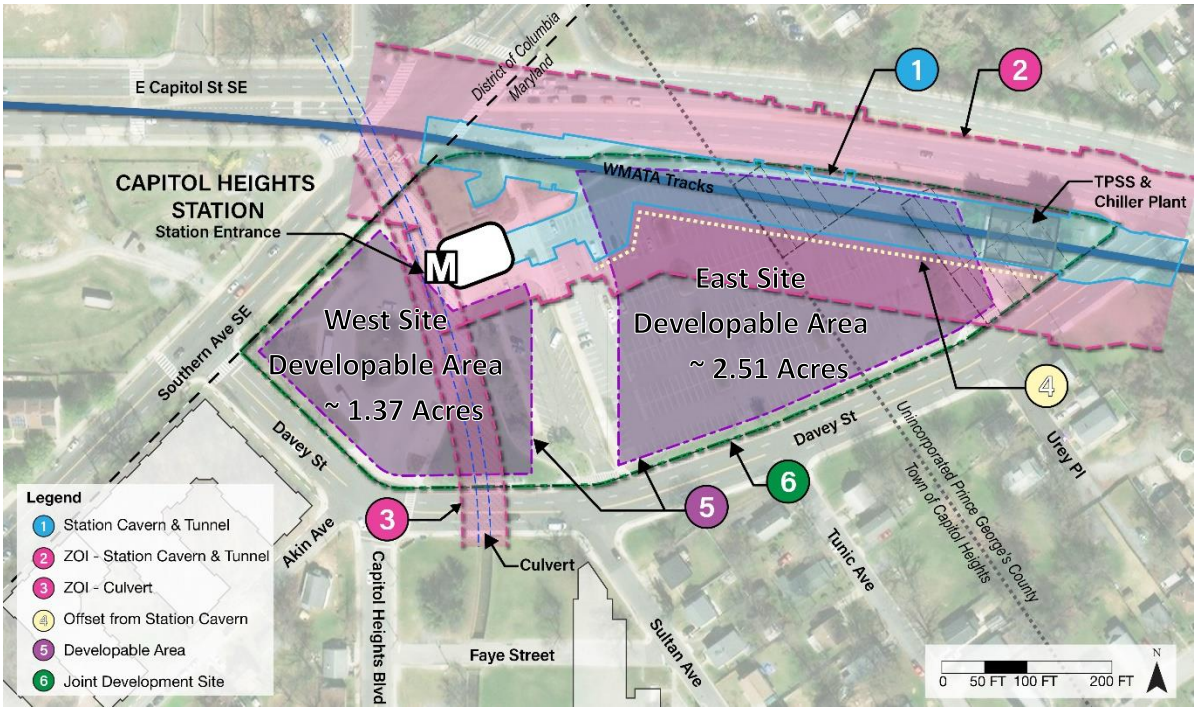
At grade, a ZOI boundary extends 25 feet from the closest edge of the Metro facility. Any construction activity or building structure within 25 feet (at, above, or below grade) is within the ZOI. If Joint Development is more than 25 feet away from Metro facilities at grade, then determination of entrance into the ZOI is based on the depth of the facility as well as the depth of Joint Development excavation.

Below grade, a ZOI boundary is calculated based on an influence line beginning two feet below the lowest point (height wise) of the facility, continuing upward at a one-to-one slope (45-degree angle) to grade.

Additionally, a ZOI boundary is calculated based on a point two feet below the lowest point of Joint Development excavation (“excavation” includes temporary construction uses as well as subgrade building levels (basements and/or parking)). From two feet below the lowest point of excavation, the ZOI influence line extends at a one-to-one slope (45-degree angle) toward the surface. If this line intersects with any below-grade Metro facilities before crossing existing grade, excavation is within the ZOI.

Figure 18 illustrates the approximate extents of the ZOI for Metro's facilities and the Prince George's County culvert. A more detailed analysis is recommended to determine exact ZOI locations.

Figure 3: Approximate ZOI boundaries at grade

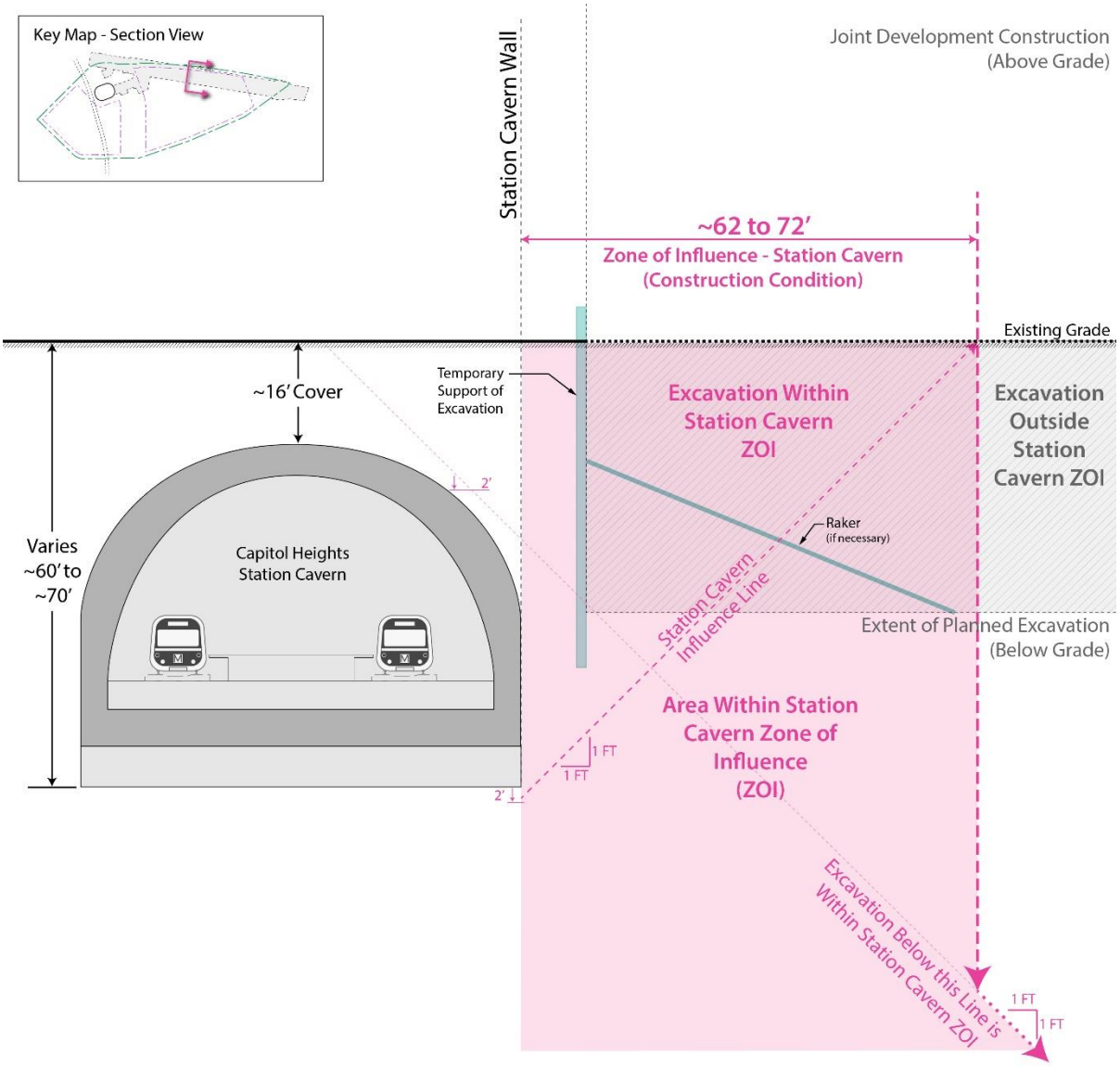


All excavation adjacent to a Metro facility shall adhere to ACPM Section 3.3 - Support of Excavation. All construction adjacent to a below grade Metro facility must adhere to ACPM 3.14 – Construction Adjacent to WMATA Tunnels. All excavation adjacent to at-grade Metro facilities, including tracks, shall adhere to ACPM Section 3.17 - Excavation Adjacent to WMATA Roadway/Right-of-Way and At-Grade Facilities. The WMATA Design Criteria and Standard Specifications shall be utilized for design and construction of any portion of JD within the Metro ZOI, and additional analysis shall be included in the submission per APCM Section 3.3C. For limitations on construction within the specified limits of existing Metro facilities refer to Section 3.9 of the WMATA ACPM.

During the construction phase, working or excavating within a ZOI triggers the requirement to mitigate any changes in structural loads and/or earth pressure on Metro facilities and other infrastructure as well as maintain their structural integrity. This may include special requirements for the support of excavation (SOE) depth and installation, such as: additional depth, vibration monitoring, tilt meter, or settlement monitoring. Developer will be required to absorb such costs.

Figure 19 illustrates a typical ZOI for the Metro station cavern during excavation and construction. Excavation for foundations and/or below-grade parking structure is likely to occur within the Metro ZOI.

Figure 4: Typical ZOI considerations for excavation and construction adjacent to Metro's station cavern



In addition to the ZOI requirements for Metro facilities, construction will also need to take into consideration the ZOI for an existing 14 ft x 6 ft below-grade culvert located across Site 2 at an estimated depth of approximately 17 feet, based on as-built documents. Excavation and final built condition will likely be within the ZOI of the culvert, which will require coordination with Prince George's County to ensure that the culvert and associated structures are protected during and after construction. Figure 20 illustrates a typical ZOI for the culvert during excavation and construction.

Figure 5: Typical ZOI considerations for excavation and construction adjacent to the existing culvert