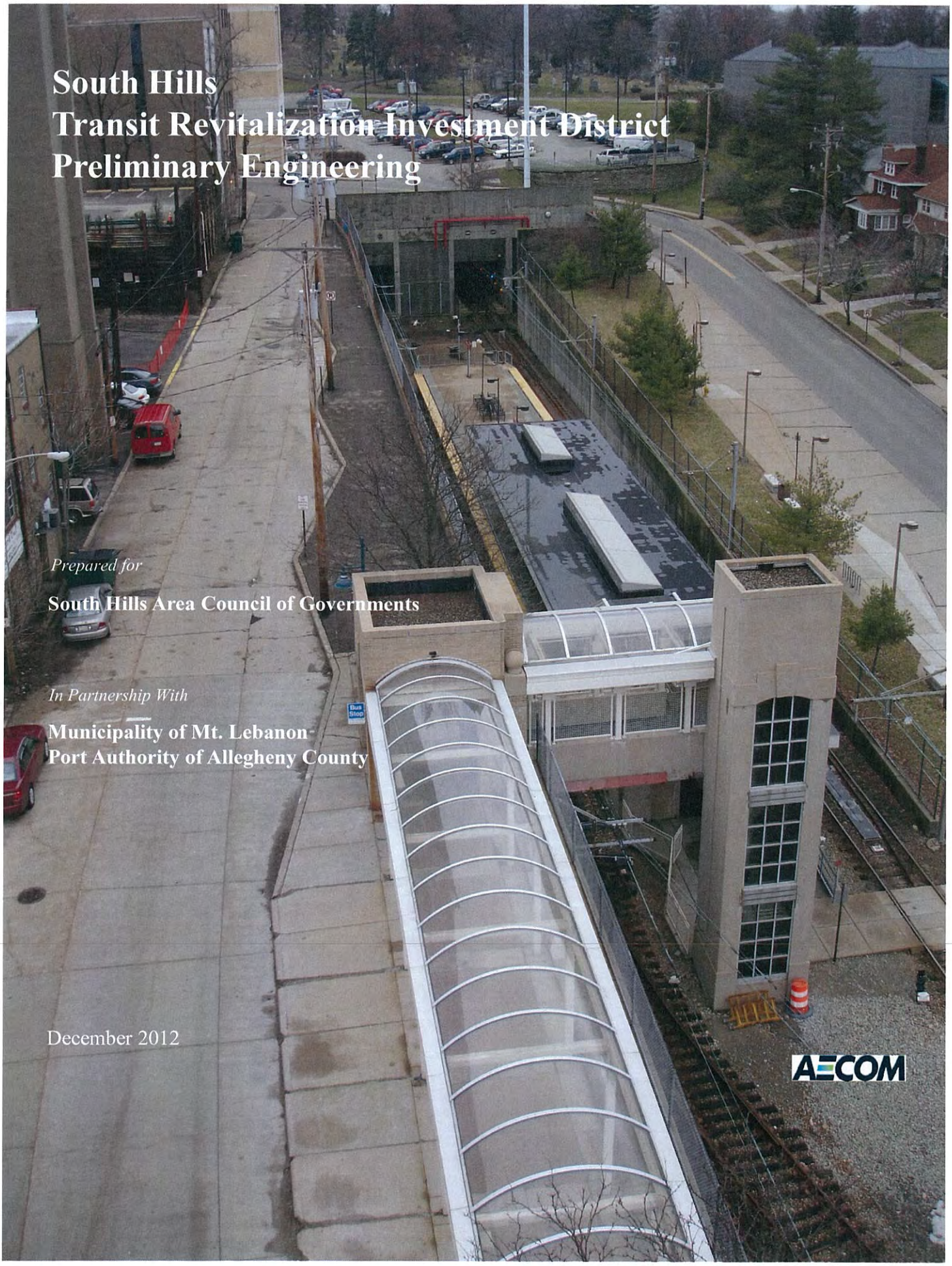
South Hills Transit Revitalization Investment District Preliminary Engineering



Prepared for

South Hills Area Council of Governments

In Partnership With

Municipality of Mt. Lebanon
Port Authority of Allegheny County

December 2012

AECOM

SOUTH HILLS TRANSIT REVITALIZATION INVESTMENT DISTRICT PRELIMINARY ENGINEERING

PREPARED FOR

SOUTH HILLS AREA COUNCIL OF GOVERNMENTS

IN PARTNERSHIP WITH

MT. LEBANON MUNICIPALITY

PORT AUTHORITY OF ALLEGHENY COUNTY

PREPARED BY

AECOM

December 2012

This Project was financed through the Community Infrastructure & Tourism Fund

Forward

South Hills Area Council of Governments (SHACOG) acted as an agent for the Municipality of Mt. Lebanon to perform the project know as the South Hills TRID Preliminary Engineering. The funds for this project are provided through the Community Infrastructure & Tourism Fund (CITF) program. These funds are administered and disbursed by the Allegheny County Department of Economic Development (ACED). Engineering guidance and technical supervision was furnished by the Municipality of Mt. Lebanon.

The Preliminary Engineering for this project began on June 27, 2011 with a Kick-off Meeting held at the Mt. Lebanon Municipal Building with representatives from the Municipality of Mt. Lebanon, Borough of Dormont, SHACOG, and AECOM consultant present. The purpose of the Municipality of Mt. Lebanon project was to take the High Density Concept from the 2008 TRID Study and further develop the Air Rights design concept over the tracks and Mt. Lebanon light rail transit station between Shady Drive East and Parse Way. Based upon building concepts similar to the 2008 TRID Study, the foundations for the concepts were to be conceptually designed to span the tracks and station and meet the Air Rights requirements published by PAAC. Past and eight new soil borings were used to make the foundation designs meet restrictions the local subsurface conditions presented. A cost estimate for these structures was then developed to give the Municipality of Mt. Lebanon a good basis for funding further development.

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Executive Summary

The primary goals of this project were to determine the size, cost, and type of construction needed to utilize the Air Rights space over the Mt. Lebanon "T" Station and the tracks leading to the station from the south. The project used the base concepts from the TRID Study completed in 2008 for high density development.

Parking Garage

The parking garage development over the station was further studied to determine if a more efficient garage could be designed than had been proposed by other developers before the 2008 TRID Study. The parking design shown on the massing design concepts for this project illustrates a concept which doubled the capability of previous studies. To accomplish this, Parse Way becomes a one-way street running north to south and it becomes the entrance and exit street for the garage. The extra width of the garage could be moved toward Shady Drive East but the neighbors across the street would be impacted more by this design. The proposed garage concept also moves the Port Authority bus layover area from Parse Way to Shady Drive East where current provisions are designed for bus parking. To make the proposed parking structure less dominating to the residences, planting boxes with vines and flowers or other landscaping treatment is shown to soften the structural requirements and noise generated from the garage and existing light rail train operations.

Advantages for placing the parking garage in this location include providing parking for the "T" users closer to the station, keeping the entrance away from Shady Drive East, and providing more parking in the Washington Road garage for businesses on Washington Road. This development also uses the Air Rights capability of placing columns at the center of the station which reduces the structural costs for any structure at this location. The height of the garage is variable but the cost estimate was based upon a 4 story garage with the structural design to add two more stories if needed.

The parking garage structure was thus determined to be cast-in-place concrete columns and beams with pre-cast concrete "T's" spanning across the station. This will permit faster construction of the garage floors over the station to minimize disruption to train service.

Based upon 2012 costs the construction cost estimate for the 4 story parking garage including stairs and elevators is approximately $13,460,000. This cost includes work being done during non-standard work times to accommodate Port Authority Operations and cost for Port Authority personnel involvement while work is occurring above the catenary wires. Costs for replacement bus service and possible temporary construction easements are not included as line items. There are however, 10% to 20% allocated contingencies for every work item to allow for those type of possible construction costs

Mixed Use Tower

The platform designed to support a mixed use tower development had to be designed to span the tracks and the Port Authority right-of-way to meet the Air Rights requirements in this area. The structure thus became a steel frame structure with drilled caisson foundations set into the rock below. The spacing of the columns is 34 feet to provide the developer with more open area

around the structure. The platform was designed to be 8 bays long with the capacity to support 7 stories depending upon the weight of the materials used. The enclosed drawings illustrate steel frame construction above the platform without the use of any masonry construction to minimize the loads. The platform could be made longer or shorter depending upon the extent of the development proposed, but the height of the development will be restricted by the loads and the desire of the neighbors to have a tall building beside them. If a developer desires to have different column spacing north and south, a new platform design will be required because the structure above the platform structure must be centered on the steel box girders spanning over the tracks.

Since the top of the platform is over 11 feet above Parse Way and over 32 feet above grade toward Shady Drive East, access via stairs and elevators will be required on both sides. The location of the stairs and elevators are not shown on the platform design drawings, but the cost for them are included in the cost estimate along with the structure required to house them. Based upon 2012 costs the construction cost estimate for the mixed use tower platform including stairs and elevators is approximately $ 13,106,000. This estimate includes and excludes the same cost factors described for the parking garage relating to work around an operating light rail operation.

Soil Borings

The eight soil boring locations were located close to proposed column locations, four borings for each structure. The borings were also between former boring locations done for previously planned developments to gain a better understanding of where the rock layers are and how deep they are. This information was used by the structural engineer to determine the foundation requirements in the enclosed preliminary design.

Similar to previous soil boring reports, coal seams are reported as present approximately 275 to 306 feet below the current site surface elevations. These seams were last mined in 1918, thus mine subsidence is not considered an issue for the proposed foundations. The maps also do not indicate that any of the mining operations occurred under the proposed site location.

Port Authority of Allegheny County (PAAC)

During this preliminary design process a meeting was held with the PAAC representatives to get the Air Rights requirements for Mt. Lebanon Station established with a technical document. This was done with the enclosed Appendix A – Exhibit B – Sheet 3 of 3 which provides the Right-of-Way dimension, the height above tracks dimension and the elevation of this height where Air Rights begin. It also shows where columns can and cannot be built within the PAAC Right-of-Way to support an Air Rights structure.

After this meeting telephone calls and emails were made to keep the designated PAAC representative apprised of the developments of the preliminary design including where and when the soil borings were to be drilled. The PAAC representative declined an invitation to be part of the presentation of the Density Study design in January, 2012 but came to the final presentation in July, 2012 to provide the Mt. Lebanon Council assurance that the PAAC accepted the preliminary design because it met the Air Rights requirements.

In the next phase of work the PAAC will be involved primarily where the station design is being revised and scheduling of construction over the station and tracks is being determined. The

PAAC's Manual of Design Criteria and the latest NFPA-130 "Standard for Fixed Guideway Transit and Passenger Rail Systems" will need to be used to meet the latest design requirements. There is also a safety course the Port Authority will require designers and contractors to take while working around active tracks. The PAAC has no permit requirements, but will be heavily involved during construction with time constraints when construction can occur because of operational and safety concerns. Weekends and evenings where large events are occurring in the area, such as professional sports events, the Arts Festival, the Regatta, Thanksgiving Weekend and Light-up Night will prohibit the PAAC from limiting operations for construction. These will be part of the construction documents scheduling requirements.

Involving the PAAC in the final design process with coordination meetings and using rail system design criteria will be the main differences in the final design process over other similar sized projects. Regular building permits and reviews will remain in effect especially since the station will not be underground nor require special smoke control ventilation. The NFPA – 130 Code recommends higher fire ratings between the rail facilities and adjacent buildings than the International Building Code but these have been included in the enclosed preliminary design and cost estimate.

Recommendations for Development

To develop buildings in the Air Rights over the Port Authority Right-of-Way it is recommended that the maximum height available be constructed to keep the costs within reason. The 4 story parking garage structure will house approximately 240 cars which equates to about $34,2272.12 per parking space for construction. In the R S Means Building Construction Cost Data book this is approximately twice the median unit cost for a parking garage. Adding the final two floors will reduce the cost per parking space to a more reasonable level because the dominant portion of the cost is in the foundation and making the lower portion part of the Mt. Lebanon "T" Station. The cost per car also validates the need to make the parking garage wide enough to provide double width parking.

The cost estimate includes four elevators in the parking garage design because it serves two different levels. The Port Authority was requested by local ADA advocates to design two elevators into their new stations so there is always elevator service if one of them requires service and is shut down. Some of the elevator costs could be reduced by incorporating the current station elevator into the parking garage design and using it for service to both the station and the parking garage.

It may be difficult to sell the taller building concepts to the residents along Shady Drive East, but the mixed-use building will also need to be developed to its maximum to justify the extra foundation costs. Developing a public space between the parking garage and the mixed-use building, such as shown on the AECOM conceptual design, may be the best way to provide a benefit for the residents to gain their support on the taller building concepts.

Another method to evaluate the cost for constructing platforms for future development is to determine the cost of the land being created. Since the Air Rights land is being constructed, its cost per acre can be compared to land cost. The total area of "land" being constructed is 1.214 acres and since the construction cost of the "land" is approximately $232/SF the cost per acre is about $10,107,100 (elevator costs are not included). Since a development on the platforms will not have to construct foundations like they would on land, the value of the foundations could be subtracted from this per acre cost.

By comparison properties on Washington Road adjacent to the proposed Air Rights platforms have the following 2012 assessed land values: two 1/4 acre lots about $526,700 per acre, a 1/5 lot about $617,625 per acre and a 2.8 acre lot about $265,000 per acre. This makes the platform "land" cost about 20 times larger than adjacent land assessments.

The final recommendation is to create first rate developments on the Air Rights platforms to justify the rental costs and parking rates required to create the new property.

Structural Design

Construction of Mixed Use Air Rights Structure:

Construction of a mixed use air rights structure above active railroad tracks presents restrictions which were met in the conceptual design of this structure. First, all work must be performed to minimize impact on PAAC train operations, thus there are no supports within the active train way or dynamic envelope. The design incorporates steel transfer girders to span over the tracks to minimize the structural depth and maximize its load carrying capabilities. Second, accommodations were made for a seven story mixed use structure to be built on top of the transfer girders by a future developer. The platform design restricts the developed building above to be a light weight steel framed structure with light weight sheathing. Due to the height of the first floor above the tracks, a wide column spacing of 34 feet on center was chosen to maximize open space and avoid having the substructure appear like a picket fence. The design is for a structure 238 feet long with 7 building bays and an end bay with open space. This type of bay design allows for bays to be added in the future. A cast-in-place 10" thick concrete deck serves as ground level for the future development. The design basis for the future structure was estimated to be 115 pounds per square foot.

Due to the height above the tracks a braced frame was necessary on the east side to reduce the lateral deflection from wind loads. This gave the added benefit of increasing the original footprint layout from 51 feet to 68 feet wide with a minimum 10 foot wide walkway around all sides of the structure.

The substructure of the future use air rights building consists of a 7 foot deep double web steel transfer girder spaced at 34 feet on center, supported by a steel column on the west side and a tapered double web steel box girder column on the east side which are seated on drilled shafts into the bedrock below. Due to the large size and weight of the transfer girders, 82.5 tons, a large crane will be needed to hoist the girders into place at a distance and time to avoid interruption of PAAC train traffic. The remainder of the work can be performed using smaller cranes on each side of the tracks beyond the right-of-way.

Two sets of public access/egress stairs and two elevators are included in the cost estimates to provide access from grade level to the elevated deck. The exact locations of the stairs and elevators were not shown because the circulation of people within the site and around the buildings will not be finalized until the design and use of the structure is determined by the developer.

On the enclosed Drawing S-04 Sections C and D and Detail 3 are shown with cross-out lines through them. This indicates that these types of designs were considered for the columns and the attachment of the steel box girder, but were found to be designs that did not work. Section A is the design of the box girder and Section B is the design of the drilled shafts which were estimated for the structure.

Loading for the Mixed Use Building design is as follows:

Live Loads: 100 psf for first floor space and upper spaces with the following uses -storage, lobby, conference, retail, computer rooms, files rooms, corridors and balconies
50 psf for office space
40 psf for apartments

Dead Loads: 35 psf at roof
17.3 psf for snow
85 psf for structure

Wind Loads: 20.2 to 29.1 psf as the structure gets higher

The final designer will determine the actual live loads based on what the building is designed to include. It will be best to have that determination before the base is built, especially if the proposed development requires many heavy live load uses.

Construction of the Parking Garage Air Rights Structure:

Construction of a parking garage air rights structure above active railroad tracks presents similar restrictions as the mixed-use structure which is met in the conceptual design of this structure. First, all work must be performed to minimize impact on PAAC train operations. This is not totally possible because the center support columns for the garage design are at the center of the station platform as permitted in the PAAC Air Rights development plan. Impacts may include single tracking or weekend outages, but much of the work at the platform may be required at night when the trains are not operating. Since the center columns are located in the center of the existing platform, a small rig will be used to install drilled mini-piles. This type of operation can be done with minor interruption at local areas along the platform. Once the mini-piles are installed, a pile cap will be constructed below the existing platform slab. Precast columns can then be lowered into position and the platform slab around the column can be restored. The remainder of the substructure support system will be drilled shafts installed away from PAAC train operations. Precast concrete double T sections and precast support beams will then be hoisted into place over the tracks.

The structure has four stories of parking structure with an elevator and stair at each corner as well as an area for office space. The design accommodates two additional stories to be built in the future. The structure consists of precast double tee sections supported on precast beams attached to precast columns which are seated on drilled shafts into the bedrock below on each side of the station with a pile cap on top of drilled mini-piles for the center columns foundation.

Loading for the Garage design is as follows:

Live Loads: 40 psf

Dead Loads: 85 psf for structure
20.8 psf for snow

Wind Loads: 37.4. to 46.6 psf as the structure gets higher

Common Elements Included in the Design

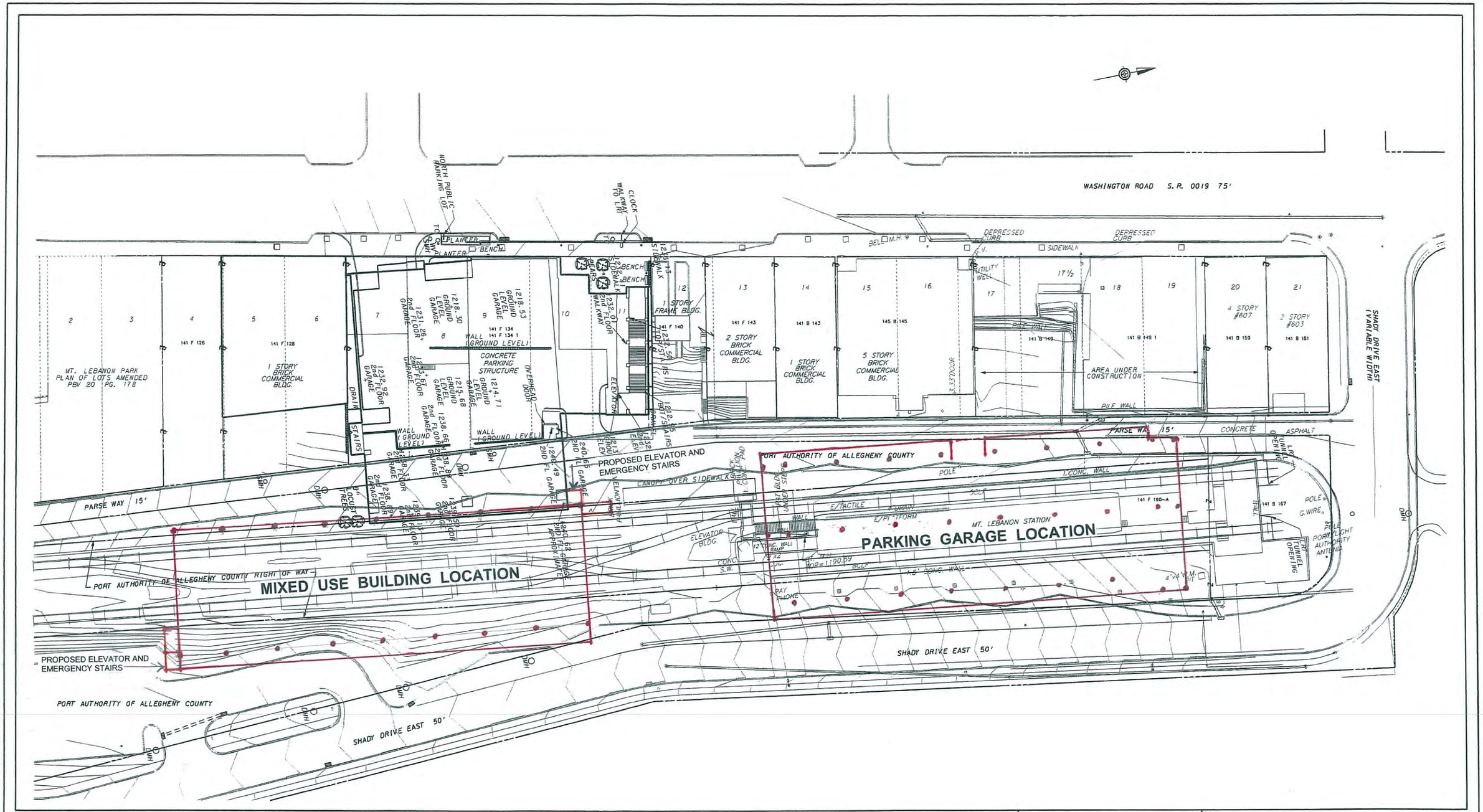
The Air Rights structure and the Parking Garage structure cost estimates include allowances for utility relocations, parking lot reconstruction, finished retaining walls, sidewalks, curbs, bicycle parking, roadway repairs for Parse Way, landscaping, lighting for the stairs and below the elevated deck, signage, traffic control during construction, and other temporary supports and devices during construction.

Recommendations for Final Design

The final design of the base foundations should include shafts socketed into three feet of the limestone or sandstone found in the borings. This will ensure support for the height of the buildings on top and provide resistance for any horizontal wall foundation movement which the base foundation shafts penetrate.

Load carrying capabilities of earth adjacent to the proposed support construction should also be tested to provide contractors with its capabilities to support cranes and heavy equipment needed to construct the base and the ensuing structures above. Since the adjacent hotel contractor encountered soil problems with cranes, extra soil testing will help contractors select construction methods which can be accomplished on this site.

The enclosed topographic plan with red lines indicates the proposed location of each of the buildings and the red dots indicate the approximate location of each of the proposed columns. The foundations for the light rail retaining walls were taken into consideration, but the foundations of the parking garage over Parse Way were not investigated for possible interference nor were specific utility interferences identified. Costs were included for these possible design and construction modifications however. Once specific column locations can be field located, possible modifications can be identified.



NOTES:

SURVEY INFORMATION TAKEN FROM
KAG ENGINEERING, INC.
PLAN OF TOPOGRAPY
DATED AUGUST 29, 2003.

THIS PLAN WAS UPDATED FROM FIELD DATA COLLECTED BETWEEN JULY 2011 AND SEPTEMBER 2011.

T.W. ENGINEERING, INC.
CONSULTING ENGINEERS
PITTSBURGH OFFICE & RESEARCH PARK
ONE CORPORATE CENTER
5500 CORPORATE DRIVE, SUITE 300
PITTSBURGH, PA 15237
TEL: (412) 369-7400
FAX: (412) 369-7964

30 Ft. 0 30 Ft.
SCALE

PLAN OF TOPOGRAPHY

SITUATE IN

MUNICIPALITY OF MT. LEBANON
ALLEGHENY COUNTY, PA

SCALE: 1"=30' DATE: JUNE 27, 2012

S - 00

K:\2011\11005-002 - South Hills Transit - Mt Lebanon - AECOM\cad\Plots\Mapping\11005-002-plot.dgn
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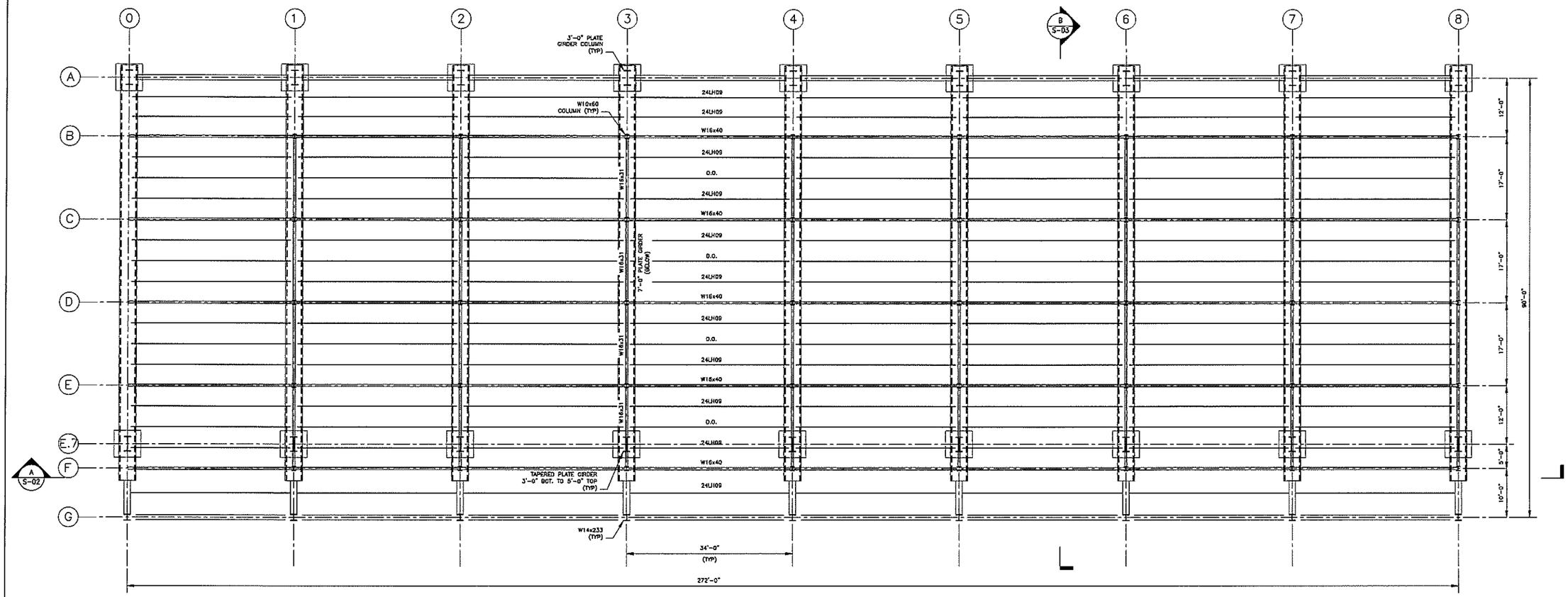
NOTES:

1. UPPER STRUCTURE IS A LIGHT WEIGHT STEEL BRACED FRAME.
2. CROSS BRACING OF THE DOUBLE WEB BOX GIRDER IS NOT SHOWN.
3. STRUCTURE INSTALLATION SHALL BE COORDINATED AROUND EXISTING GARAGE SUPPORTS ABOVE PARSE WAY.
4. CONTRACTOR IS NOT ALLOWED TO AFFECT PAAC OPERATIONS.
5. NO TEMPORARY SUPPORTS ARE ALLOWED IN THE RIGHT OF WAY.
6. VERTICAL TRUSS FRAME SHALL BE SURROUNDED BY MASONRY UNIT WALLS.



1 PLAN – AIR RIGHTS MIXED USE FRAMING PLAN
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA
TRID PRELIMINARY ENGINEERING
AIR RIGHTS MIXED USE BUILDING
CONTRACT NO: MOUNT LEBANON, PA

PLAN

N

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

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GRAPHIC SCALE

ENGINEER/ARCHITECT
AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:
Project Manager Date

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NOTES:

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2. CROSS BRACING OF THE DOUBLE WEB BOX GIRDER IS NOT SHOWN.
3. LONGITUDINAL MEMBER FRAMING IS NOT SHOWN FOR CLARITY.
4. STRUCTURE INSTALLATION SHALL BE COORDINATED AROUND EXISTING GARAGE SUPPORTS ABOVE PARSE WAY.
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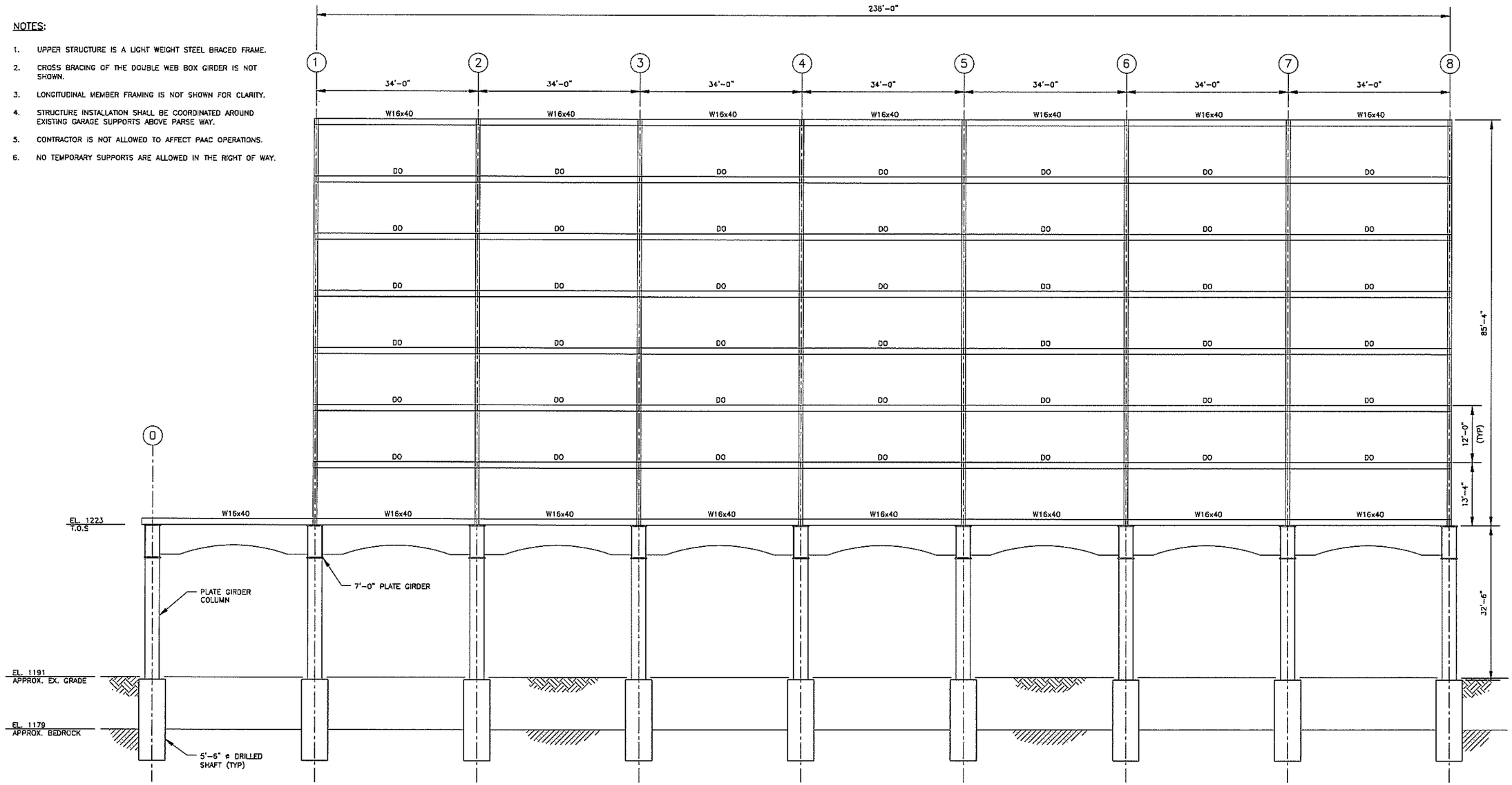
6. NO TEMPORARY SUPPORTS ARE ALLOWED IN THE RIGHT OF WAY.



A ELEVATION
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA
TRID PRELIMINARY ENGINEERING
AIR RIGHTS MIXED USE BUILDING
CONTRACT NO: MOUNT LEBANON, PA

ELEVATION - SHEET 1 OF 2

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

ENGINEER / ARCHITECT:
AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
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Project Manager Date

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3. LONGITUDINAL MEMBER FRAMING IS NOT SHOWN FOR CLARITY.
4. STRUCTURE INSTALLATION SHALL BE COORDINATED AROUND EXISTING GARAGE SUPPORTS ABOVE PARSE WAY.
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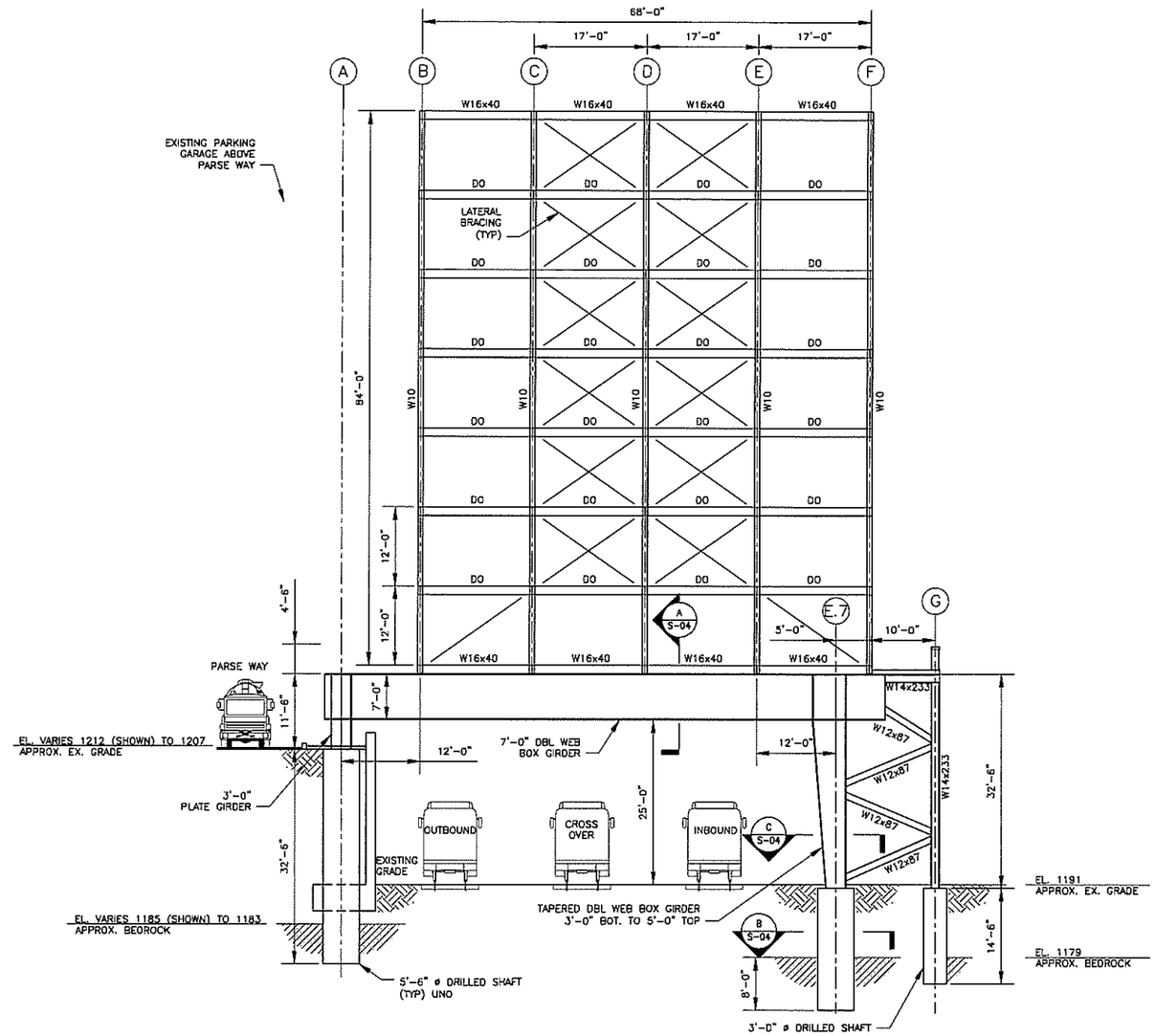
7. VERTICAL TRUSS FRAME SHALL BE SURROUNDED BY MASONRY UNIT WALLS.



B ELEVATION
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS MIXED USE BUILDING

CONTRACT NO: MOUNT LEBANON, PA

ELEVATION - SHEET 2 OF 2

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

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AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:
Project Manager Date

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GRAPHIC SCALE

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DATE: JUNE 2012

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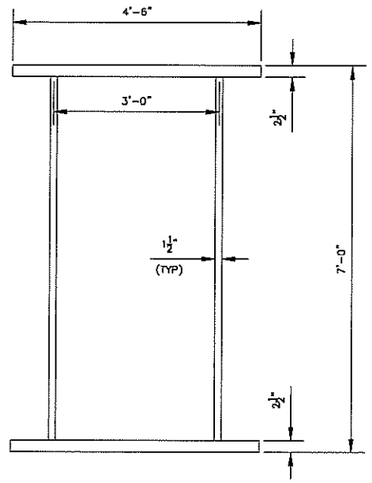

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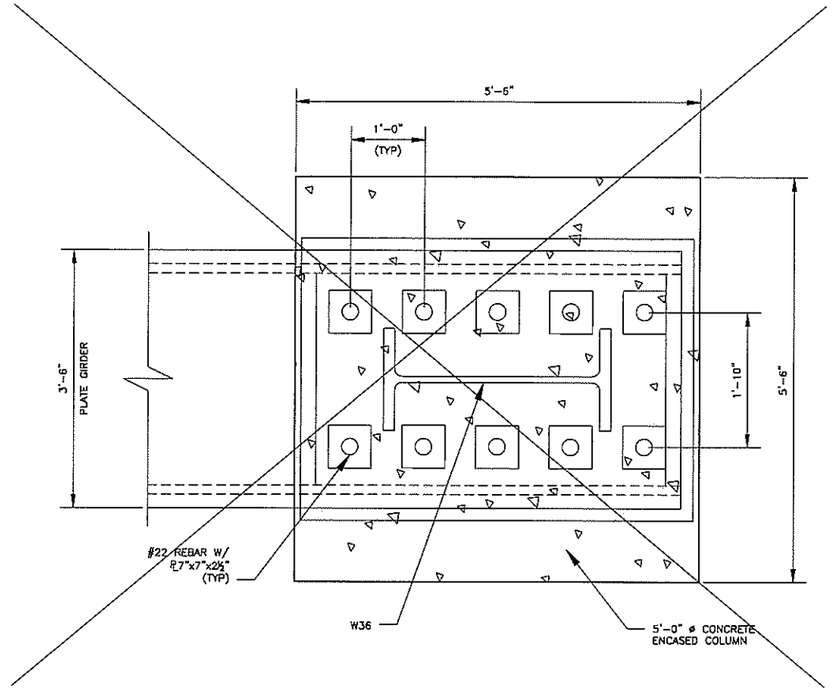

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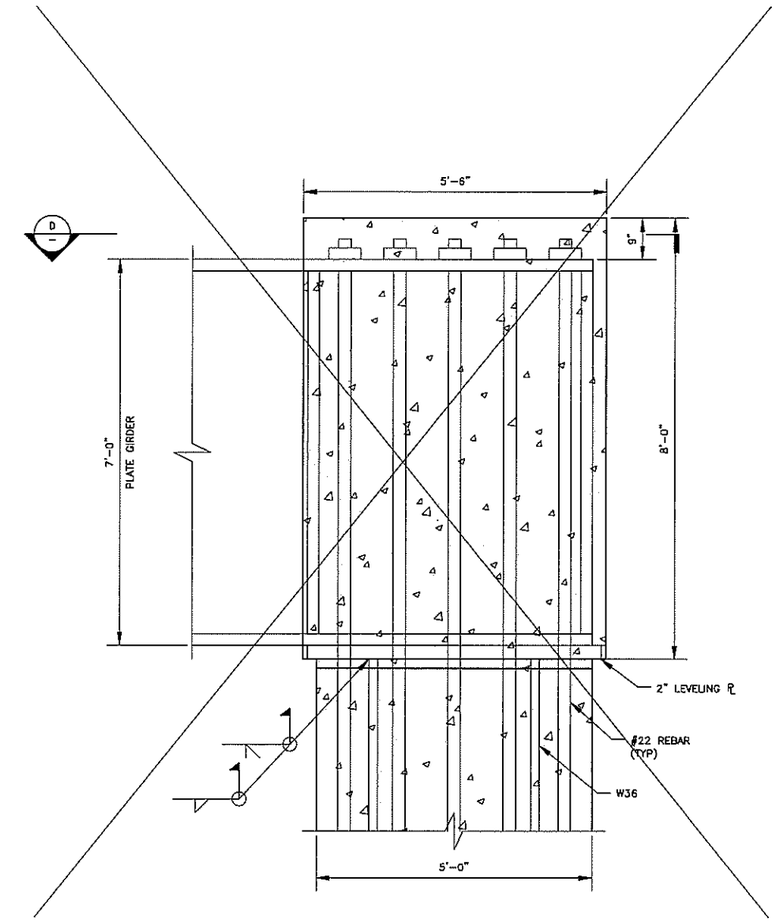

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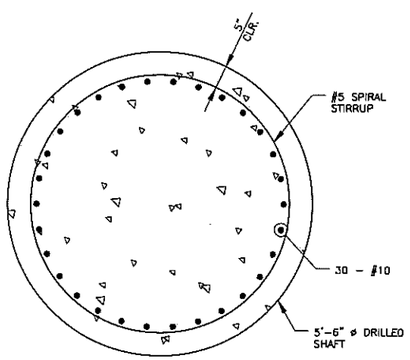

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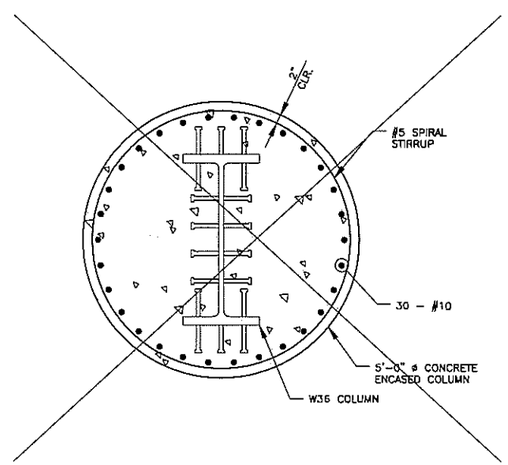

C SECTION – CONCRETE ENCASED COLUMN
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MUNICIPALITY OF MOUNT LEBANON, PA
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AIR RIGHTS MIXED USE BUILDING
CONTRACT NO: MOUNT LEBANON, PA

DETAILS

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

0 4 8 16 32 FEET
GRAPHIC SCALE

ENGINEER / ARCHITECT
AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:
Project Manager Date

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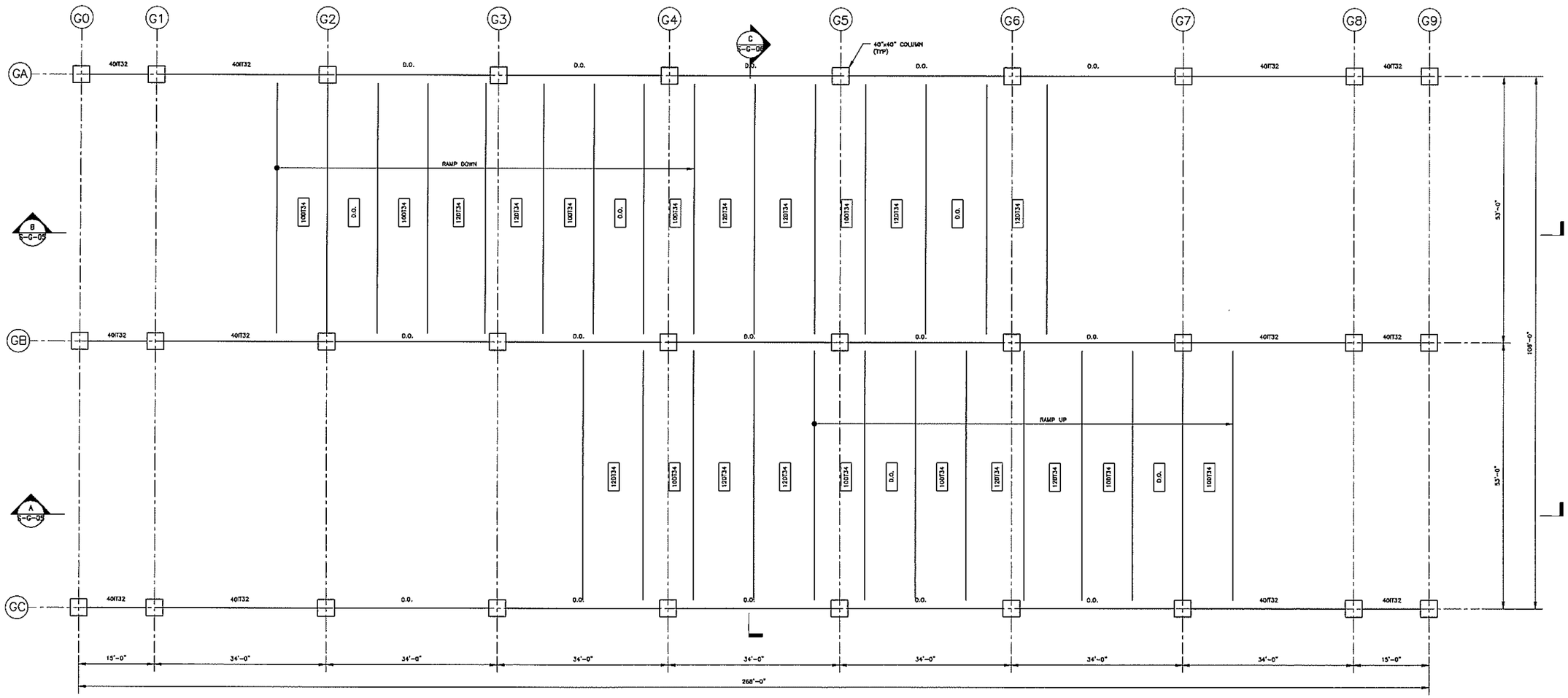
DATE: JUNE 2012					



1 PLAN – GROUND FLOOR
3/32"=1'-0"

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MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

GARAGE PLAN
SHEET 1 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

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AECOM

Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:

Project Manager Date

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DATE: JUNE 2012					

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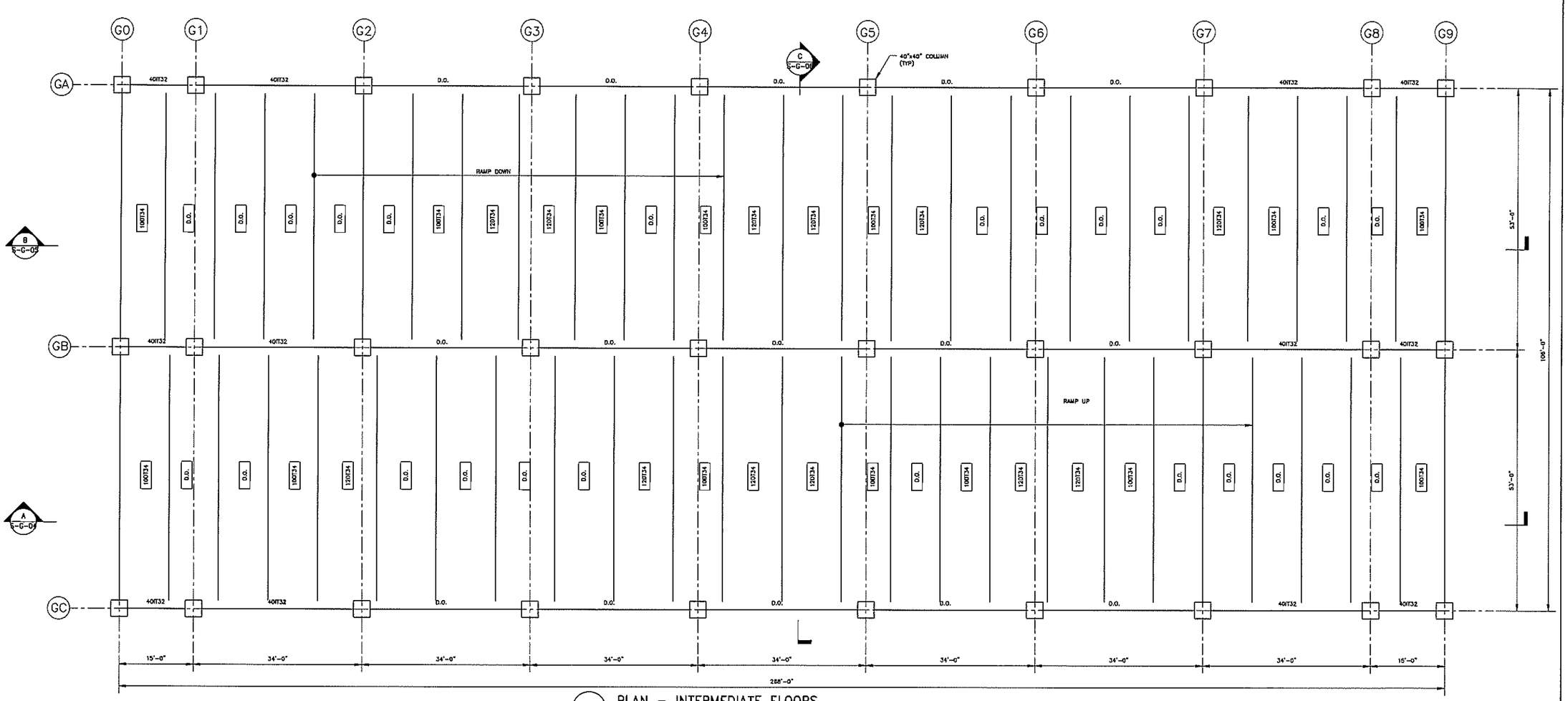
DRAWING: J:\PROJECTS\60116025 SHARD MT LEBANON PITTSBURGH\CAD\S\SHEETS\S-G-01 - GARAGE PLAN - SHEET 1 OF 3.DWG [LAYOUT1] 07/02/12 9:53AM



1 PLAN – INTERMEDIATE FLOORS
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

GARAGE PLAN
SHEET 2 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

0 4 8 16 32 FEET
GRAPHIC SCALE

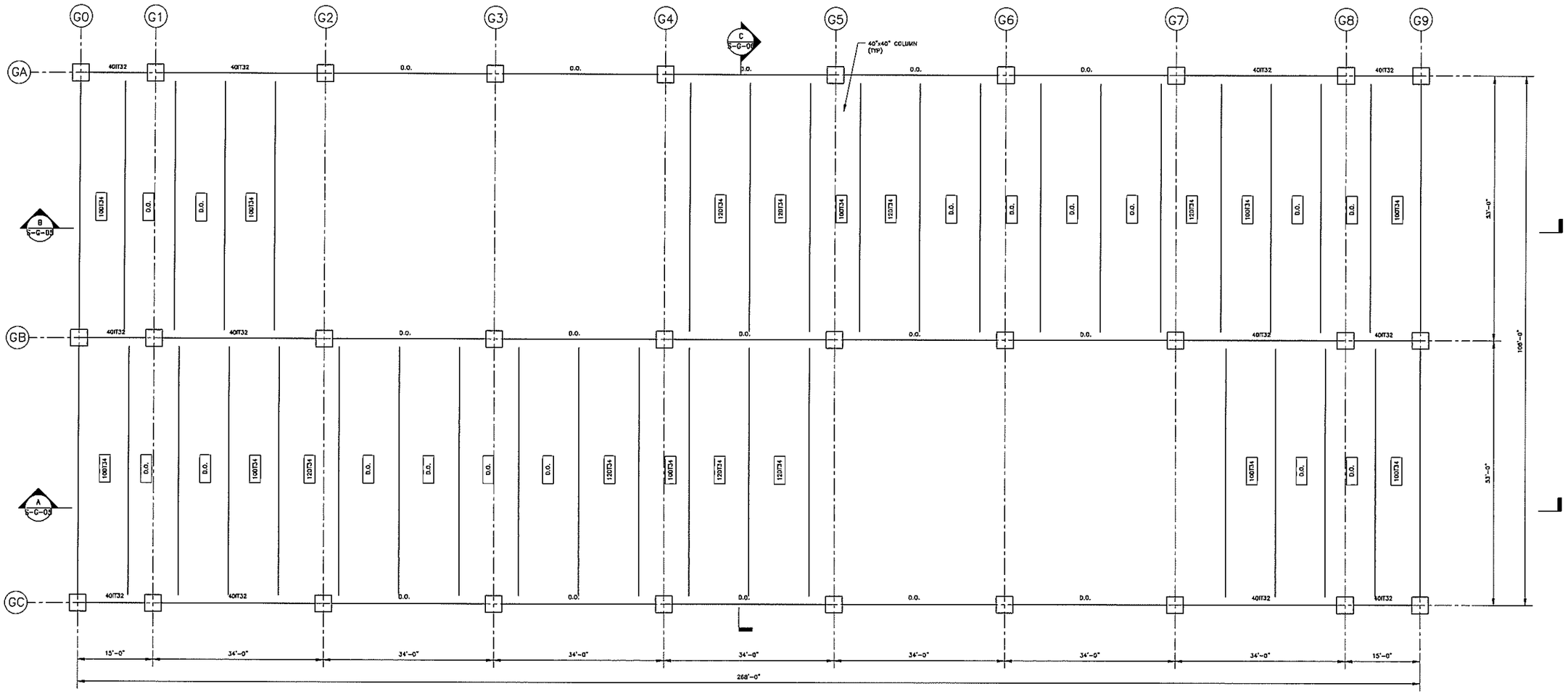
ENGINEER / ARCHITECT
AECOM

Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:

Project Manager Date

HORIZ: 3/32"=1'-0"	DESIGN BY:	DRAWN BY:	CHECK BY:	PLAN NUMBER:	ISSUE
VERT: 3/32"=1'-0"					0
DATE: JUNE 2012	KM	RJS	WBT	SHEET: S-G-02	



1 PLAN – ROOF LEVEL
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

GARAGE PLAN
SHEET 3 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

0 4 8 16 32 FEET
GRAPHIC SCALE

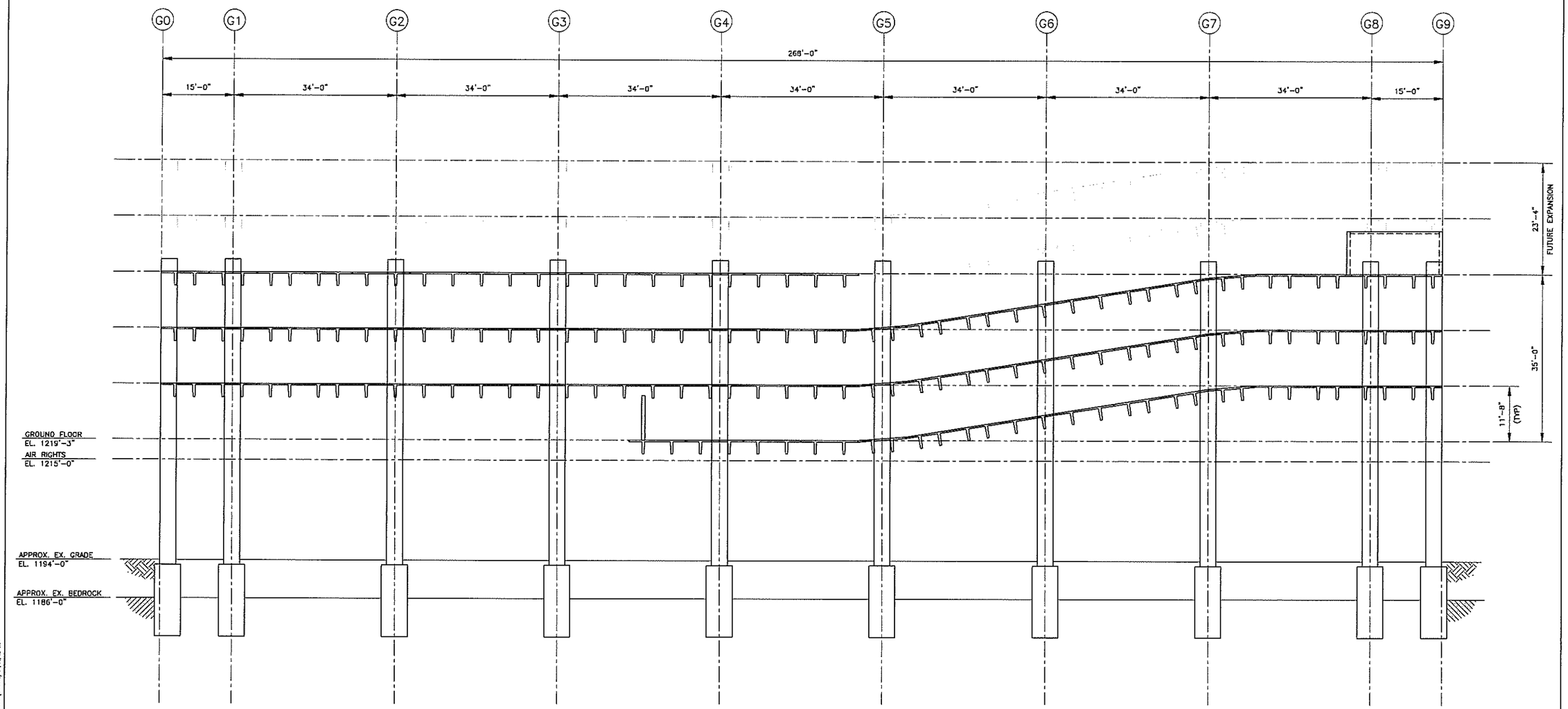
ENGINEER / ARCHITECT:
AECOM

Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:

Project Manager Date

HORIZ: 3/32"=1'-0"	DESIGN BY:	DRAWN BY:	CHECK BY:	PLAN NUMBER:	ISSUE
VERT: 3/32"=1'-0"	KM	RJS	WBT	SHEET: S-G-03	0
DATE: JUNE 2012					



A ELEVATION
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

ELEVATION - SHEET 1 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

0 4 8 16 32 FEET
GRAPHIC SCALE

ENGINEER / ARCHITECT:
AECOM

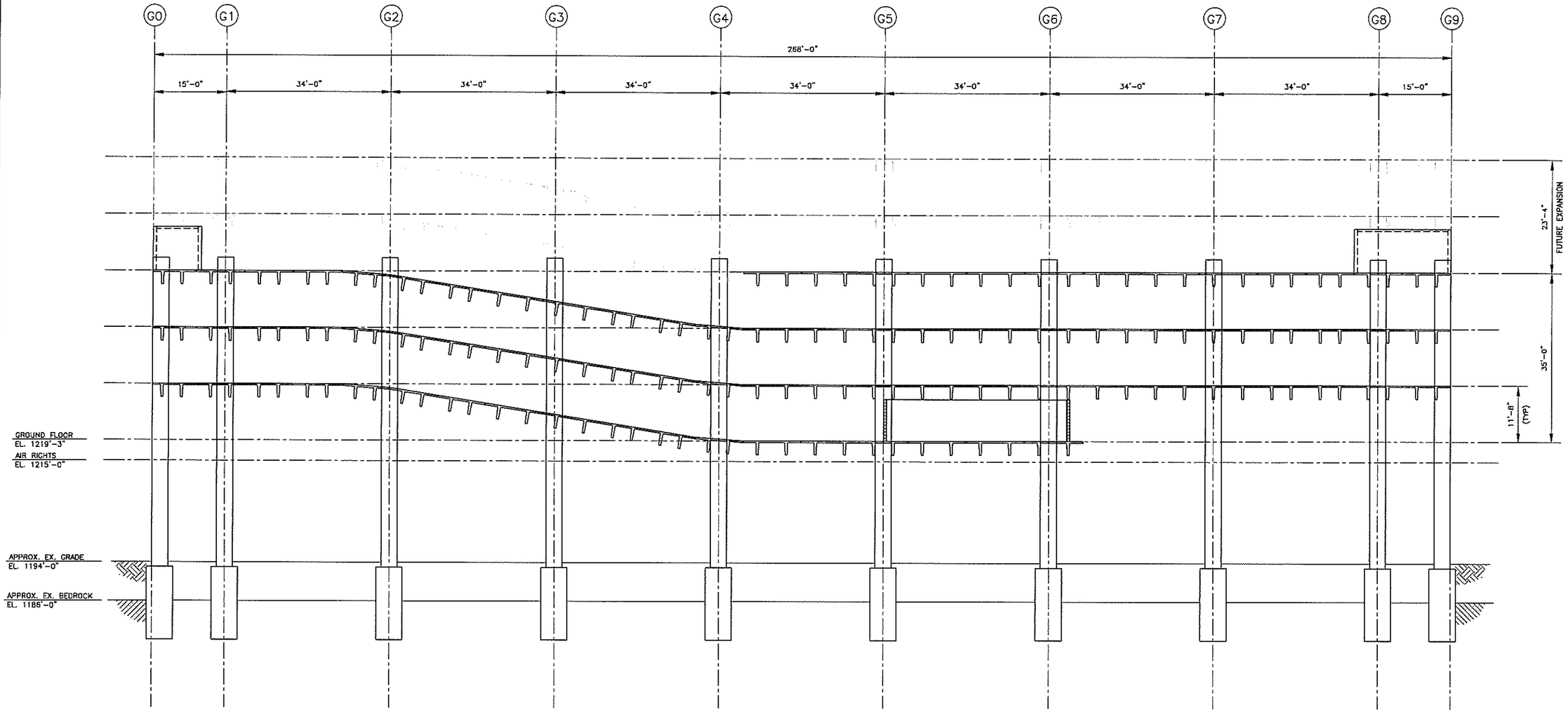
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:

Project Manager Date

HORIZ: 3/32"=1'-0"	DESIGN BY:	DRAWN BY:	CHECK BY:	PLAN NUMBER:	ISSUE
VERT: 3/32"=1'-0"	KM	RJS	WBT	SHEET: S-G-04	0
DATE: JUNE 2012					

PLOTTED: 07/03/12 1:25PM BY:SALDANAR
DRAWING: J:\PROJECTS\60210003 SHRD MT LEBANON PITTSBURGH\CAD\S\SHEETS\S-G-04 - GARAGE ELEVATION - SHEET 1 OF 3.DWG [LAYOUT1] 07/02/12 9:54



B ELEVATION
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

ELEVATION - SHEET 2 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

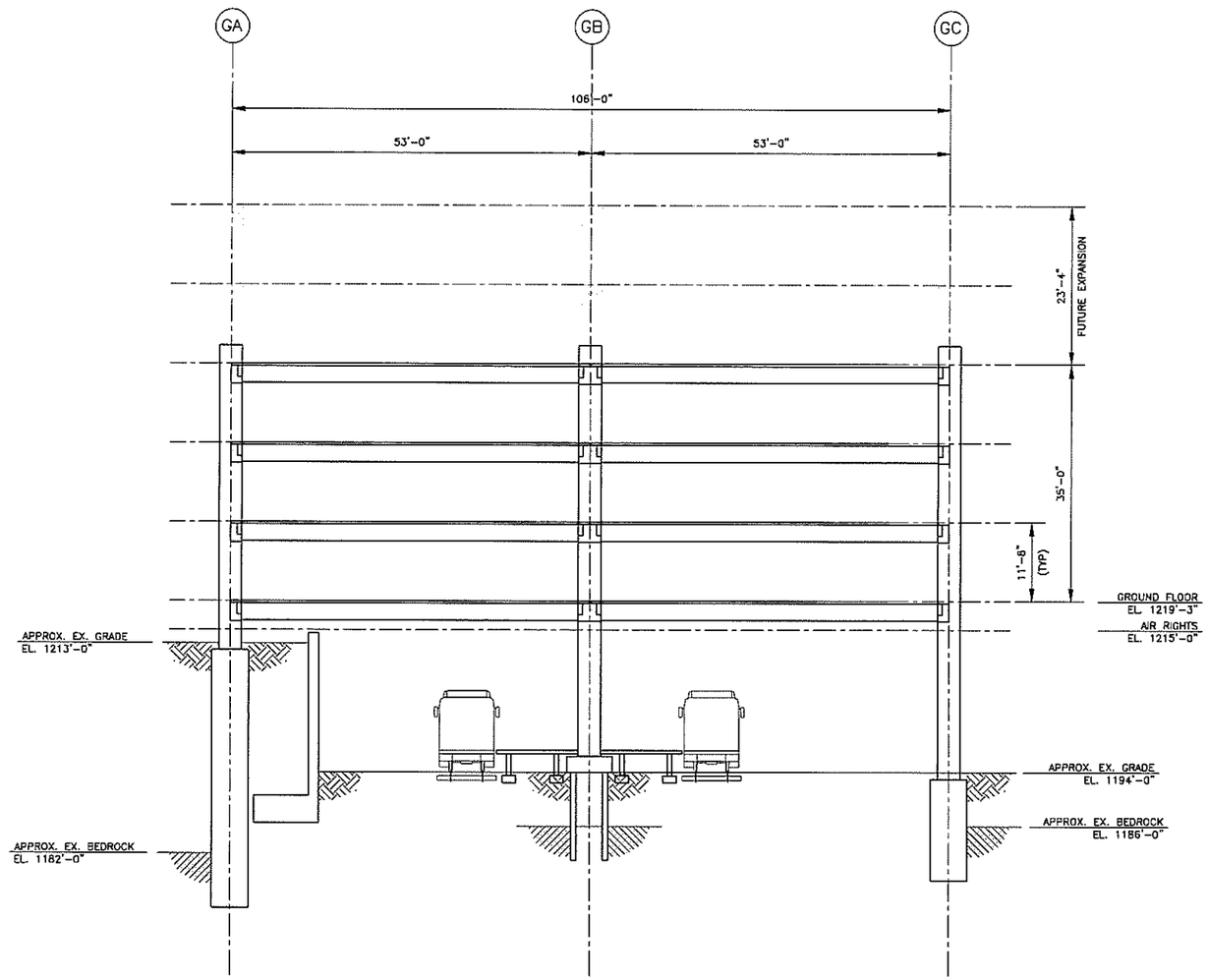
0 4 8 16 32 FEET
GRAPHIC SCALE

ENGINEER / ARCHITECT.
AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:
Project Manager Date

HORIZ: 3/32"=1'-0"	DESIGN BY:	DRAWN BY:	CHECK BY:	PLAN NUMBER:	ISSUE
VERT: 3/32"=1'-0"	KM	RJS	WBT	SHEET: S-G-05	0
DATE: JUNE 2012					

PLOTTED: 07/02/12 1:25PM BY:SOLLENNER
DRAWING: J:\PROJECTS\60216005 SHRND MT LEBANON PITTSBURGH\CAD\S\SHEETS\S-G-05 - GARAGE ELEVATION - SHEET 2 OF 3.DWG [LAYOUT1] 07/02/12 9:54



C ELEVATION
3/32"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA

TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE

CONTRACT NO: MOUNT LEBANON, PA

ELEVATION - SHEET 3 OF 3

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

ENGINEER / ARCHITECT: AECOM

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:

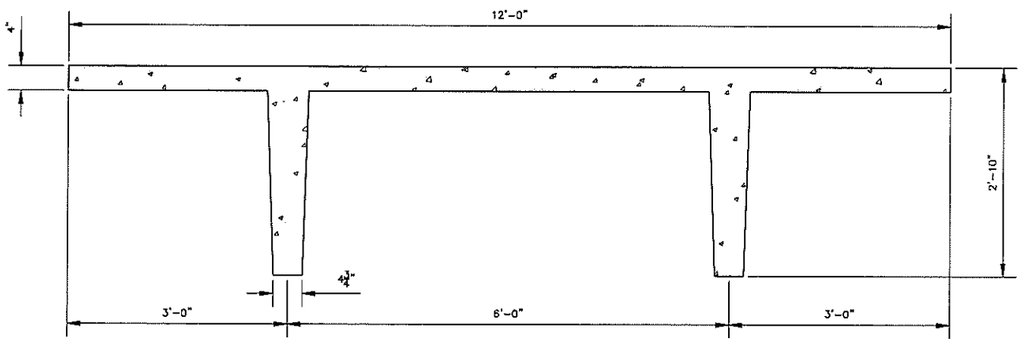
Project Manager Date

Project Manager Date

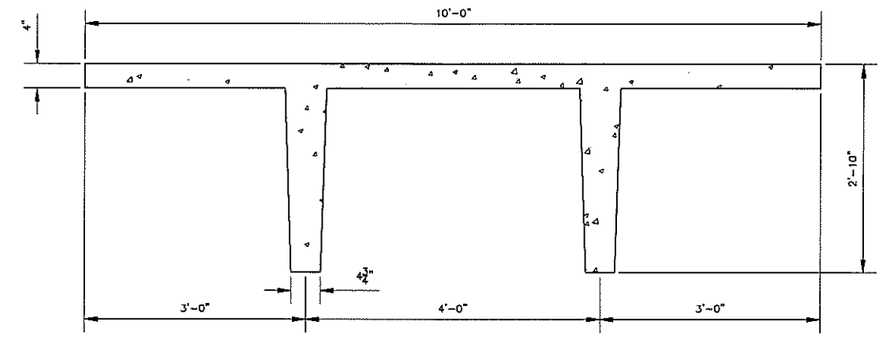
0 4 8 16 32 FEET
GRAPHIC SCALE

HORIZ: 3/32"=1'-0"	DESIGN BY:	DRAWN BY:	CHECK BY:	PLAN NUMBER:	ISSUE
VERT: 3/32"=1'-0"	KM	RJS	WBT	SHEET: S-G-06	0
DATE: JUNE 2012					

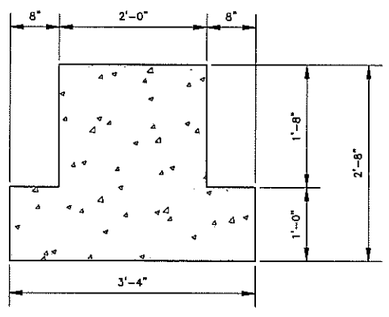
PLOTTED: 07/03/12 1:25PM BY:SALUNAR
DRAWING: J:\PROJECTS\60216003 SHIRO MT LEBANON PITTSBURGH\CAD\S\SHEETS\S-G-06 - GARAGE ELEVATION - SHEET 3 OF 3.DWG [LAYOUT1] 07/02/12 9:54



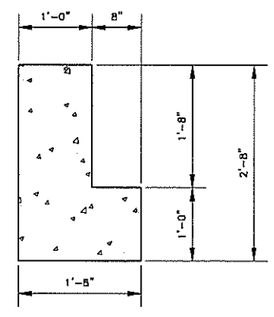
1 DETAIL – TYPICAL 12'-0" DOUBLE-TEE
3/4"=1'-0"



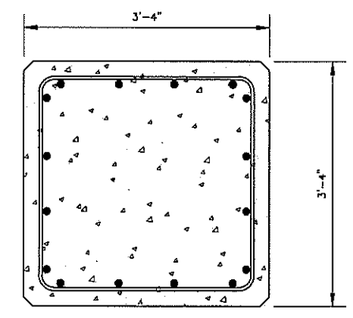
2 DETAIL – TYPICAL 10'-0" DOUBLE-TEE
3/4"=1'-0"



3 DETAIL – TYPICAL INVERTED TEE BEAM
3/4"=1'-0"



4 DETAIL – TYPICAL SPANDREL BEAM
3/4"=1'-0"



5 DETAIL – TYPICAL 40"x40" COLUMN
3/4"=1'-0"

NOT FOR CONSTRUCTION

MUNICIPALITY OF MOUNT LEBANON, PA
TRID PRELIMINARY ENGINEERING
AIR RIGHTS PARKING GARAGE
CONTRACT NO: MOUNT LEBANON, PA

DETAILS

ISSUE	DESCRIPTION	DRAWN BY:	CHECK BY:	APRVD BY:

ENGINEER / ARCHITECT:
AECOM
Project Manager Date

MUNICIPALITY OF MOUNT LEBANON, PA
APPROVED BY:
Project Manager Date

0 4 8 16 32 FEET
GRAPHIC SCALE

HORIZ: AS SHOWN
VERT: AS SHOWN
DATE: JUNE 2012

DESIGN BY:	DRAWN BY:	CHECK BY:
KM	RJS	WBT

PLAN NUMBER:
SHEET: S-G-07
ISSUE 0

PLOTTED: 07/29/12 1:52PM BY:SULLIVAN
DRAWING: J:\PROJECTS\0218\0009 SHIRO M LEBANON PITTSBURGH\CAD\S\SHEETS\S-G-07 - GARAGE DETAILS.DWG [JAMES] 07/29/12 9:54AM

AECOM
SHACOG
Mt. Lebanon TOD Estimate
Project No. 60218088
6/13/2012
Air Rights and Parking Garage Estimate

MADE BY: KS DATE: 6/11/2012
CHKD BY: WT DATE: 6/13/2012

	Description			Amount
20.05	Joint development			$ 7,478,541
20.06	Automobile parking multi-story structure			$ 8,225,309
20.07	Elevators, escalators			$ 6,087,123
40.01	Demolition, Clearing, Earthwork			$ 221,443
40.02	Site Utilities, Utility Relocation			$ 179,532
40.03	Haz. Mat'l, contam'd soil removal/mitigation, ground water treatments			$ 75,600
40.05	Site structures including retaining walls, sound walls			$ 308,546
40.06	Pedestrian/bike access and accommodation, landscaping			$ 214,737
40.07	Automobile, bus, van accessways including roads, parking lots			$ 314,062
40.08	Temporary facilities and other indirect costs during construction			$ 3,460,952
SUBTOTAL SCC CATEGORIES 10-50		**(Construction Cost)**		**$ 26,565,845**
60.01	Purchase or lease of real estate			$ -
80.00	**PROFESSIONAL SERVICES (SCC CATEGORIES 10 - 50)**	**25.00%**		
80.01	Preliminary Engineering	2.40%		$ 637,580
80.02	Final Design	7.00%		$ 1,859,609
80.03	Project Management for Design and Construction	2.00%		$ 531,317
80.04	Construction Administration & Management	8.00%		$ 2,125,268
80.05	Professional Liability and other non Construction Insurance	2.60%		$ 690,712
80.06	Legal; Permits; Review Fees by other agencies, cities, etc.	1.75%		$ 464,902
80.07	Surveys, Testing, Investigation, Inspection	0.85%		$ 225,810
80.08	Start-up	0.40%		$ 106,263
SUBTOTAL SCC CATEGORIES 10-80				$ 33,207,306
90.00	**Contingency (Unallocated)**	5%		$ 1,660,365
	Escalation Factor (2.5%) Annually (to mid-point of construction)		21 mo. to mid-point 4.4%	$1,525,461
	***GRAND TOTAL* (Program Cost Estimate)**			**$36,393,132**

Cost Estimating Assumptions:
Estimates are prepared using current dollars (2012)
Adequate experienced craft labor is available
Normal productivity rates as historically experienced are utilized
Compatible trade agreements exist in the region
No strike impacts will be experienced by the project
There are sufficient experienced contractors available to perform said work
Normal Pittsburgh area weather impacts to constructions schedule
Existing state of the art construction technology will be utilized
Assumes cooperation between stakeholders

Total SF	
52,888	sf of Air Rights
$688.12	/sf for all work
$502.30	/sf for all construction work
$346.78	/sf for all air rights construction work less elevated garage
$231.69	/sf for all air rights construction work less garage & elevators

All opinions of probable project costs are projections based on AECOM's analysis as of the effective date of the estimate and are based, in part, upon information provided to AECOM upon which AECOM has a right to rely. Accordingly, such opinions may not be valid in other time periods or as conditions change. AECOM assumes no responsibility for events, conditions, or circumstances affecting the project over which AECOM has no control or that occur subsequent to the effective date of its estimate. All opinions of probable project costs provided herein are based, in part, on comparable project cost data upon which AECOM has a right to rely. Estimates based, whether in whole or in part, upon such data are subject to the accuracy of such information. Moreover, AECOM's opinions of probable project costs are based on estimates and assumptions, which are inherently subject to uncertainty and variation depending upon evolving events. All opinions and estimates expressed herein represent AECOM's reasonable judgment and should not be construed as advice or recommendation to act in any way. Any actions taken by Client should be based on its own judgment and its decision process should consider many factors other than just AECOM's opinion of probable project costs and information provided herein. No third party shall have any right to rely upon the information or opinions expressed herein.

With respect to opinions of probable construction costs, neither AECOM nor Client has control over (a) the cost of labor, materials or equipment, (b) construction contractors' methods of determining bid prices, (c) competitive bidding, market or negotiating conditions, or (d) any other circumstances that are beyond AECOM's or Client's reasonable control. Accordingly, AECOM cannot and does not warrant or represent that bids or negotiated prices will not vary from Client's project budget or from any opinion of probable construction costs or evaluation prepared or agreed to by AECOM.

AECOM
SHACOG
Mt. Lebanon TOD Estimate

MADE BY: KS DATE: 6/11/2012
CHKD BY: WT DATE: 6/13/2012

Project No. 60218088
Air Rights and Parking Garage Estimate
6/13/2012

PAGE: C-2 DF 14
Date Printed: 7/3/2012

20.05 Joint Development

Description	Quantity	Units	Material: Unit Price	Material: Material Subtotal	Labor: Labor Productivity	Labor: Labor Hours	Labor: Average Labor Rate	Labor: Labor Cost	Equipment: Equipment Productivity	Equipment: Equipment Unit Rate	Equipment: Equipment Subtotal	Total Cost	Comments
Commercial & Garage Deck TOD Area													
						-	$0.00	$ -			$ -	$ -	
CSL Pipes (assume PVC; 2" diameter; 3 per shaft with a cap)	3684	LF	$ 2.50	$ 9,210	0.072	266	$32.32	$ 8,583	0.000	$ 300	$ -	$ 17,793	Includes placing water in tubes
Ultrasonic Transmitter	1	LS	$ -	$ -	0.000	-	$120.00	$ -	1.000	$ 2,000	$ 2,000	$ 2,000	
Probes	1	LS	$ -	$ -	0.000	-	$120.00	$ -	1.000	$ -	$ -	$ -	Included in the above equipment
Depth Sensors	1	LS	$ -	$ -	0.000	-	$120.00	$ -	1.000	$ -	$ -	$ -	Included in the above equipment
Testing Engineer Field Work	1	LS	$ -	$ -	8.000	40	$120.00	$ 4,800	1.000	$ 500	$ 500	$ 5,300	
Test Data Reports	1	LS	$ -	$ -	12.000	60	$120.00	$ 7,200	1.000	$ 1,900	$ 1,900	$ 9,100	Reports
CSL Pipes Supporting Rebar beyond 25'	0	lbs	$ 0.50	$ -	0.020	-	$34.83	$ -	0.0010	$ 1,000	$ -	$ -	
Grouting Tubes after Testing Results	74.0	cf	$ 120	$ 8,884	0.020	4	$42.67	$ 171	0.1000	$ 300	$ 2,221	$ 11,276	
Load Testing	1	LS	$ 150,000	$ 150,000	0.000	-	$120.00	$ -	0.000	$ 500	$ -	$ 150,000	
Caisson Rebar	237,583	lbs	$ 0.50	$ 118,792	0.008	1,782	$42.67	$ 76,032	0.0001	$ 1,000	$ 23,758	$ 218,582	Includes CSL tube support rebar
Caisson Concrete (Including Drilling)	938	cy	$ 150.00	$ 140,700	3.000	2,814	$51.83	$ 145,838	0.021	$ 2,000	$ 40,000	$ 326,538	
Caisson Casing	614	lf	$ 120.00	$ 73,680	1.000	614	$55.79	$ 34,253	0.0200	$ 2,000	$ 24,560	$ 132,493	Assume 1/2 total length of caissons
Deck Concrete	1,189	cy	$ 150.00	$ 178,376	7.000	8,324	$51.83	$ 431,410	0.0001	$ 1,000	$ 119	$ 609,905	Assumes 10" thick
Deck Rebar	142,701	lbs	$ 0.50	$ 71,350	0.012	1,712	$42.67	$ 73,068	0.0001	$ 1,000	$ 14,270	$ 158,689	
Floor Decking	38,684	sf	$ 5.00	$ 193,420	0.015	580	$53.01	$ 30,762	0.0001	$ 1,000	$ 3,868	$ 228,051	
Columns	117,671	lbs	$ 2.00	$ 235,343	0.008	981	$41.69	$ 40,881	0.0002	$ 2,000	$ 47,069	$ 323,293	
Concrete Columns - Rebar	63,942	lbs	$ 0.50	$ 31,971	0.010	639	$53.01	$ 33,899	0.0001	$ 1,000	$ 6,394	$ 72,264	
Concrete Columns - Concrete	246	cy	$ 150.00	$ 36,963	6.000	1,479	$51.83	$ 76,626	0.081	$ 1,000	$ 20,000	$ 133,589	
Plate Girders	686,297	lbs	$ 1.80	$ 1,235,334	0.003	2,059	$53.01	$ 109,151	0.0001	$ 5,000	$ 171,574	$ 1,516,060	
Floor Beams	282,292	lbs	$ 1.80	$ 508,126	0.010	2,823	$53.01	$ 149,656	0.0001	$ 1,000	$ 28,229	$ 686,011	
Bracing	187,920	lbs	$ 1.80	$ 338,256	0.010	1,879	$53.01	$ 99,625	0.0001	$ 1,000	$ 18,792	$ 456,673	
Stairways	119	vif	$ 1,085.00	$ 129,115	0.005	-	$53.01	$ -	0.0000	$ 1,000	$ -	$ 129,115	Except Elevated Garage Portion
Signage	160	sf	$ 150.00	$ 24,000	1.000	160	$53.81	$ 8,609	0.0100	$ 1,000	$ 1,600	$ 34,209	Except Elevated Garage Portion
Drainage Piping	1,448	lf	$ 40.00	$ 57,920	0.400	579	$66.59	$ 38,572	0.0050	$ 1,000	$ 7,240	$ 103,732	Except Elevated Garage Portion
Lighting	52,888	sf	$ 18.00	$ 951,984	0.020	1,058	$69.65	$ 73,675	0.0003	$ 1,000	$ 15,866	$ 1,041,525	Except Elevated Garage Portion
Patching Mt. Lebanon Platform	18	cy	$ 150.00	$ 2,667	12.000	213	$51.83	$ 11,056	0.200	$ 1,000	$ 3,556	$ 17,278	
Garage Above Deck Level	-	sf	$ -	$ -	0.005	-	$74.65	$ -	0.0001	$ 1,000	$ -	$ -	See 20.06
	-	lbs	$ -	$ -	0.005	-	$63.71	$ -	0.0001	$ 1,000	$ -	$ -	
	-	lbs	$ -	$ -	0.005	-	$63.71	$ -	0.0001	$ 1,000	$ -	$ -	
	-	lbs	$ -	$ -	0.005	-	$63.71	$ -	0.0001	$ 1,000	$ -	$ -	
	0	lbs	$ -	$ -	0.067	-	$53.01	$ -	0.0033	$ 800	$ -	$ -	
				$ 4,496,091		28066		$ 1,453,867			$ 433,517		
Sales Tax	Sales Tax Rate		7%									$ 314,726	
Subtotal												$ 6,698,201	
Subcontracting Mark-Up	5%	Assume	30%	is subcontracted								$ 100,473	
Allocated Contingency	10%											$ 679,867	
Total Cost												$ 7,478,541	

AECOM
SHACOG
Mt. Lebanon TOD Estimate

MADE BY: KS DATE: 6/11/2012
CHKD BY: WT DATE: 6/13/2012

Project No. 60218088
Air Rights and Parking Garage Estimate
6/13/2012

Date Printed: 7/3/2012

20.06 Parking Structure

Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
				Material		Labor			Equipment				
New Work													
		hrs				-	$0.00	$ -			$ -	$ -	
Parking Structure - Complete	85,224	SF	$ 80.00	$ 6,817,920	0.000	-	$32.32	$ -	0.000	$ 300	$ -	$ 6,817,920	Above 1215' - 0"; RS Means 2012
		LS	$ -	$ -	0.000	-	$120.00	$ -	1.000	$ 500	$ -	$ -	
				$ 6,817,920		0		$ -			$ -		
Sales Tax	Sales Tax Rate		7%									$ 477,254	
Subtotal												$ 7,295,174	
Subcontracting Mark-Up	5%	Assume	50%	is subcontracted								$ 182,379	
Allocated Contingency	10%											$ 747,755	
Total Cost												$ 8,225,309	

AECOM
SHACOG
Mt. Lebanon TOD Estimate

MADE BY: KS DATE: 6/11/2012
CHKD BY: WT DATE: 6/13/2012

Project No. 60218088
Air Rights and Parking Garage Estimate
6/13/2012

Date Printed 7/3/2012

20.07 Elevators & Escalators

			Material		Labor				Equipment				
Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
		hrs				-	$0.00	$ -			$ -	$ -	
Commercial Section	4	ea	$ 675,000	$ 2,700,000	0.000	-	$32.32	$ -	0.000	$ 300	$ -	$ 2,700,000	Kone unit prices
Parking Garage to 1219'	2	ea	$ 630,000	$ 1,260,000	0.000	-	$120.00	$ -	0.000	$ 500	$ -	$ 1,260,000	
Parking Garage Above 1219'	2	ea	$ 600,000	$ 1,200,000	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ 1,200,000	
				$ 5,160,000		0		$ -			$ -		
Sales Tax	Sales Tax Rate		7%									$ 361,200	
Subtotal												$ 5,521,200	
Subcontracting Mark-Up	5%	Assume	100%	is subcontracted								$ 276,060	
Allocated Contingency	5%											$ 289,863	
Total Cost												$ 6,087,123	

AECOM
SHACOG
Mt. Lebanon TOD Estimate
Project No. 60218088

MADE BY: KS DATE: 6/11/2012
CHKD BY: WT DATE: 6/13/2012

Date Printed 7/3/2012

Air Rights and Parking Garage Estimate
6/13/2012

40.01 Demolition, Clearing, Earthwork

Description	Quantity	Units	Material Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				480	$72.67	$ 34,882			$ -	$ 34,882	
Demolition Along Edges of Work Area	1	LS	$ -	$ -	0.072	1,600	$53.59	$ 85,747	0.000	$ 300	$ -	$ 85,747	
Demolition of Parking Area	1	LS	$ -	$ -	0.000	200	$53.59	$ 10,718	1.000	$ 500	$ 500	$ 11,218	
Demolition Parse Way	1	LS	$ -	$ -	0.000	400	$53.59	$ 21,437	1.000	$ -	$ -	$ 21,437	
E&S Controls	1	LS	$ 25,000	$ 25,000	0.000	-	$53.59	$ -	1.000	$ -	$ -	$ 25,000	
				$ 25,000		2680		$ 152,785			$ 500		
Sales Tax	Sales Tax Rate		7%									$ 1,750	
Subtotal												$ 180,035	
Subcontracting Mark-Up	5%	Assume	50%	is subcontracted								$ 4,501	
Allocated Contingency	20%											$ 36,907	
Total Cost												$ 221,443	

AECOM
SHACOG
Mt. Lebanon TOD Estimate

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40.02 Site Utilities & Relocations

			Material		Labor				Equipment				
Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				480	$72.67	$ 34,882			$ -	$ 34,882	
Storm Drainage Lines	1088	LF	$ 80	$ 87,040	0.000	-	$32.32	$ -	0.000	$ -	$ -	$ 87,040	Allowances
Telephone/Communication Lines	544	LS	$ 60	$ 32,640	0.000	-	$120.00	$ -	0.000	$ -	$ -	Allowances	Allowances
Water Lines	544	LS	$ 120	$ 65,280	0.000	-	$120.00	$ -	0.000	$ -	$ -	Allowances	Allowances
Electrical Lines	1088	LS	$ 100	$ 108,800	0.000	-	$120.00	$ -	0.000	$ -	$ -	Allowances	Allowances
	1	LS	$ -	$ -	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ -	
				$ 293,760		480		$ 34,882			$ -		
Sales Tax	Sales Tax Rate		7%									$ 20,563	
Subtotal												$ 142,485	
Subcontracting Mark-Up	5%	Assume	100%	is subcontracted								$ 7,124	
Allocated Contingency	20%											$ 29,922	
Total Cost												$ 179,532	

AECOM
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40.03 Contaminated Material Handling

Description	Quantity	Units	Material: Unit Price	Material: Material Subtotal	Labor: Labor Productivity	Labor: Labor Hours	Labor: Average Labor Rate	Labor: Labor Cost	Equipment: Equipment Productivity	Equipment: Equipment Unit Rate	Equipment: Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				-	$72.67	$ -			$ -	$ -	
Contaminated Water	1	LS	$ 20,000	$ 20,000	0.000	-	$32.32	$ -	0.000	$ -	$ -	$ 20,000	Allowances
Contaminated Soil	1	LS	$ 40,000	$ 40,000	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ 40,000	Allowances
	0	LS	$ -	$ -	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ -	
				$ 60,000		0		$ -			$ -		
Sales Tax	Sales Tax Rate		0%									$ -	
Subtotal												$ 60,000	
Subcontracting Mark-Up	5%	Assume	100%	is subcontracted								$ 3,000	
Allocated Contingency	20%											$ 12,600	
Total Cost												$ 75,600	

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40.05 Site Structures, Retaining Walls, etc.

Description	Quantity	Units	Material Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				-	$72.67	$ -			$ -	$ -	
Retaining Walls	16,320	SF	$ 5.56	$ 90,667	0.296	4,836	$32.32	$ 156,308	0.000	$ 300	$ -	$ 246,975	
	0	LS	$ -	$ -	0.000	-	$120.00	$ -	0.000	$ 500	$ -	$ -	
				$ 90,667		4836		$ 156,308			$ -		
Sales Tax	Sales Tax Rate		7%									$ 6,347	
Subtotal												$ 253,322	
Subcontracting Mark-Up	5%	Assume	30%	is subcontracted								$ 3,800	
Allocated Contingency	20%											$ 51,424	
Total Cost												$ 308,546	

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Mt. Lebanon TOD Estimate
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Air Rights and Parking Garage Estimate
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40.06 Pedestrian Access, Bikes, Landscaping

			Material		Labor				Equipment				
Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				40	$72.67	$ 2,907			$ -	$ 2,907	
Sidewalks	4,080	sf	$ 6.00	$ 24,480	0.000	-	$32.32	$ -	0.000	$ 300	$ -	$ 24,480	Includes placing water in tubes
Bike Racks	20	ea	$ 800.00	$ 16,000	0.000	-	$120.00	$ -	0.000	$ 500	$ -	$ 16,000	
Landscaping	16,320	sf	$ 8.00	$ 130,560	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ 130,560	Included in the above equipment
	0	LS	$ -	$ -	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ -	Included in the above equipment
				$ 171,040		40		$ 2,907			$ -		
Sales Tax	Sales Tax Rate		7%									$ 11,973	
Subtotal												$ 185,920	
Subcontracting Mark-Up	5%	Assume	100%	is subcontracted								$ 9,296	
Allocated Contingency	10%											$ 19,522	
Total Cost												$ 214,737	

AECOM
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40.07 Roads, Parking Lots, Curbs

Description	Quantity	Units	Material Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
Foreman		hrs				-	$72.67	$ -			$ -	$ -	
Parse Way Repavement	14,400	sf	$ 9.00	$ 129,600	0.000	-	$32.32	$ -	0.000	$ 300	$ -	$ 129,600	Includes line striping
Parking Lot	8,000	sf	$ 9.00	$ 72,000	0.000	-	$120.00	$ -	0.000	$ 500	$ -	$ 72,000	Includes line striping
Concrete Curbs	1,800	LS	$ 25.00	$ 45,000	0.000	-	$120.00	$ -	0.000	$ -	$ -	$ 45,000	
				$ 246,600		0		$ -			$ -		
Sales Tax	Sales Tax Rate		7%									$ 17,262	
Subtotal												$ 263,862	
Subcontracting Mark-Up	5%	Assume	70%	is subcontracted								$ 9,235	
Allocated Contingency	15%											$ 40,965	
Total Cost												$ 314,062	

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Mt. Lebanon TOD Estimate

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40.08 Temporary Controls, Indirect Construction Costs

Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
			Material		Labor				Equipment				
New Work													
		hrs				-	$72.67	$ -			$ -	$ -	
Project Manager	18	mo.	$ -	$ -	1.000	18	$20,131	$ 362,354	0.000	$ 300	$ -	$ 362,354	Includes placing water in tubes
Field Office Trailers	18	mo.	$ -	$ -	0.000	-	$120	$ -	1.000	$ 1,000	$ 18,000	$ 18,000	
Construction Equipment	18	mo.	$ -	$ -	1.000	18	$120	$ 2,160	1.000	$ 1,500	$ 27,000	$ 29,160	Included in the above equipment
Shift Foreman	36	mo.	$ -	$ -	1.000	36	$11,627	$ 418,588	0.000	$ -	$ -	$ 418,588	Included in the above equipment
Field Equipment	18	mo.	$ -	$ -	0.000	-	$120	$ -	1.000	$ 500	$ 9,000	$ 9,000	Assumes performing all 3 on the same day
Field Engineer	18	mo.	$ -	$ -	1.000	18	$14,704	$ 264,676	0.000	$ 1,900	$ -	$ 264,676	Assumes one report for all 3 tests
Field Testing	5760	hrs	$ -	$ -	1.000	5,760	$32.32	$ 186,191	0.0000	$ 1,000	$ -	$ 186,191	Assumes 37' depth hole
Scheduler	288.0	hrs	$ -	$ -	1.000	288	$91.90	$ 26,468	0.0000	$ 300	$ -	$ 26,468	
Safety Equipment	1	LS	$ 25,000	$ 25,000	0.000	-	$0.00	$ -	0.0000	$ 1,000	$ -	$ 25,000	Includes CSL tube support rebar up to 25'
Traffic Control	1	LS	$ 50,000	$ 50,000		-	$0.00	$ -	0.000		$ -	$ 50,000	
Profit	1	LS	$ 1,200,000	$1,200,000		-	$0.00	$ -	0.000		$ -	$ 1,200,000	
Performance Bond	1	LS	$ 192,000	$ 192,000	0.000	-	$0.00	$ -	0	$ 800	$ -	$ 192,000	
				$1,467,000		6138		########			$ 54,000		
Sales Tax	Sales Tax Rate		7%									$ 102,690	
Subtotal												$ 2,884,127	
Subcontracting Mark-Up	5%	Assume	0%	is subcontracted								$ -	
Allocated Contingency	20%											$ 576,825	
Total Cost												$ 3,460,952	

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			Material		Labor				Equipment				
Description	Quantity	Units	Unit Price	Material Subtotal	Labor Productivity	Labor Hours	Average Labor Rate	Labor Cost	Equipment Productivity	Equipment Unit Rate	Equipment Subtotal	Total Cost	Comments
New Work													
						-	$0.00	$ -		$ -	$ -	$ -	
				$ -		-	$0.00	$ -	0.000	$ -	$ -	$ -	
Allowance	0	LS	$ 100,000	$ -		-	$0.00	$ -	0	$ -	$ -	$ -	
				$ -		0	$ -	$ -			$ -		
Closing Costs			10%									$ -	
Subtotal												$ -	
Condemnation Costs	20%											$ -	
Allocated Contingency	20%											$ -	
Total Cost												$ -	

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Air Rights and Parking Garage Estimate
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CAISSON REBAR

Mark	Diameter	Vertical Reir	Ties	Depth
C30	30	9-#8	#4@12"	10
C36	36	13-#8	#4@12"	10
C42	42	11-#10	#4@12"	10.5
C48	48	15-#10	#4@12"	12
C54	54	15-#10	#4@12"	13.5
C60	60	15-#10	#4@12"	15
C66	66	18-#10	#4@12"	16.5

Bar	Area [SI]
#4	0.2
#8	0.79
#10	1.27

Mark	No. [EA]	Diameter [IN]	Tip Elevation [FT]	Top of Caisson [FT]	Caisson Length [FT]	Vertical Rebar Area Each [SI]	Tie Rebar Area Each [SI]	Rebar Volume Each [CF]	Rebar Weight Total [LBS]	Caisson Concrete Volume - CY	Caisson Depth - FT
C36	9	36.0			14.5	10.27	21.05	3.15	13907.45	34	130.5
C36	10	36.0			10.0	10.27	21.05	2.17	10657.05	26	100
C66	19	66.0			32.5	22.86	39.90	14.16	131868.54	543	617.5
C66	19	66.0			20.0	22.86	39.90	8.72	81149.87	334	380
									237582.91	937.61	1228.00

TOTAL REBAR, CAISSONS = 237,583 LBS 938 1,228

Concrete Deck Areas

120 lbs/cy

	Length - ft	Width - ft	Concrete Depth - ft	Area - sf	Concrete Volume - cy	Rebar - lbs	
Commercial Building	272	90	0.83	24,480	753	90,304	
Parking Garage Area	268	106	0.83	14,204	437	52,397	Includes only 1/2 of area to accommodate up and down ramps
				38,684	1,189	142,701	

Stairways	VF	# of	Combined VF

Commercial TOD Area	33.5	2	67
Parking Garage TOD	26	2	52
			119

Columns	Qty	Height	Width	Length	Rebar	Concrete - cy	Web t - in	Flange t - in	WF Size	Web Area - sf	Flange Area - sf	Weight - lbs
Concrete	10	10	3.33	3.33	10,657	41						
	10	23	3.33	3.33	24,511	94						
	10	27	3.33	3.33	28,774	111						
Tapered	9	33	1.5	4			0.75	1		1188	891	36,353
	9	11	1.5	4			0.75	1		396	297	12,118
WF	9	33							233			69,201
					63,942	246						117,671

Plate Girders	Qty	Length	Width	Depth	Rebar	Concrete - cy	Web t - in	Flange t - in	WF Size	Web Area - sf	Flange Area - sf	Weight - lbs
Plate Girders	9	84	2	7			1.75	2.5		5292	3024	686,297
Floor Beams												
	9	92							31			25,668
	7	272							40			76,160
	3.5	268							40			37,520
	7	268							24			45,024
Floor Joists	15	272							24			97,920
												282,292
Bracing	144	15.0							87.0			187,920

Allegheny County, PA Area Prevailing Wage Labor Rates

2012 1/31/2012

Job Description	Base Rate	Fringe Benefits	% Internal Mark-up	Contractor Mark-Up	Built-Up Rate					
Foreman	$41.12	$16.45	36.75%	0.00%	$72.67	Fringe Benefits	40%	C	Annual Rate	80,000
Plumber	$35.85	$17.57	36.75%	0.00%	$66.59			Prevailing Rate, Allegheny County, PA		
Apprentice (Laborer)	$15.77	$3.99	36.75%	0.00%	$25.56			Prevailing Rate, Allegheny County, PA		
Operator	$28.55	$14.55	36.75%	0.00%	$53.59			Prevailing Rate, Allegheny County, PA		
Laborer	$19.36	$5.85	36.75%	0.00%	$32.32			Prevailing Rate, Allegheny County, PA		
Pipe layer	$27.95	$15.88	36.75%	0.00%	$54.10			Prevailing Rate, Allegheny County, PA		
Driver (Truck)	$26.95	$11.55	36.75%	0.00%	$48.40			Prevailing Rate, Allegheny County, PA		
Bricklayer	$27.95	$15.88	36.75%	0.00%	$54.10			Prevailing Rate, Allegheny County, PA		
Carpenter	$28.77	$12.88	36.75%	0.00%	$52.22			Prevailing Rate, Allegheny County, PA		
Cement Mason	$27.39	$14.37	36.75%	0.00%	$51.83			Prevailing Rate, Allegheny County, PA		
Electrician	$35.76	$20.75	36.75%	0.00%	$69.65			Prevailing Rate, Allegheny County, PA		
Ironworker (Structural)	$26.38	$16.94	36.75%	0.00%	$53.01			Prevailing Rate, Allegheny County, PA		
Painter	$25.72	$14.09	36.75%	0.00%	$49.26			Prevailing Rate, Allegheny County, PA		
Steamfitter	$33.47	$13.92	36.75%	0.00%	$59.69			Prevailing Rate, Allegheny County, PA		
Sheet Metal Installer	$31.58	$21.43	36.75%	0.00%	$64.62			Prevailing Rate, Allegheny County, PA		
Tile Setter	$28.39	$14.44	36.75%	0.00%	$53.26			Prevailing Rate, Allegheny County, PA		
Sign Erector	$26.38	$16.94	36.75%	0.00%	$53.01			Same as Iron Worker		
Drywall Finisher	$26.87	$11.81	36.75%	0.00%	$48.55			Prevailing Rate, Allegheny County, PA		
Balancing Technician	$27.00	$5.00	36.75%	0.00%	$41.92			Prevailing Rate, Allegheny County, PA		
Glazier	$27.98	$18.79	36.75%	0.00%	$57.05			Prevailing Rate, Allegheny County, PA		
Insulation Worker	$35.09	$20.84	36.75%	0.00%	$68.83			Prevailing Rate, Allegheny County, PA		
Wiring System Installer (Cable)	$28.02	$5.00	36.75%	0.00%	$43.32			Prevailing Rate, Allegheny County, PA		
Pile Driver	$30.85	$13.60	36.75%	0.00%	$55.79			Prevailing Rate, Allegheny County, PA		
Pipefitter (Sprinkler)	$32.04	$17.70	36.75%	0.00%	$61.51			Prevailing Rate, Allegheny County, PA		
Roofer	$23.11	$6.30	36.75%	0.00%	$37.90			Prevailing Rate, Allegheny County, PA		
Elevator Mechanic	$42.28	$23.53	36.75%	0.00%	$81.35			Prevailing Rate, Allegheny County, PA		
General Superintendent	$54.47	$21.79	36.75%	0.00%	$96.28	Fringe Benefits	40%	From web site salary.com	Annual Rate	110,000
Assistant Superintendent	$42.09	$16.84	36.75%	0.00%	$74.40	Fringe Benefits	40%	From web site salary.com	Annual Rate	85,000
Project Manager	$56.95	$22.78	36.75%	0.00%	$100.65	Fringe Benefits	40%	From web site salary.com	Annual Rate	115,000
Clerical	$27.24	$10.89	36.75%	0.00%	$48.14	Fringe Benefits	40%	From web site salary.com	Annual Rate	55,000
Scheduler	$52.00	$20.80	36.75%	0.00%	$91.90	Fringe Benefits	40%	From web site salary.com	Annual Rate	105,000
			36.75%	0.00%	$0.00					
			36.75%	0.00%	$0.00					
			36.75%	0.00%	$0.00					
			36.75%	0.00%	$0.00					

% Internal Mark-up includes the following:

Unemployment Tax	7.00%	Unemployment tax rate - Federal
FICA	7.65%	
FUTA	0.80%	Unemployment tax rate - Pennsylvania
Main Office Indirect Costs	0.00%	(Includes owner's compensation, office clerical wages, home office costs,
		corporate, legal & accounting costs, advertising, vehicle expenses,
		association dues, travel and entertainment expenses.) (Included in main contractor overhead)
General Liability Ins	5.00%	
Workman's Compensation	16.30%	RS Means 2012
	36.75%	

APPENDIX A

PORT AUTHORITY OF ALLEGHENY COUNTY
AIR RIGHTS DRAWING
AND
PROJECT INPUT

PARCEL "C"
PHASE III

PARCEL "A"
PHASE II

PARCEL "B"

RETAINING WALL

PLATFORM 210'

℄ P.A.T. L.R.T. RT. TRACK

PHASE I

PHASE II

RETAINING WALL

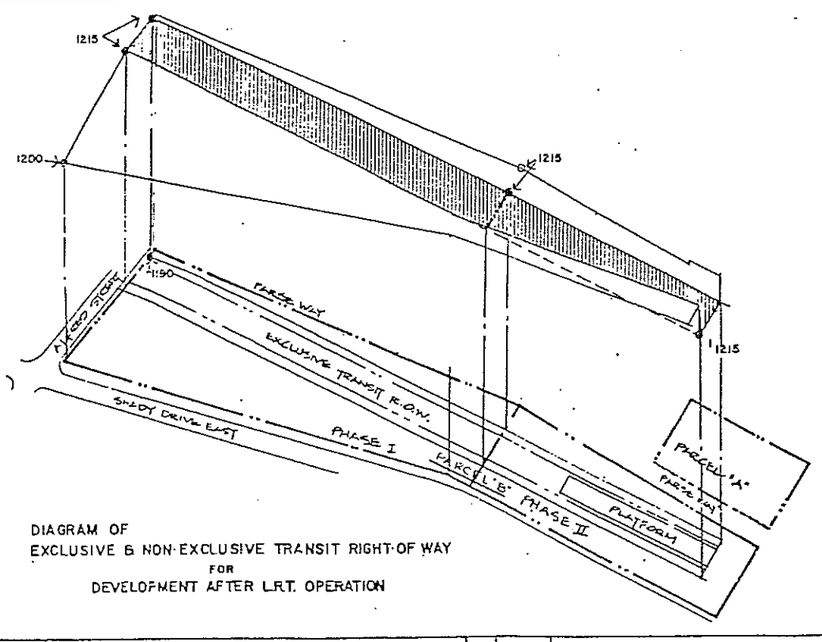
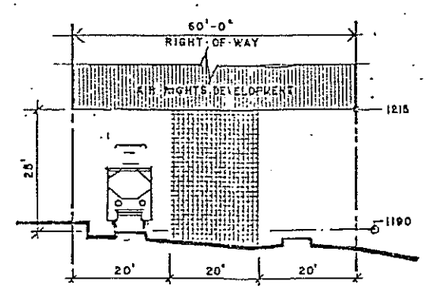


DIAGRAM OF
EXCLUSIVE & NON-EXCLUSIVE TRANSIT RIGHT-OF WAY
FOR
DEVELOPMENT AFTER L.R.T. OPERATION

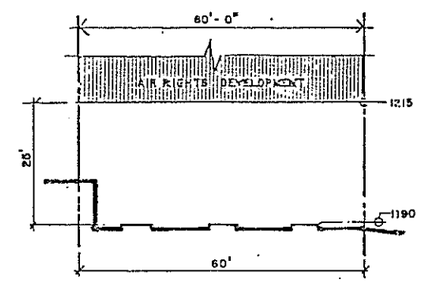
ZONE - MAXIMUM TOUCHDOWN 50% OF LENGTH

2 FT. WIDE ZONE AT PLATFORM CENTER 3 FT. LENGTHS AT 20 FT. CENTERS

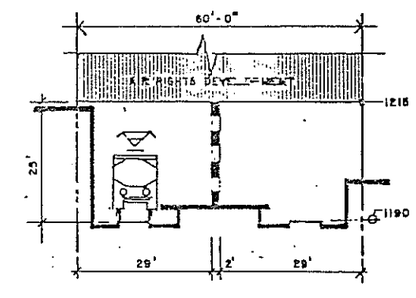
KEY TO AVAILABLE TOUCHDOWN ZONES



SECTION 1



SECTION 2



SECTION 3

POSSIBLE TOUCHDOWN ZONES FOR STRUCTURAL COLUMNS OF AIR RIGHTS DEVELOPMENT

DEVELOPMENT AFTER L.R.T. LINE CONSTRUCTION AND OPERATIONS
PARCEL "B"

No	DATE	DESCRIPTION

REVISIONS

DESIGNED:
DRAWN:
CHECKED:
IN CHARGE:
DATE:
SCALE:

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED, IN PART, THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED

SUBMITTED — DATE

Consulting Engineers
PARSONS BRINCKERHOFF - GIBBS & HILL

APPROVED — DATE

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

EXHIBIT B – SHEET 3 OF 3
MT. LEBANON LIGHT RAIL TRANSIT STATION SITE

PARSONS BRINCKERHOFF - GIBBS & HILL
A JOINT VENTURE
PITTSBURGH, PENNSYLVANIA

CONTRACT NO.
DWG. NO.
SHT.

Port Authority of Allegheny County
Project Input

A. Who - The Port Authority of Allegheny County (PAAC) with headquarters in the Heinz 57 Center (former Gimbels Department Store) 345 Sixth Avenue in downtown Pittsburgh will assign a project representative to final design. The current contact is Eric Bilsky at 412-566-5167 ebilsky@portauthority.org Eric's office is in the Heinz 57 Center on the third floor.

B. What – The PAAC rep will review design and construction areas which affect the PAAC facilities and operations. The facilities affected by the "Parking Garage" design will be the station platform. During construction the columns in the center of the station and construction of the building over the tracks and platform will affect PAAC operations.

The "Mixed Use" building design will affect the east retaining wall foundations. Construction will affect the wall foundations and PAAC operations while placing beams and other platform construction over the tracks.

If the Mt. Lebanon Station design is changed, the designer will use the PAAC Manual of Design Criteria and NFPA 130 Code to ensure the changes meet PAAC requirements. No separate permit is required by the PAAC, thus building codes govern if it is more stringent than the PAAC design criteria.

C. When - The PAAC rep will attend the "Kick-off Meeting" to provide design guidance concerning Air Rights requirements and communication requirements when design personnel are on site taking measurements, surveys, soil boring, and other activities around the tracks. The PAAC requires designers to take a Track Safety Course.

The PAAC rep will not attend all design coordination meetings but will require a copy of each design phase document to review Air Rights compliance, station design changes, and interfaces between current PAAC foundations and new foundations. If the PAAC is concerned about any structural implications, they may have one of their consultants do a study of the design to be sure it will not affect their existing facilities.

D. Where – The PAAC rep will attend meetings at the location where the designer designates. Meetings which apply to PAAC concerns can be scheduled at the PAAC downtown offices. The PAAC rep will make the meeting room arrangements.

E. Why – The PAAC's primary concerns are their operations and safety. These will take priority over all design and construction activities.

F. Construction Coordination - In the Contract Documents the GC will be told (for bidding purposes) what the restrictions will be when working around and over the tracks. Special weekend events when train operation cannot be disrupted will be provided to the designer by the PAAC rep during final design.

The General Contractor (GC) will be required to attend the PAAC Track Allocation Meetings which are held each week on Monday mornings in the South Hills Village LRT Maintenance and Operations Building. The GC will describe what they plan to do on the contract during the week and when they plan to do it. The times for various operations will be discussed and what impact it may have on train operations. If work operations planned are not considered to be a safety problem with train operations, time restrictions will not apply.

General work time constraints are as follows if construction planned will affect train operations:

1. PAAC does not want the project to affect operations during rush hours because the trains on this line (Red Line) operate every 10 minutes thus no work is permitted during these hours.
2. From 9 AM to 3PM and 8 PM to 1 AM the train schedule is between 20 and 30 minutes per train. PAAC will permit construction to be done during this time but will be interrupted when the trains are in the area.
3. From 1 AM to 4:30 AM when the power can be turned off at the catenaries, work can be done without interruption.
4. Weekends when there are not special and/or large events happening downtown, PAAC will provide bus service as an alternate to the LRT service. PAAC may or may not charge for using buses in place of the trains.

G. Safety During Construction – Each member of the construction team who will be on site will be required to take a day long training course at the South Hills Village Light Rail Transit operations center. After passing the final exam each participant will be given a badge to be worn while working at the site.

All personnel will be required to wear reflecting vests and hard hats while working on the project. Track safety personnel will be required to be stationed at each end of the construction site with whistles which they will blow each time a train is approaching the construction area. This warns construction people of the coming train and requires them to move themselves and any equipment away from the tracks far enough to permit safe train passage.

Port Authority
connecting people to life

STEPHEN G. BLAND
Chief Executive Officer
Direct Phone: 412.566.5311
Direct Fax: 412.566.5111

SENT VIA FIRST-CLASS U.S. MAIL, POSTAGE PRE-PAID

July 16, 2012

Mr. Eric Milliron
Economic Development Officer/
Manager of Commercial District Office
Municipality of Mt. Lebanon
710 Washington Rd.
Pittsburgh, PA 15228-2018

RE: South Hills Transit Revitalization Investment District – June 2012 Preliminary Engineering Report Prepared by AECOM

Port Authority's Letter of Support and General Concurrence

Dear Mr. Milliron:

Pursuant to your recent communications with Port Authority's Assistant Director of Capital Programs, Eric Bilsky, P.E., please allow this letter to serve as confirmation that Port Authority has received and reviewed the above-referenced Preliminary Engineering Report prepared by AECOM in an effort to further advance the proposed transit-oriented development of the air rights spanning Port Authority's light rail/T tracks and station between Shady Drive East and Parse Way in the Municipality of Mt. Lebanon.

Based upon this review, Port Authority believes that the proposed development would be a valued project and community enhancement for Mt. Lebanon, Port Authority's T system and the general public. From a long-term operational perspective, it appears that the design would not pose any interference with Port Authority's active transit operations in the area. Accordingly, please allow this letter to confirm Port Authority's support for advancing the project and general concurrence with the preliminary design concepts proposed by AECOM in the report.

However, there are a few issues that Port Authority would like to highlight at this time for Mt. Lebanon and any developer(s) who might undertake implementation and construction of this project to keep in mind:

1. The conceptual design of the parking garage shows the center columns touching down on the station platform along column line GB to be 40" x 40" at 34 feet center to center from column line G1 to G8 and 15 feet center to center from column line G0 to G1 and G8 to G9. The size of the columns is in excess of those stipulated on Exhibit B. The spacing of the columns from column line G0 to G1 and G8 to G9 is less than the spacing stipulated on Exhibit B and the spacing of columns from column line G1 to G8 exceed the spacing stipulated on Exhibit B. Though these conceptual features appear to deviate from the permissible touch down locations shown on Exhibit B, they do not appear to adversely affect Port Authority operations in any manner. However, if the referenced touch down points are utilized, they would appear to fall outside of the current air rights and related ownership interests held by Mt. Lebanon, and the parties would thus need to work together to convey any additional property interests required by Mt. Lebanon during the implementation phase. Such conveyances would be subject to Port Authority Board and Federal Transit Administration review and approval. Additionally, prospective developers should be made aware of the potential need to relocate station platform equipment and related amenities for the Mt. Lebanon T Station, including the fare booth, ticket vending machines, benches, CCTV cameras, platform lighting, utilities and signage.

2. The conceptual layout of the development indicates relocating buses from Parse Way to Shady Drive East. While this should not have an adverse operational impact on Port Authority, the Authority must note that past complaints from residents on Shady Drive East had resulted in Port Authority moving its bus staging from Shady Drive East to Parse Way. This history should be considered in the community informational and public engagement stage of any implementation effort that would involve relocation of Port Authority buses from Parse Way.

3. The conceptual design of the parking garage and the mixed use building both appear to adhere to the air rights vertical clearances stipulated in Exhibit B.

4. It does not appear the mixed use building has any touch down points planned in Port Authority's Right-of-Way.

5. The Structural Design section of the report indicates construction of the parking garage structure may require single track or weekend outages of the light rail system. Port Authority acknowledges and appreciates that operational impacts may be required during the construction phase of any prospective development. To that end, the Authority reserves the right to review and approve any such closures that would be proposed by a prospective developer and to require the developer to enter into an appropriate agreement to provide insurance, indemnity safety and track training and coordination with Port Authority to minimize impacts on Port Authority's operations during construction (which could include reimbursement of out-of-pocket costs incurred by Port Authority as a result of construction efforts).

Again, the foregoing issues can be discussed in more detail and resolved when a developer or developers is identified by Mt. Lebanon and the project proceeds towards final design, implementation and actual construction. Port Authority looks forward to continuing to work with Mt. Lebanon and other relevant stakeholders to further advance this important transit-oriented development effort. Should you have any remaining questions or concerns regarding Port Authority's review of the Preliminary Engineering Report, please contact Mr. Bilsky at 412-566-5167 or via e-mail at EBilsky@PortAuthority.org.

Sincerely,

Stephen G. Bland
Chief Executive Officer

SGB/mjc

cc: J. Brooks, PAAC Board Chairman
E. Bilsky
K. Wargo
B. Miller
W. Stern
M. Cetra
D. Firko
(all via e-mail)

Port Authority of Allegheny County (PAAC)
Project Status Based Upon Letter of July 16, 2012

Letter Items:

1. Conceptual Design of Parking Garage – As stated in the letter Columns G0, G1, G8 and G9 are outside the area stipulated in the Air Rights Drawing. In further discussions with the Port Authority, they did not expect this to be a problem in final design since the columns do not affect the operations in the station nor with the trains. This situation should be addressed early in the design to gain final approval. The alternate solution is to eliminate these center columns and design deeper beams to span across the station at both ends of the building.

   This design does not address specific changes to be made in the Mt Lebanon Station. The cost estimate does provide money for changes in lighting and signage if the existing canopy is eliminated to construct the center columns easier. The items at the end of Item 1 list possible systems which may be changed during the final design process. Since the new garage will cover the station, a new canopy may not be needed if eliminated but the systems supported by the canopy will need to be relocated or revised support designs developed.

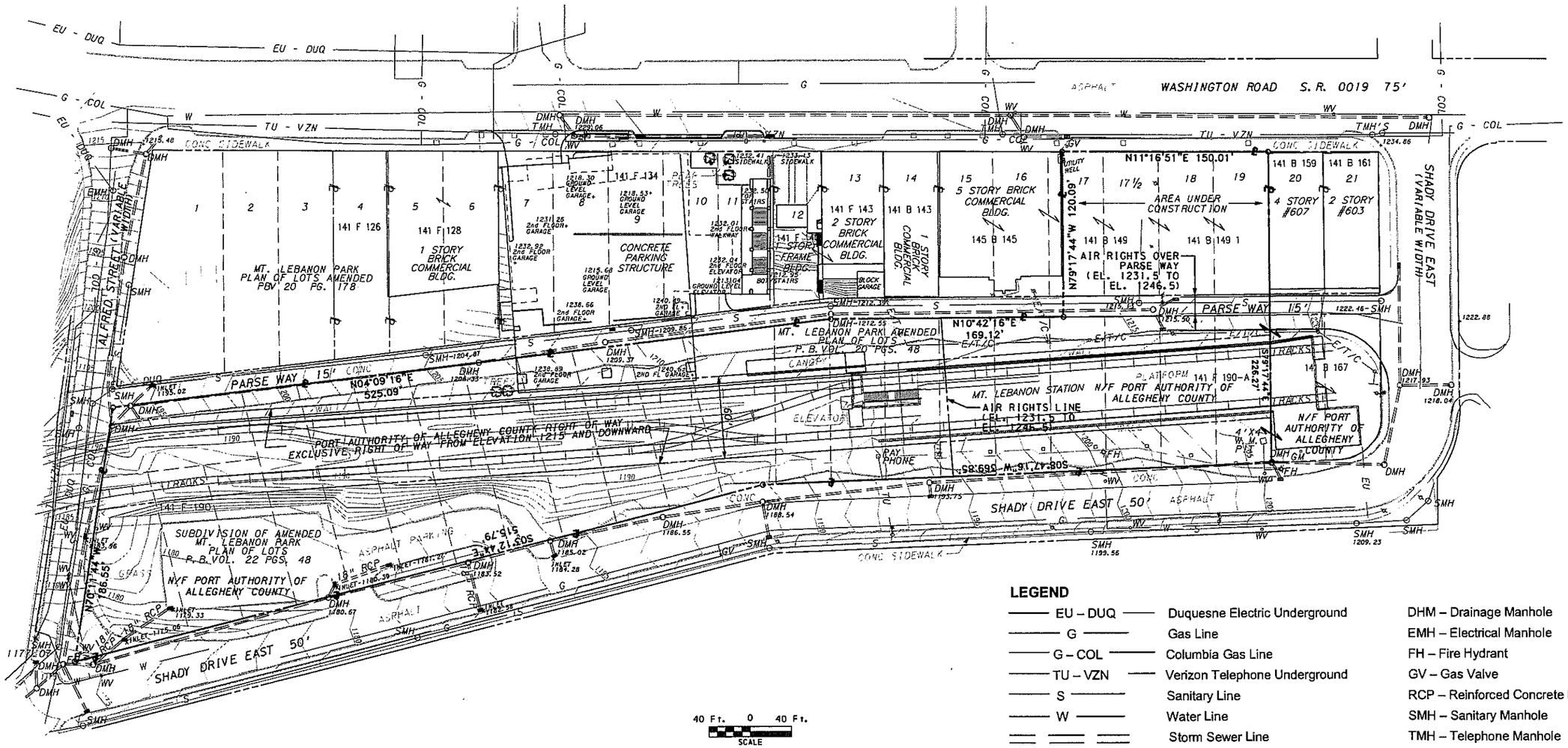
2. The location of PAAC buses parked during the day between rush hours was a problem with the community in the past. They do not want to be held responsible to revise this problem again. This design moved them back to their former location but further off the street. There is enough property between the street and the bus parking area to design a screen using earth, plants, a well designed wall or fence or a combination of these items to resolve this issue with the residents on Shady Drive East.

3. There are no concerns expressed in Item 3 concerning the vertical clearance above the catenary wires and poles.

4. Item 4 correctly states the column locations for the "Mixed Use" building are outside the PAAC Right-of-Way. The foundations for the eastern retaining wall, however, extend beyond the PAAC Right-of-Way thus there will be some interface between the "Mixed Use" column caissons and the PAAC wall foundations. The foundations for the existing Parking Garage limit the east-west location for the "Mixed Use" building caissons, thus foundation interfaces cannot not be eliminated. This is shown on Sheet S-03 of the "Mixed Use" building design.

5. Item 5 informs Mt. Lebanon of the PAAC operational requirements and possible costs during construction. This is a standard for construction occurring adjacent to PAAC transit operations.

APPENDIX B
CONCEPT DESIGN DRAWINGS



LEGEND

EU – DUQ	Duquesne Electric Underground	DHM – Drainage Manhole
G	Gas Line	EMH – Electrical Manhole
G – COL	Columbia Gas Line	FH – Fire Hydrant
TU – VZN	Verizon Telephone Underground	GV – Gas Valve
S	Sanitary Line	RCP – Reinforced Concrete Pipe
W	Water Line	SMH – Sanitary Manhole
	Storm Sewer Line	TMH – Telephone Manhole
		WV – Water Valve

REFERENCE PLANS:

PLAN OF TOPOGRAPHY BY KAG ENGINEERING, DATED 8/29/2003

AIR RIGHTS PLAN BY GATEWAY ENGINEERS, INC., DATED 3/2002

NOTE:

THIS COMPOSITE WAS UPDATED FROM FIELD DATA COLLECTED BETWEEN JULY 2011 AND SEPTEMBER 2011. CHARACTER AND LOCATION OF SUBSURFACE INSTALLATIONS SHOWN ON THE PLAN HAVE BEEN TAKEN FROM SURFACE FEATURES AND SURFACE MARKINGS MADE FOR THE OWNERS BY OTHERS RESPONDING TO DESIGN ONE CALL #20122281371, AND FROM RECORD PLANS PROVIDED BY UTILITIES, AND SHOULD BE CONSIDERED APPROXIMATE. ADDITIONALLY, THERE MAY BE OTHER BURIED STRUCTURES OR LINES NOT KNOWN TO T.W. ENGINEERING. PENNSYLVANIA ACT 287 OF 1974, AS AMENDED, REQUIRES THAT 3 WORKING DAYS NOTICE MUST BE GIVEN TO PENNSYLVANIA ONE CALL SYSTEM BEFORE ANY EXCAVATION, DRILLING, OR BORING OPERATIONS BY CALLING 1-800-242-1776.

REVISED: 11/28/12 PER DANIEL DEISEROTH COMMENTS

T.W. ENGINEERING, INC.
CONSULTING ENGINEERS
PITTSBURGH OFFICE & RESEARCH PARK
ONE CORPORATE CENTER
5500 CORPORATE DRIVE, SUITE 300
PITTSBURGH, PA 15237
TEL: (412) 369-7400
FAX: (412) 369-7964

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DONALD T. MANN
LAND SURVEYOR
SU-52492-E

PLAN OF SURVEY OF EXISTING CONDITIONS

SITUATE IN

MUNICIPALITY OF MT. LEBANON
ALLEGHENY COUNTY, PA

PREPARED FOR

SOUTH HILLS AREA COUNCIL OF GOVERNMENTS
AND MUNICIPALITY OF MT. LEBANON

SCALE: 1"=40' DATE: SEPTEMBER 14, 2012

K:\2011\11005-002 - South Hills Transit - Mt_Lebanon - AECOM\cad\Plots\Mapping\11005-002-plot-2-MERGED.dgn
Date: 11/29/2012 Time: 1:23:44 PM Plot By: Josh_Mallonero

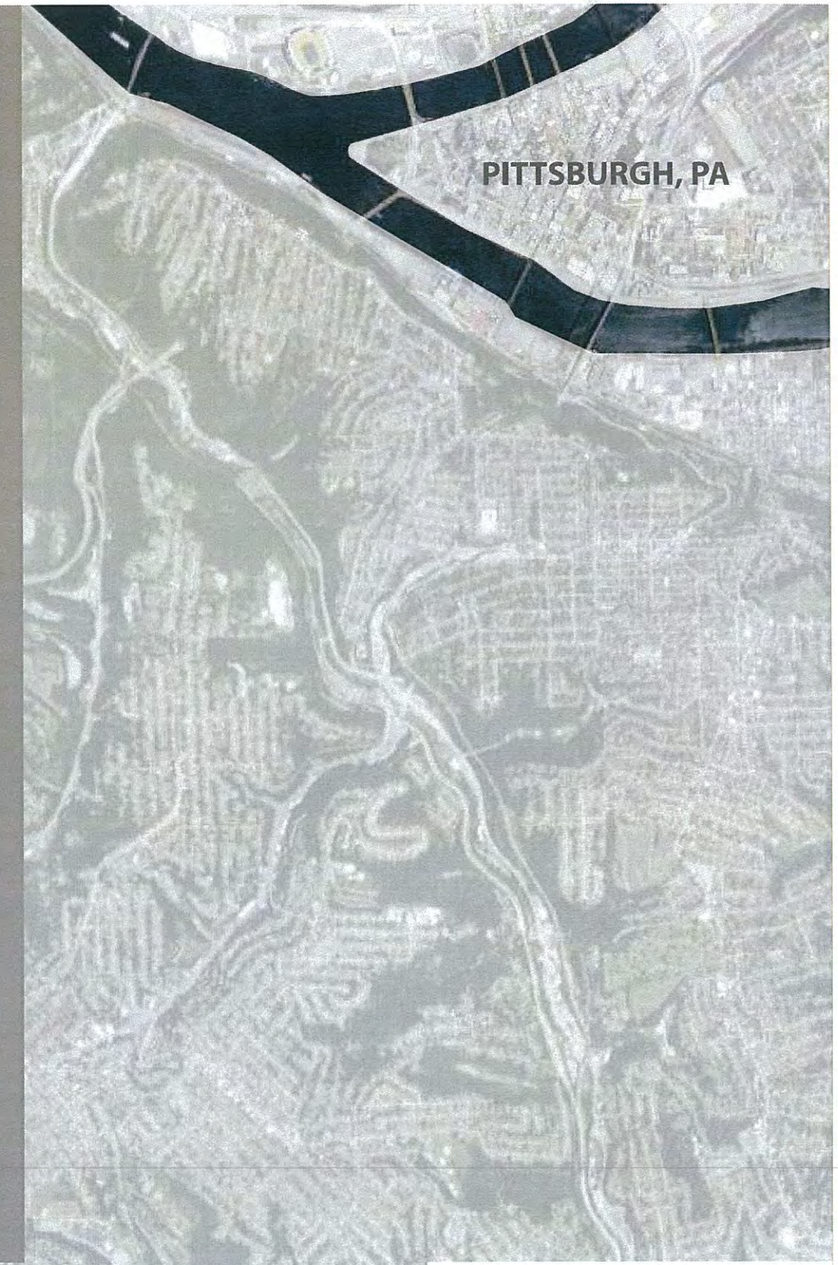
APPENDIX C
TOPOGRAPHY SURVEY

EXISTING SITE PLAN

PROPOSED SITE PLAN

EXISTING AERIAL VIEW TO NW

PROPOSED AERIAL VIEW TO NW



VIEW TO NE FROM TOP OF PARKING GARAGE

VIEW TO NE FROM WASHINGTON RD

VIEW TO W FROM CEMETARY

VIEW TO S FROM FIRE DEPT.

VIEW TO NE FROM TOP OF PARKING GARAGE

AECOM

MT. LEBANON TOD
MAXIMUM DENSITY STUDY
OCTOBER 2011

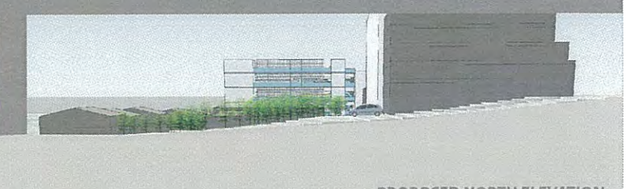
PROPOSED AERIAL VIEW TO SE

PROPOSED AERIAL VIEW TO NE

PROPOSED AERIAL VIEW TO SW

PROPOSED SOUTH ELEVATION

PROPOSED EAST ELEVATION



PROPOSED NORTH ELEVATION

AECOM

MT. LEBANON TOD

MAXIMUM DENSITY STUDY

OCTOBER 2011

PROPOSED AERIAL VIEW TO NW

PROPOSED STREET VIEW - APPROACH FROM NORTH SHADY DR.

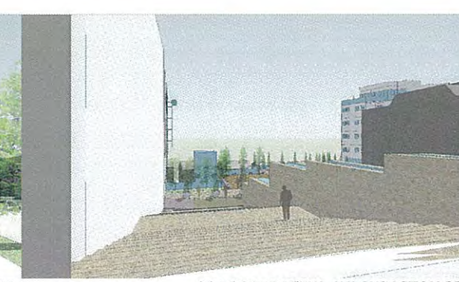
PROPOSED LONGITUDINAL SECTION - LRT PLATFORM

PROPOSED CROSS SECTION - PARKING GARAGE

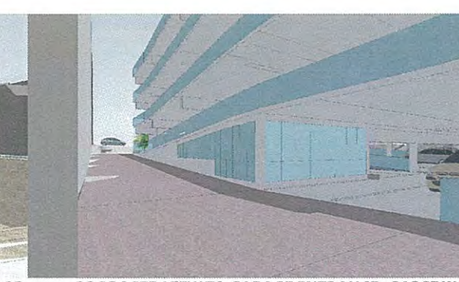
PROPOSED VIEW TO PLAZA DECK - APPROACH FROM SOUTH SHADY DR.

PROPOSED STREET VIEW - SOUTH SHADY DR.

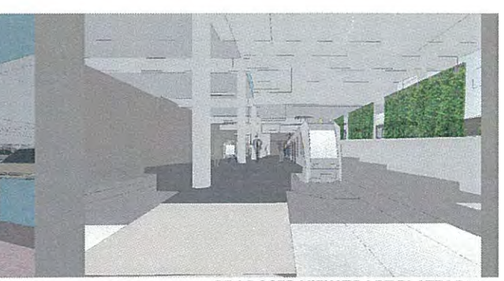
PROPOSED VIEW - SOUTH SHADY DR.



PROPOSED VIEW - WASHINGTON RD.



PROPOSED VIEW TO GARAGE ENTRANCE - PARSE WAY



PROPOSED VIEW TO LRT PLATFORM

AECOM

MT. LEBANON TOD
MAXIMUM DENSITY STUDY
OCTOBER 2011

PROPOSED PLAZA DECK VIEW - APPROACH FROM SOUTH DECK

PROPOSED STREET VIEW - APPROACH FROM SHADY DR. RESIDENCES

PROPOSED MIX USE TOWER VIEW - APPROACH FROM NORTH STAIR & LRT

PROPOSED LONGITUDINAL SECTION - SHADY DR. GRADE

PROPOSED CROSS SECTION - PLAZA DECK

PROPOSED CROSS SECTION - MIX USE TOWER

AECOM

MT. LEBANON TOD
MAXIMUM DENSITY STUDY
OCTOBER 2011

APPENDIX D
GEOTECHNICAL REPORT

PRELIMINARY GEOTECHNICAL REPORT
FOR
PROPOSED MIXED-USE FACILITY
MT. LEBANON T-STATION
MT. LEBANON MUNICIPALITY
ALLEGHENY COUNTY, PA

Presented to: **SHACOG**
794 WASHINGTON ROAD
PITTSBURGH, PA 15228

South Hills Area Council Of Governments

Prepared By:

AECOM

707 GRANT STREET, SUITE 500

PITTSBURGH, PENNSYLVANIA 15219

JUNE 2012

FIGURES

Figure 1 – Project Location Map ((USGS Quad)
Figure 2 – Coal Contour Map
Figure 3 – Mined Out Areas Map
Figure 4 – Pittsburgh Stratigraphic Column
Figure 5 – Soil Survey Map

APPENDIX

Geotechnical Appendix A – Boring Location Plan
Geotechnical Appendix B – Typed Boring Logs
Geotechnical Appendix C – Laboratory Testing
Geotechnical Appendix D – Calculations
Geotechnical Appendix E – Prior Boring Testing Information

1.0 INTRODUCTION

The following report is the summation of all pertinent information for submission to the South Hills Area Council of Governments in the development of the mixed use facility. This report includes the results of the subsurface investigation and preliminary recommendations for the proposed structure foundations. A review of published and unpublished information, along with field reconnaissance, subsurface investigation, and lab testing, was performed prior to this report. The information gathered is incorporated into this report.

2.0 PROPOSED CONSTRUCTION

Foundations for two structures have been developed by AECOM to use the Air Rights above the Port Authority of Allegheny County (PAAC) right-of-way at the Mount Lebanon "T" Station and track leading to the station from the south. The limits of the development are between rail stations R360 and R367 on the right-of-way. These foundations are designed to provide a platform for commercial development above the south track area and a new parking garage above the station area. The foundation structures will be constructed outside the PAAC right-of-way except for center columns in the station area where columns are currently located to support the station canopy. The station canopy will be demolished with the new station roof being constructed with the parking garage lower level. The PAAC Air Rights document permits columns to be constructed in the station area, but not in the track only areas which these two building foundation designs follow. A site location map can be found in the figures section of this report.

3.0 EXISTING AND NEARBY STRUCTURE INFORMATION

AECOM was provided existing borings for the previous TRID study at the site location. These borings were reviewed and used to confirm the subsurface conditions that were encountered during the drilling operations.

4.0 GEOLOGY

Geologically, the project area lies in the physiographic province of the Appalachian Plateaus, specifically the Waynesburg Hills Section. This section's dominant topographic form is described as very hilly with narrow hilltops and steep-sloped narrow valleys. The geologic structure is horizontal and the drainage pattern is dendritic. This section originated from fluvial erosion and landslides.

Two soils are prevalent at the site location, the Urban Land-Culleoka (UCD) complex and the Urban Land-Guernsey (UGD) complex. Urban land's parent material is human transported, or fill. Culleoka's parent material is residuum weathered from nonacid siltstone, fine-grained sandstone, and shale. Guernsey's parent material is residuum weathered from limestone and calcareous shale. Soil slopes range from 8 to 25 percent.

Guernsey soils are moderately well draining, while Culleoka soils are well draining. A soil survey map of the site is provided in the Figures section of this report.

According to the Stratigraphic Column of Pittsburgh Geology, the bedrock encountered at the site belongs to the Pennsylvania system, particularly the upper portion of the Monongahela group. The Pittsburgh Coal seam lies at the bottom of this particular group. The bedrock consists of alternating layers of shale, claystone, sandstone, siltstone, limestone, coal and underclay. The bedding of this rock is well developed for the sandstones, siltstones, and limestones, while the claystones show very poor bedding. Joints are poor to moderately well-formed for the sandstones and siltstones and moderately to well developed for the limestone. Limestones and sandstones are moderately resistant to weathering, while shales, claystones, siltstones, and coals weather deeper and more rapidly. Foundation stability is good for heavy structures, however foundations should not be placed on underclays or claystones since they may deform under the weight when wet. Potential mine subsidence is possible where minable coals have been extracted. The Stratigraphic Column of Pittsburgh Geology has been provided in the Figures section of this report.

According to the Coal Resources of Allegheny County, the Pittsburgh coal seam lies approximately at an elevation 910 feet. The boring elevations ranged from 1185 feet to 1216 feet, the coal approximately lies approximately 275 feet to 306 feet below the site. The coal seam has been deep mined according to mined-out areas of Pittsburgh Coal map. The coal status report from the DEP District Mining Operations office states that the abandoned Alderson mine was last active in 1918. Therefore, mine subsidence will not be an issue with the proposed foundations. Copies of the Coal Contours and Mined-out areas of the Pittsburgh Coal have been provided in the Figures section.

It is believed that Uniontown coal seam was encountered in a few of the borings. According to the Bituminous Coal Fields of Pennsylvania, it occurs at approximately 285 feet above the Pittsburgh coal seam. It has been prospected, but outcrops indicate that it is not mineable due to its impurity and shallow thickness.

5.0 SUBSURFACE INVESTIGATION

Eight (8) borings were drilled during the subsurface investigation. The boring elevations ranged from 1185 feet to 1216 feet. The elevations of the borings were determined from the contours provided on the boring location plan sheet. The depths of the borings ranged from 25.0 feet to 40.0 feet. The soil portion of the borings were advanced using 3 feet center to center split spoon sampling in accordance with ASTM D1586, "Standard Method for Penetration Test and Split-Barrel Sampling of Soil." The bedrock portion of the borings is recommended to be advanced in accordance with ASTM D 2113, "Standard Method of Diamond Core Drilling for Site Investigation." The rock coring was conducted with a solid inner barrel sampler. A boring location plan has been provided in Appendix A and the typed boring logs are provided in Appendix B.

Borings B-1 through B-4 were drilled for the south section of the proposed structure. B-1 and B-2 were drilled on the east side of the Mt. Lebanon T-station, while B-3 and B-4 were drilled to the west side. B-3 and B-4 were drilled above the existing west retaining wall with an elevation of 1205 and 1208 feet, respectively. Borings B-3 and B-4

encountered 19.0 feet and 25.0 feet of fill, respectively. The fill was described as soft to stiff and moist to damp. Underlying the fill layer in B-3 was a residual, silty clay layer approximately 6.0 feet in depth and described as very stiff to hard and damp. Top of bedrock was encountered after this layer. Borings B-1 and B-2 had elevations of 1185 feet and 1190 feet, respectively. Boring B-2 had a small fill layer from 0 feet to 2 feet. Underlying that layer was a residual, silty clay layer ranging from a depth of 10.0 to 11.0 feet. This layer was described as medium stiff to hard and moist to damp. Underlying this layer in Boring B-2 is 2.2 feet of a residual, silty to clayey gravel that was described as very dense and dry. Bedrock was encountered at approximate elevations ranging from 1174.8 feet to 1183.0 feet. The top of bedrock elevation appears to rise with the topography from east to west. The first layer bedrock encountered in borings B-1 and B-2 was Sandstone. This bedrock was described as hard and had a Rock Quality Designation (RQD) of 37%. Underlying this layer were interbedded layers of limestone, claystone, shale, siltstone, and coal to the termination depths of the borings. Hardness was described as soft to very hard and RQD's were 0%, except for the shale layer which had an RQD of 18%. The 1.0 foot thick coal layer ranged from elevation 1165.5 to 1166.2, this layer is believe to be the Uniontown Coal formation. The first layer bedrock encountered in borings B-3 and B-4 was Limestone. This bedrock was described as hard to very hard and had a RQD of 53%. Underlying this layer was a sandstone in B-3 and claystone, then a sandstone layer in B-4. The claystone was described as very soft to soft and had a RQD 13%. The sandstone layer was described as hard to very hard and had a RQD of 77%.

Borings B-5 through B-8 were drilled for the north section of the proposed structure. B-5 and B-6 were drilled on the east side of the Mt. Lebanon T-station, while B-7 and B-8 were drilled to the west side. B-7 and B-8 were drilled above the existing west retaining wall with an elevation of 1214 and 1216 feet, respectively. Borings B-7 and B-8 encountered 15.0 feet and 27.1 feet of fill, respectively. The fill was described as soft to very stiff and moist to wet. Underlying the fill layer in B-7 was a residual, silty clay layer approximately 3.5 feet in depth and described as stiff and damp. A small layer of coal approximately 1.0' in thickness was encountered in this layer. This is believed to be the Uniontown coal seam. The existing spread foundation was encountered in boring B-8. The existing foundation had a thickness of 4 feet. Top of bedrock was encountered at approximate elevations of 1190 and 1184.5, in borings B-7 and B-8, respectively. Borings B-5 and B-6 had approximate elevations of 1198 feet and 1204 feet, respectively. The first soil layer contained between 7.0 feet and 13.0 feet of fill material. This material was described a silty clay, medium stiff to very stiff, and moist to damp. Underlying that layer was a residual, silty clay layer ranging from a depth of 3.5 to 6.5 feet. This layer was described as medium stiff to hard and moist to damp. Underlying this layer in Boring B-5 is 1.6 feet of a residual, silty to clayey gravel that was described as very dense. Bedrock was encountered at approximate elevations ranging from 1182.9 feet to 1187.5 feet in borings B-5 and B-6, respectively. The bedrock encountered at the top of bedrock in borings B-5 through B-8 was limestone. This bedrock was described as hard to very hard and had a Rock Quality Designation (RQD) of 59%.

Laboratory testing of rock samples were used to develop rock parameters for the preliminary design of the foundations. The rock tests included unconfined compressive strength tests to aid in developing bearing conditions. The results of the laboratory tests are included in Appendix C.

6.0 RECOMMENDATIONS

It is recommended that the proposed structure bear on drilled shafts or caissons either end bearing on rock or socketed into rock. The drilled shafts should not bear on claystone, carbonaceous shale, or coal. End bearing resistances were developed in accordance with AASHTO LRFD Bridge Specifications, 4th edition 2007 (AASHTO LRFD). Below is a table with the recommended end bearing resistances based on a drilled shaft diameter of 4 feet:

Table1 – Preliminary Factored End Bearing Resistances for Bedrock

Representative Borings	Bedrock Type	Compressive Strength (ksf)	Factored End Bearing Resistance (kips)	Nominal End Bearing Resistance (kips)
B-2, B-3	Sandstone	1301	546.8	994.1
B-4, B-6, B-7	Limestone	1275	392.1	713.0

It is also recommended that the caissons be checked for lateral deflection in final design. According to AASHTO LRFD Section 4.6P, the maximum allowable lateral deflection at the top of caisson is 0.5 in. Vertical settlement will be negligible due bearing on bedrock. The caisson embedment depths will vary approximately from 24 to 32 feet on the west side of the light rail tracks to approximately 15 to 17 feet on the east side of the light rail tracks from existing ground elevation. It is recommended that a minimum of one boring per overhead structure be performed during construction on each side of the light rail tracks to verify the depth to the sandstone or limestone bedrock.

7.0 REFERENCES

1. Taylor, L.E, Geologic Map of the Greater Pittsburgh Region, 1984.
2. Geyer, Alan R. and Wilshusen, J. Peter, Engineering Characteristics of the Rocks of Pennsylvania, Pennsylvania Geological Survey, ERGI, 1982.
3. Physiographic Provinces of Pennsylvania, www.dcnr.state.pa.us/topogeo
4. U.S. Department of Interior, West Pittsburgh Quadrangle, Pennsylvania – 7.5 Minute Series.
5. Dodge, C.H., Coal Resources of Allegheny County, Pennsylvania, PA Dept. of Env. Resources, 1985.
6. http://www.pittsburghgeologicalsociety.org
7. http://websoilsurvey.nrcs.usda.gov

FIGURES

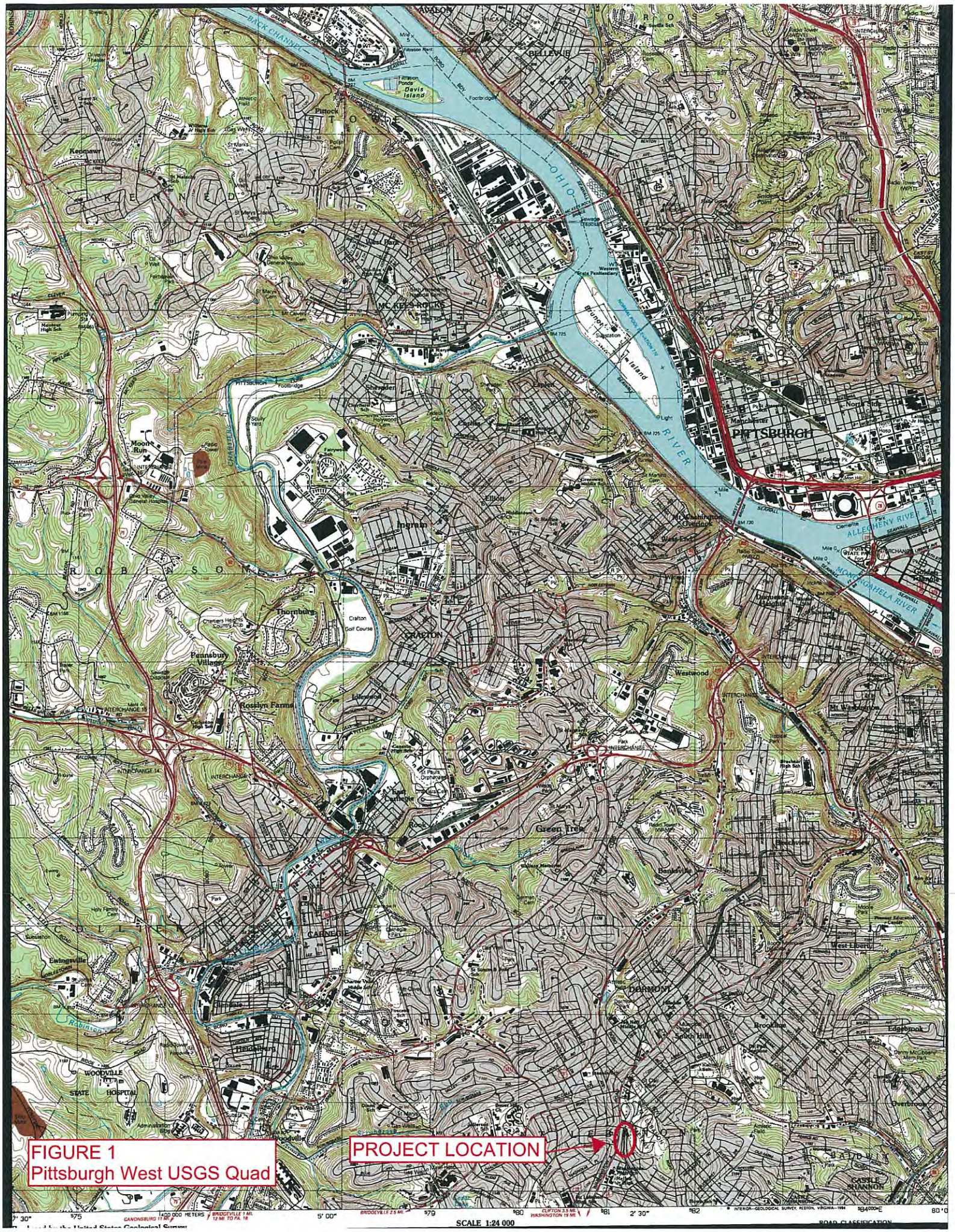


FIGURE 1
Pittsburgh West USGS Quad

PITTSBURGH WEST QUADRANGLE
PENNSYLVANIA—ALLEGHENY CO
7.5 MINUTE SERIES (TOPOGRAPHIC)

COAL CROP LINES AND STRUCTURE CONTOURS

PITTSBURGH WEST

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

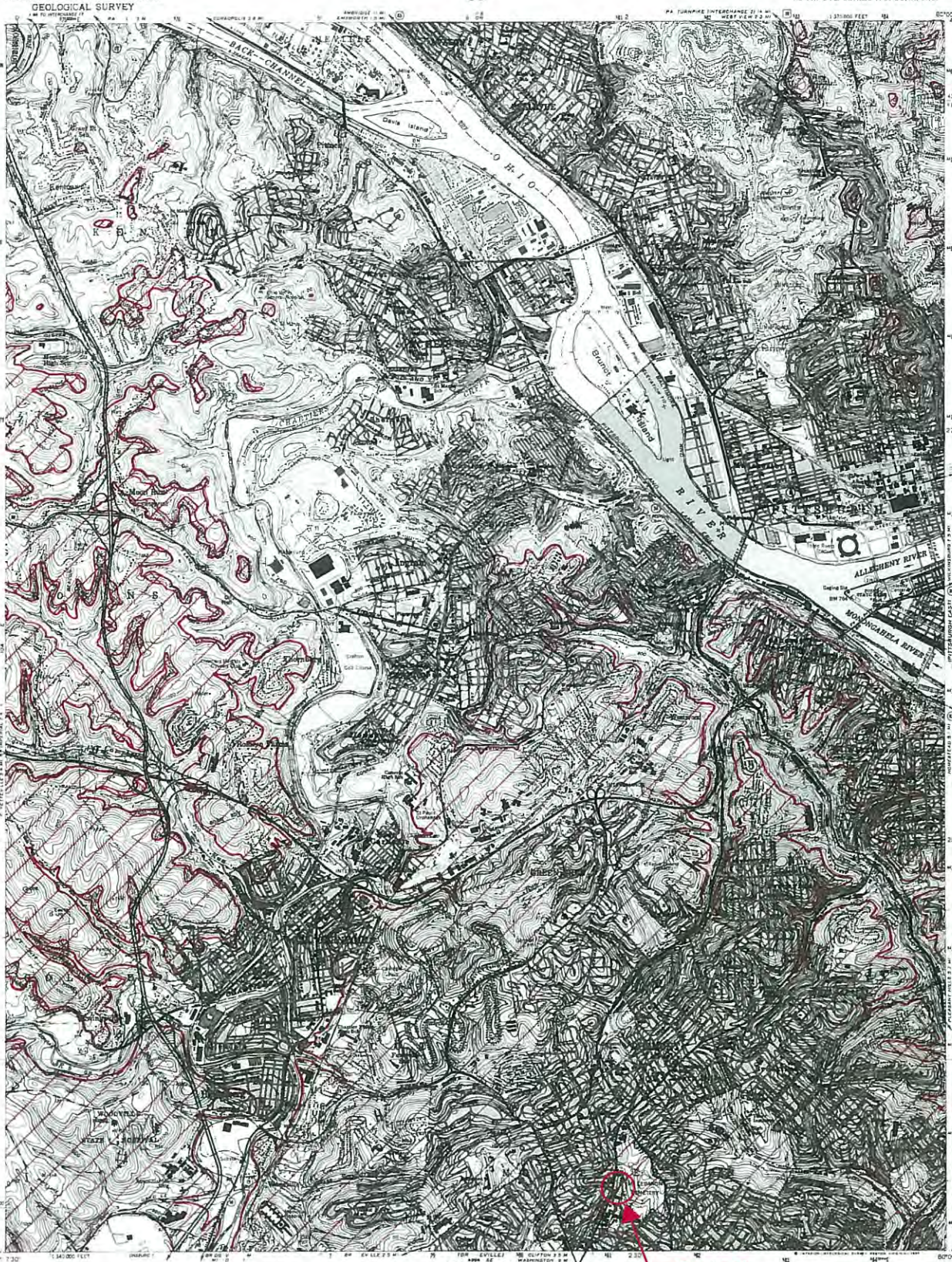
PITTSBURGH WEST QUADRANGLE
PENNSYLVANIA—ALLEGHENY CO
7.5 MINUTE SERIES (TOPOGRAPHIC)

EXPLANATION

Crop line of the Pittsburgh coal

Extent of known strip mining

Extent of known deep mining



SOURCES

Crop line modified by C. H. Dodge from Shaw, W. a d M n , M. J. (1911), *Burgettstown-Carnegie folio P nnsy v nia*, Geological Survey Geologic Atlas of the U.S , ol o 7 , 16 p
Limits of strip mining based on interpretation of opo r phic m p and on field checking.
Limits of deep mining from Pennsylvania Department of Envi onmental Resources, Bureau of Mining and Rec amation (1978 , unpublished map.

SCALE 1:62500

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

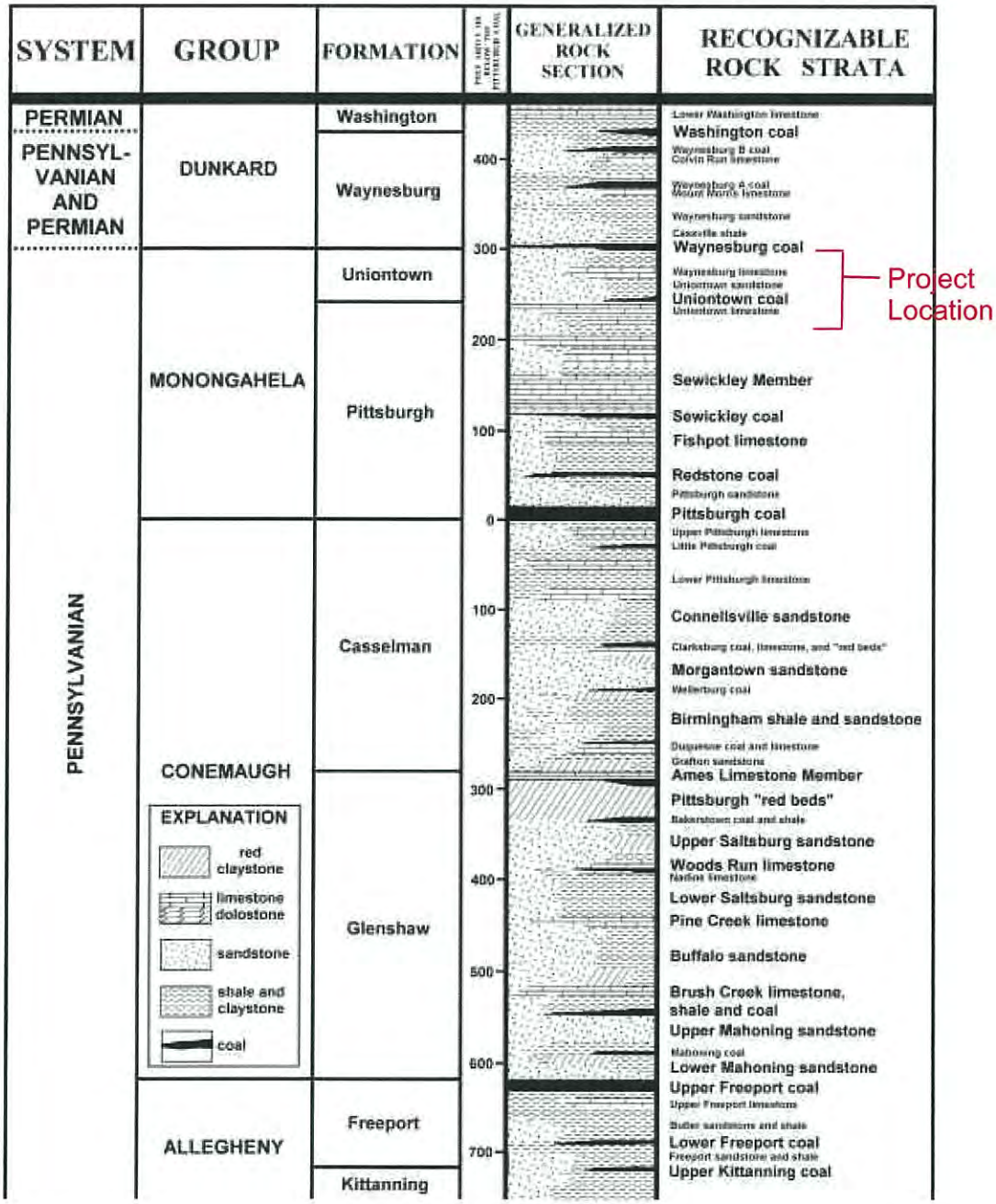
ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved dirt
Interstate Route — U.S. Route — State Route

PENNSYLVANIA
QUADRANGLE LOCATION

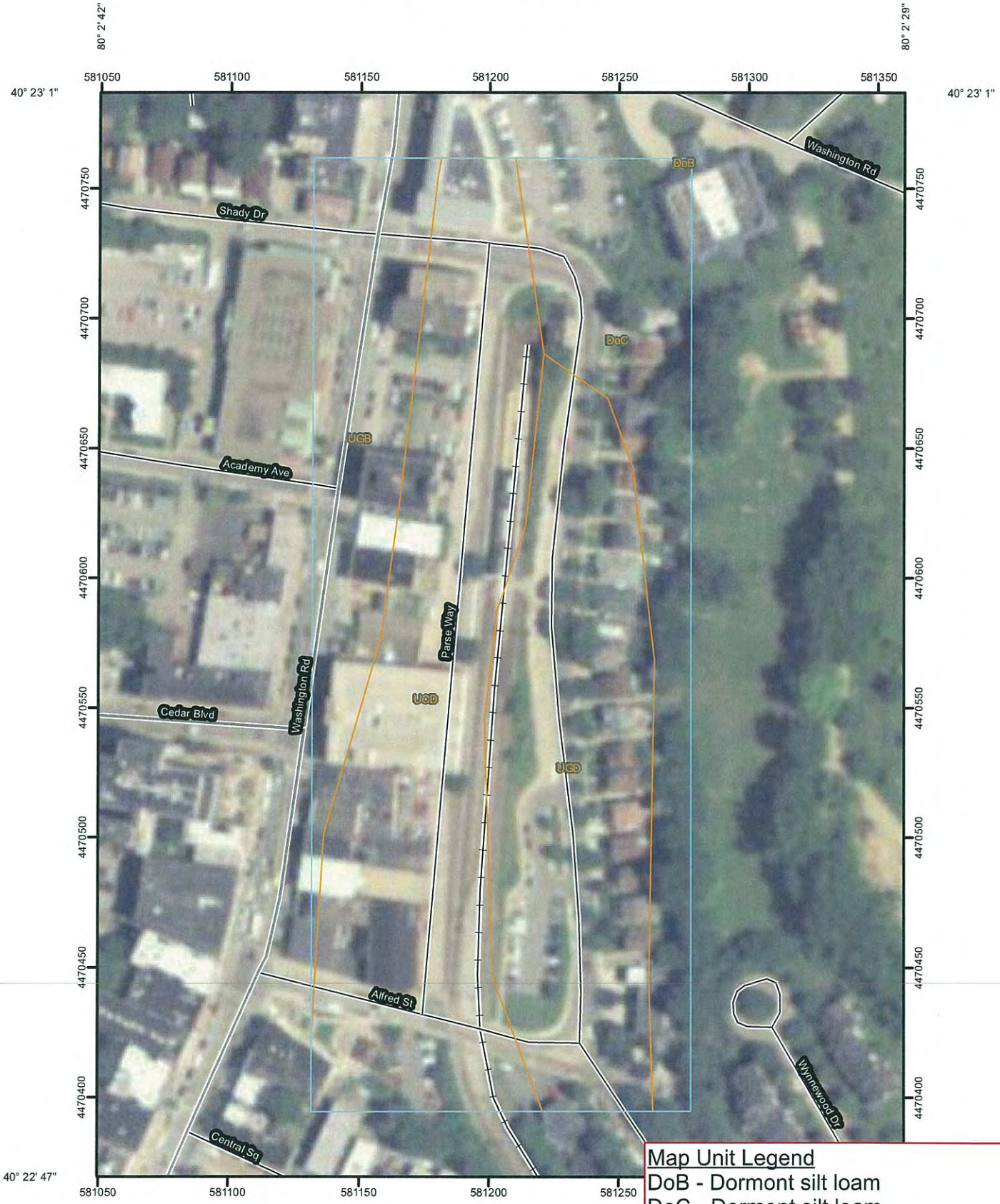
PITTSBURGH WEST

CROP LINE AND MINED-OUT AREAS OF THE PITTSBURGH COAL

Stratigraphic Column of Pittsburgh Geology



Soil Map—Allegheny County, Pennsylvania
(Mt. Lebanon Soil Map)



Map Unit Legend

DoB - Dormont silt loam
DoC - Dormont silt loam
UCD - Urban land-Culleoka complex
UGB - Urban land-Guernsey complex
UGD - Urban land-Guernsey complex

Map Scale: 1:1,990 if printed on A size (8.5" x 11") sheet.

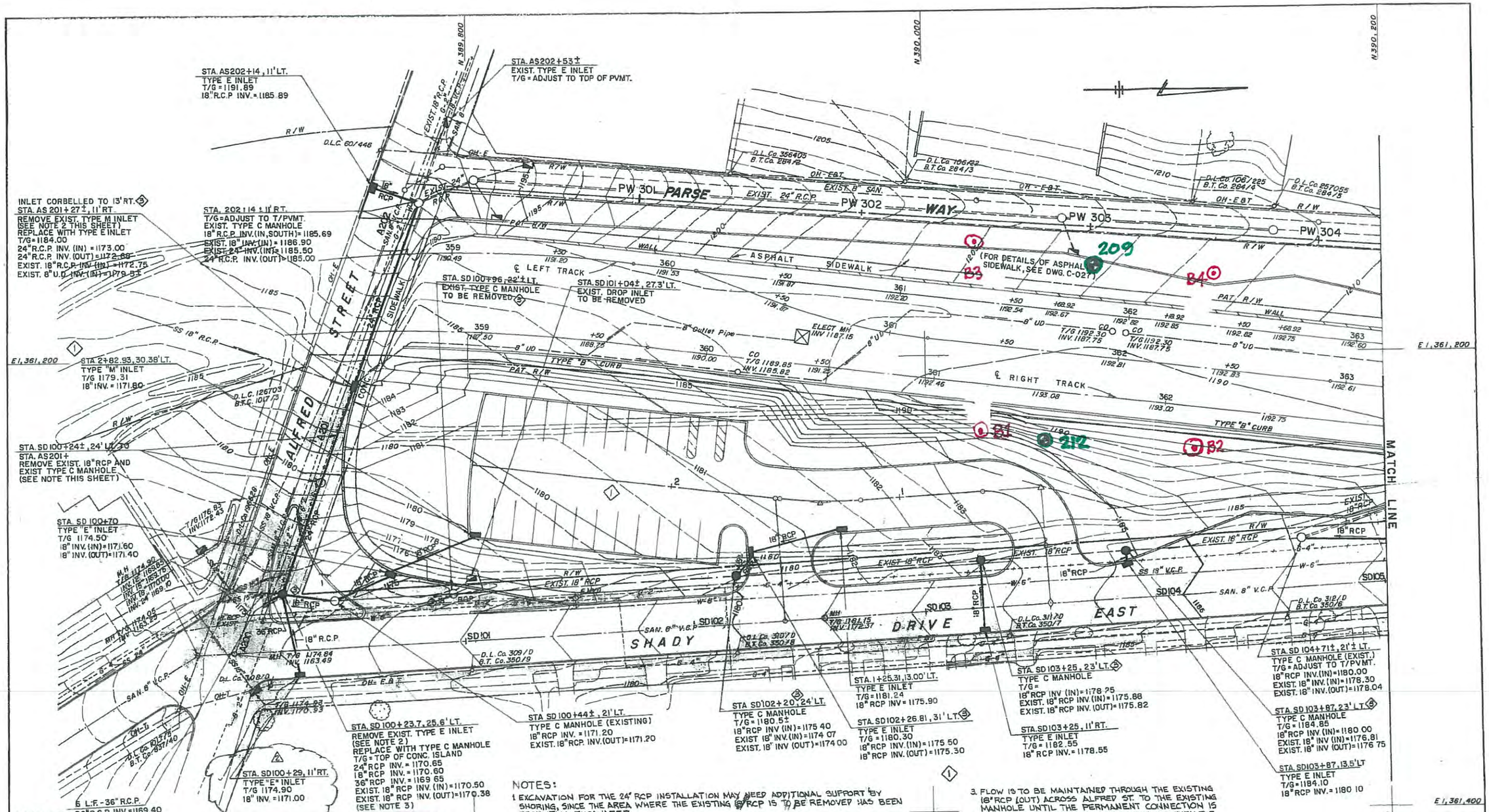
N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

GEOTECHNICAL APPENDIX A

BORING LOCATION PLAN



NOTES:

1. EXCAVATION FOR THE 24" RCP INSTALLATION MAY NEED ADDITIONAL SUPPORT BY SHORING, SINCE THE AREA WHERE THE EXISTING 24" RCP IS TO BE REMOVED HAS BEEN RECENTLY EXCAVATED.
2. THE GRATE FROM THE EXISTING TYPE M INLET AT STA. AS 201+27± RT., THE TOP UNIT AND RISER SECTIONS FROM THE EXIST. TYPE C MANHOLE AT STA. AS 200+83 RT. AND THE HOOD, FRAME AND GRATE FROM THE EXIST. TYPE E INLET AT STA. SD 100+23.7, 25.6' LT. MAY BE SALVAGED AND USED ELSEWHERE ON THE JOB WITH APPROVAL OF THE ENGINEER.
3. FLOW IS TO BE MAINTAINED THROUGH THE EXISTING 18" RCP (OUT) ACROSS ALFRED ST. TO THE EXISTING MANHOLE. UNTIL THE PERMANENT CONNECTION IS MADE BY MT. LEBANON TO THE 36" RCP, THEN THE 18" RCP (OUT) IS TO BE PLUGGED AND ABANDONED.
4. FOR DETAIL OF TYPE M INLET, SEE PENN DOT STANDARDS FOR ROADWAY CONSTRUCTION RC-34

PROJECT RECORD COPY

DWG. No.	REFERENCE

No.	DATE	DESCRIPTION
5	6 JULY 88	AS-BUILT
4	17 OCT 85	REVISE INLET T/G (NO AW REQ'D)
1	5 JUL 85	ADDENDUM NO. 1 - REVISE PARKING LOT & GRADING

REVISIONS

DESIGNED:	B.D.P.
DRAWN:	D.R.D.
CHECKED:	B.D.P.
IN CHARGE:	B.D.P.
DATE:	1-10-85
SCALE:	1"=20'

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED, IN PART, THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED

ROSARIO A. RIZZO — REGISTERED PROFESSIONAL ENGINEER — PENNSYLVANIA

SUBMITTED

DATE

pbgh Consulting Engineers
PARSONS BRINCKERHOFF – GIBBS & HILL
APPROVED
DATE

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

STAGE I LIGHT RAIL TRANSIT SYSTEM

MT. LEBANON STATION

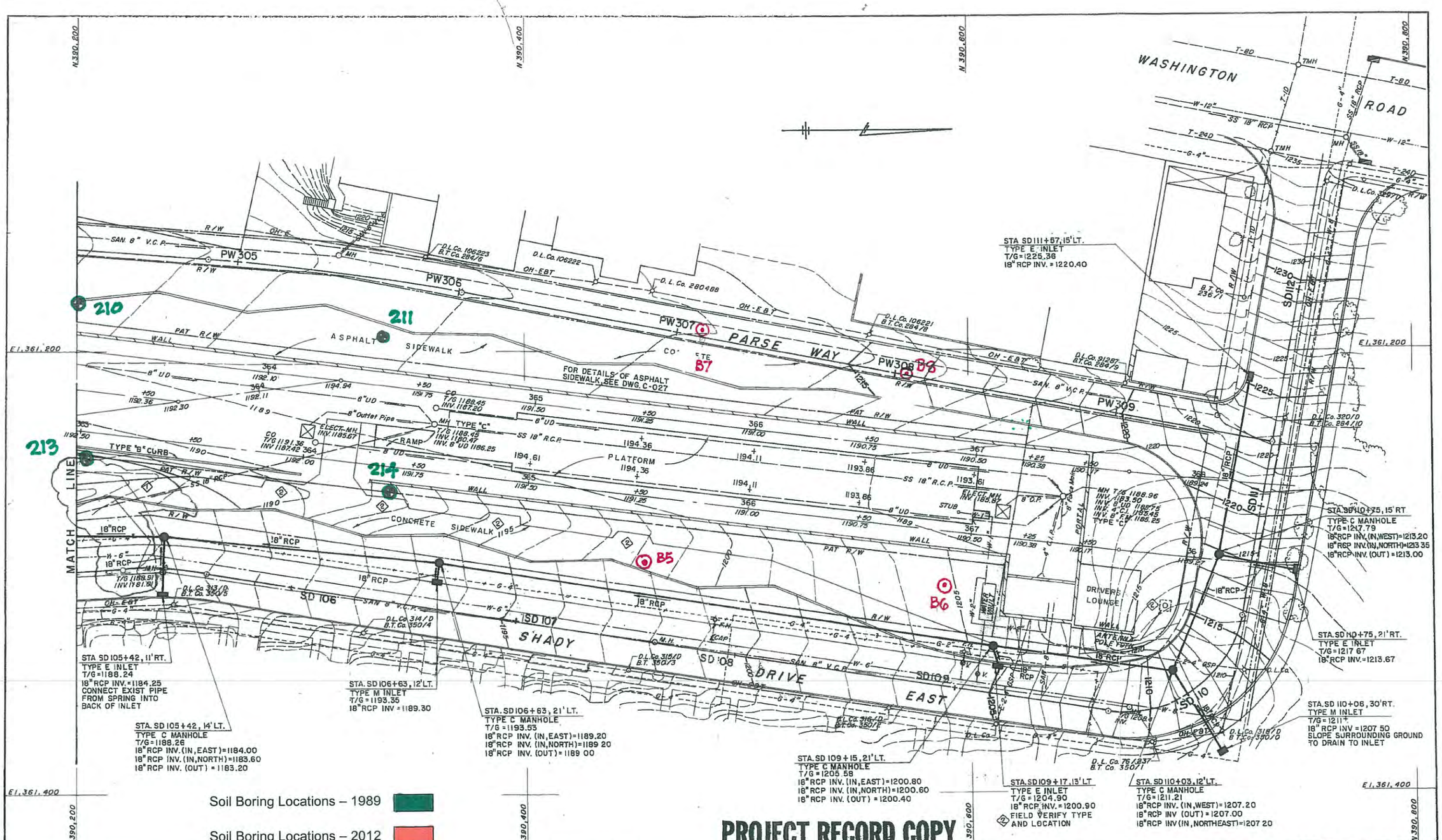
DRAINAGE, GRADING, EROSION CONTROL, & UTILITIES PLAN

PARSONS BRINCKERHOFF – GIBBS & HILL
A JOINT VENTURE
PITTSBURGH, PENNSYLVANIA

CONTRACT NO. CA 255

DWG. NO. C-004-2

SHT. 16



DWG. No.	REFERENCE	No.	DATE	DESCRIPTION
		2	7JULY88	AS-BUILT
		1	5JUL 85	ADDENDUM NO.1 - REVISE GRADING

REVISIONS

DESIGNED:	B.D.P.
DRAWN:	B.D.P.
CHECKED:	D.R.D.
IN CHARGE:	B.D.P.
DATE:	1-10-85
SCALE:	1"=20'

THE PREPARATION OF THIS DRAWING HAS BEEN FINANCED, IN PART, THROUGH A GRANT FROM THE U. S. DEPARTMENT OF TRANSPORTATION, URBAN MASS TRANSPORTATION ADMINISTRATION UNDER THE URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED

ROSARIO A. RIZZO

SUBMITTED

DATE

pbgh Consulting Engineers
PARSONS BRINCKERHOFF – GIBBS & HILL
APPROVED

DATE

PORT AUTHORITY OF ALLEGHENY COUNTY
PITTSBURGH PENNSYLVANIA

STAGE I LIGHT RAIL TRANSIT SYSTEM

MT. LEBANON STATION

DRAINAGE, GRADING, EROSION CONTROL, & UTILITIES PLAN

PARSONS BRINCKERHOFF – GIBBS & HILL
A JOINT VENTURE
PITTSBURGH, PENNSYLVANIA

CONTRACT No. CA 255

DWG. No. C-005-1

SHT. 17

GEOTECHNICAL APPENDIX B

TYPED BORING LOGS

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 8.3 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-1 Surface Elevation 1185.0 Sheet No. 1 of 2 sheets
For ____
Location ____
Started 04/30/12 Completed 04/30/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN	REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0					1		0.0	Brown SILTY CLAY, Trace Sand, Medium Stiff, Moist	.Moved Test Hole Down to Bottom of Slope
					3				
					3	1.5		(Residual)	
-3.5					7		3.5		
					26			Brown SILTY CLAY, Little to Some Sand, Little to Trace Gravel (Rock Fragments), Hard, Damp	
					39	4.5			
					20			(Residual)	
					50	7.1			
					50/.1				
					50/.2	9.2			
-10							10.0		
		40	3.0	3.0		13.0		Olive-Green to Gray Fine-Grained SANDSTONE, Thinly to Medium Bedded, Broken to Massive, Hard .Occasional Siltstone Interbeds (RQD=23%)	Top of Rock @ 10.0'
-14.3							14.3		
								Gray Calcareous CLAYSTONE, Indiscernibly Bedded, Soft to Very Soft .Very Soft From 14.3-14.8' (RQD=0%)	
-16.8							16.8		
-17.8		0	5.0	3.6		18.0	17.8	COAL	
-19.1							19.1	Gray CLAYEY SHALE To SILTSTONE, Thinly Laminated to Thinly Bedded, Broken to Blocky, Soft to Medium Hard (RQD=0%)	
-21.3							21.3	Gray Fine-Grained SANDSTONE, Thinly Bedded, Blocky to Massive, Hard to Very Hard (RQD=82%)	
		36	5.0	5.0		23.0		Dark Gray Carbonaceous SHALE, Thinly Laminated, Broken to Blocky, Soft to Medium Hard (RQD=6%)	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 8.3 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-1 Surface Elevation 1185.0 Sheet No. 2 of 2 sheets
For
Location
Started 04/30/12 Completed 04/30/12 Project No. 11063
Driller's Log ☐ Geologist's Log ☒ RCN
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
-25							25.0	Continued From Previous Page	
								.Clayey Shale And Siltstone Interbeds	
-28		8	5.0	5.0		28.0	28.0	.Carbonaceous Limestone From 27.6- 28.0'	
								Bottom of Boring @ 28.0'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. ____ 24 Hrs. ____
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-2 Surface Elevation 1188.0 Sheet No. 1 of 2 sheets
For ____
Location ____
Started 04/26/12 Completed 04/ /12 Project No. 11063
Driller's Log ☐ ____ Drilling Fluid Water
Geologist's Log ☒ RCN

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft)	DESCRIPTION	REMARKS
0					1		0.0	TOPSOIL	
-0.3					2		0.3	Brown SILTY CLAY, Little Sand, Little Gravel (Rock Fragments), Stiff, Moist	
					7	1.5			
-2							2.0	(Fill)	
					4			Brown SILTY CLAY, Little Sand, Trace Gravel (Rock Fragments), Stiff to Hard, Moist to Damp	
					5				
					4	4.5		(Residual)	
					6				
					8				
					7	7.5			
					5				
					5				
					5	10.5			
					18				
-13					19	13.1	13.0		
					50/.1			Brown And Gray SILTY To CLAYEY GRAVEL (Shale And Limestone Fragments), Little to Some Sand, Very Dense, Dry	
-15.2							15.2		
					50/.2	15.2		(Residual)	
		22	2.3	2.3		17.5		Gray Fine-Grained SANDTONE, Thinly to Thickly Bedded, Broken to Massive, Medium Hard to Hard .Clayey Shale And Clay Seam From 17.9-18.9' (Very Soft) (RQD=46%)	
-22.2		54	5.0	5.0		22.5	22.2		
								Gray LIMESTONE, Thinly Bedded, Broken to Blocky, Medium Hard to Hard	
-23.6							23.6		
-24.5							24.5	.Vertical Fractures Throughout With Broken Stains @ Fractures	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. _____ 24 Hrs. _____
Casing Hammer: Wt. _____ lbs. Drop _____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-2 Surface Elevation 1188.0 Sheet No. 2 of 2 sheets
For _____
Location _____
Started 04/26/12 Completed 04/ /12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (FL.)	DESCRIPTION	REMARKS
-25.5							25.5	(RQD=0%)	
								Gray CLAYSTONE, Indiscernible Bedded, Very Broken, Very Soft	
-27.5		28	5.0	5.0		27.5	27.5	(RQD=0%)	
								COAL	
								Dark Gray Carbonaceous SHALE, Thinly Laminated, Blocky to Massive, Medium Hard	
								(RQD=70%)	
								Bottom of Boring @ 27.5'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 3.3 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-3 Surface Elevation 1205.0 Sheet No. 1 of 2 sheets
For
Location
Started 04/23/12 Completed 04/24/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0				4		0.0	ASPHALT PAVEMENT	
-0.3						0.3		
-0.8				2		0.8	STONE BASE	
					1.5		Brown And Gray SILTY CLAY, Little to Some Gravel (Rock Fragments), Trace to Little Sand, Soft to Very Stiff, Moist	
				6				
				10				
				14	4.5		(Fill)	
				6				
				5				
				8	7.5			
				4				
				3				
				4	10.5			
				4				
				6				
				4	13.5			
				2				
				2				
				2	16.5			
-17						17.0		
					18.0		SLAG	
				50/.0				
-19						19.0		
							Brown And Gray SILTY CLAY, Little Sand, Trace Gravel (Rock Fragments), Very Stiff to Hard, Damp (Highly Decomposed Limestone) (Residual)	
				22				
				17				
				10	22.5			
				15				
				50/.3	24.8			

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 3.3 24 Hrs.
Casing Hammer: Wt. lbs. Drop in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-3 Surface Elevation 1205.0 Sheet No. 2 of 2 sheets
For
Location
Started 04/23/12 Completed 04/24/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (FL)	DESCRIPTION	REMARKS
-25							25.0	Gray Argillaceous LIMESTONE, Thinly Bedded, Broken to Massive, Hard	Top of Rock @ 25.0'
-27							27.0		
			2.5	2.5		27.5		.Calcareous Claystone @ 25.0', 26. 0' And 26.5' (RQD=32%)	
								Gray Fine-Grained SANDSTONE, Thinly to Medium Bedded, Blocky to Massive, Hard to Very Hard	
								.High Angled Fracture @ 31.5'	
			5.0	5.0		32.5		.Water Stains @ Fractures	
								.Clay Seams @ 32.2'	
								.Occasional Siltstone Beds	
-35			2.5	2.3		35.0	35.0	(RQD=79%)	
								Bottom of Boring @ 35.0'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. Dry 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-4 Surface Elevation 1208.0 Sheet No. 1 of 2 sheets
For
Location
Started 04/23/12 Completed 04/24/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0			0.5			0.0	CONCRETE PAVEMENT	
-0.5						0.5	STONE BASE	
-0.8				2		0.8	Brown SILTY CLAY, Trace to Little Sand, Little Gravel (Rock Fragments), Soft to MEdium Stiff, Moist	
				2	1.5			
				2				
				3				
				4	4.5		(Fill)	
				5				
				4				
				3	7.5			
				4				
				2				
				3	10.5			
-11						11.0		
							Brown SILTY GRAVEL (Rock Fragments), Little to Some Sand, Trace Clay, Meidum Dense, Damp	
				12				
				6				
-13.5				6	13.5	13.5	(Fill)	
							Brown SILTY CLAY, Trace Sand, Trace Gravel (Rock Fragments), Stiff to Medium Stiff, Moist	
				4				
				5				
				8	16.5		(Fill)	
				2				
				3				
				5	19.5			
-21						21.0		
				50/.1	21.1		SLAG And LIMESTONE Fragments	.Hit Obstruction (Existing ____ @ 21.0' Relocated Boring 11.0' From Wall
				15				
				50/.3				

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. Dry 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3½" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-4 Surface Elevation 1208.0 Sheet No. 2 of 2 sheets
For
Location
Started 04/23/12 Completed 04/24/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
-25						25.0	25.0	Light Gray LIMESTONE, Thickly Bedded, Blocky to Massive, Hard to Very Hard	Top of Rock @ 25.0'
-27.5		72	2.5	2.5		27.5	27.5	(RQD=72%)	
								Blusih Gray CLAYSTONE, Indiscernible Bedding, Broken, Very Soft to Soft (RQD=13%)	
-32.2		12	5.0	5.0		32.5	32.2		
								Gray Fine-Grained SANDSTONE, Medium to Thickly Bedded, Blocky to Massive, Hard to Very Hard (RQD=71%)	
-35		80	2.5	2.5		35.0	35.0		
								Bottom of Boring @ 35.0'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 2.1 24 Hrs.
Casing Hammer: Wt. lbs. Drop in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-5 Surface Elevation 1198.0 Sheet No. 1 of 2 sheets
For
Location
Started 04/26/12 Completed 04/26/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0					3		0.0	TOPSOIL	
-0.3					2		0.3	Brown And Gray SILTY CLAY, Little Sand, Little to Trace Gravel (Rock Fragments), Medium Stiff to Stiff, Moist	
					4	1.5			
					5			(Fill)	
					5				
					7	4.5			
					3				
-7					3		7.0		
					5	7.5		Brown And Gray SILTY CLAY, Little Sand, Trace Gravel (Rock Fragments), Medium Stiff to Hard, Moist to Damp	
					3				
					5			(Residual)	
					5	10.5			
					19				
					22				
-13.5					18	13.5	13.5		
								Gray SILTY To CLAYEY GRAVEL (Limestone Fragments), Little Sand, Very Dense	
-15.1							15.1		
					50/.1	15.1		(Residual)	Top of Rock @ 15.1'
		72	2.9	2.9		18.0		Light Gray LIMESTONE, Thickly Bedded, Broken to Massive, Hard to Very Hard	
		60	5.0	4.7		23.0		.Claystone From 20.2-20.8' And 21. 2-21.4' .Siltsotne From 20.8-21.0' (RQD=66%)	
-24							24.0		
								Blusish Gray CLAYSTONE, Indiscernably Bedded, Soft to	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 2.1 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-5 Surface Elevation 1198.0 Sheet No. 2 of 2 sheets
For
Location
Started 04/26/12 Completed 04/26/12 Project No. 11063
Driller's Log ☐ Drilling Fluid Water
Geologist's Log ☒ RCN

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
-25		40	2.0	1.6		25.0	25.0	Very Soft (RQD=0%)	
								Bottom of Boring @ 25.0'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 4.0 24 Hrs.
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-6 Surface Elevation 1204.0 Sheet No. 1 of 2 sheets
For ____
Location ____
Started 04/26/12 Completed 04/ /12 Project No. 11063
Driller's Log ☐ ____ Drilling Fluid Water
Geologist's Log ☒ RCN

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0					4		0.0	TOPSOIL	
-0.3					5		0.3	Brown And Gray SILTY CLAY, Little Sand, Little Gravel (Rock Fragments), Medium Stiff to Very Stiff, Moist	
					8	1.5			
					8			(Fill)	
					11				
					11	4.5			
					5				
					7				
					8	7.5			
					3				
					4				
					4	10.5			
					2				
-13					2		13.0		
					10	13.5		Brown SILTY CLAY, Trace Sand, Trace Gravel (Rock Fragments), Stiff to Hard, Moist to Damp	
					50/.4	15.4		.Highly Decomposed Shale	
-16.5							16.5	(Residual)	
			1.5	1.5		18.0		Gray to Light Gray LIMESTONE, Thinly to Thickly Bedded, Broken to Massive, Hard to Very Hard	Top of Rock @ 16.5'
			5.0	5.0		23.0		.High Angled Fracture From 19.0-19.4' .Clay Seam From 16.7-16.9' .Shale From 19.7-19.8 And 20.0-20. 1' .Clay, Siltstone And Claystone From 20.5-21.7' .Carbonaceous From 16.8-17.8' And 19.0-20.5' (RQD=52%)	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 4.0 24 Hrs. _____
Casing Hammer: Wt. _____ lbs. Drop _____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-6 Surface Elevation 1204.0 Sheet No. 2 of 2 sheets
For _____
Location _____
Started 04/26/12 Completed 04/ /12 Project No. 11063
Driller's Log ☐ _____ Drilling Fluid Water
Geologist's Log ☒ RCN

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (FL)	DESCRIPTION	REMARKS
-25							25.0	Continued From Previous Page	
-26.5			3.5	3.5		26.5	26.5	.Clayey Shale From 23.4-23.5'	
								Bottom of Boring @ 26.5'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 8.0 24 Hrs. 7.6
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-7 Surface Elevation 1214.0 Sheet No. 1 of 2 sheets
For ____
Location ____
Started 04/24/12 Completed 04/25/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
0						0.0	ASPHALT PAVEMENT	
-0.5						0.5	STONE BASE	
-0.8				3		0.8	Brown And Gray SILTY CLAY, Little Sand, Trace to Little Gravel (Rock Fragments), Medium Stiff to Very Stiff, Moist to Damp	
				3	1.5			
				3				
				6	4.5		(Fill)	
				4				
				8				
				10	7.5			
				3				
				3				
				4	10.5			
				3				
				3				
				2	13.5			
-15						15.0		
				5			Brown SILTY CLAY, Trace to Little Sand, Trace Gravel (Rock Fragments), Stiff, Damp	
				5				
				6	16.5			
							.High Decomposed Shale	
-18.5				21		18.5	(Residual)	
				23			COAL	
-19.5				18	19.5	19.5		
							Light Gray SILTY CLAY, Little to Some Sand, Trace Gravel (Rock Fragments), Hard, Damp	
				16				
				39			.Highly Decomposed Clayey Shale	
-22.5				50/.4	22.4	22.5		
							Gray SILTY CLAY, Little Sand, Trace Gravel (Rock Fragments), Hard, Damp	
-24						24.0		
				50/.0			.Highly Decomposed Calcareous	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 8.0 24 Hrs. 7.6
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-7 Surface Elevation 1214.0 Sheet No. 2 of 2 sheets
For ____
Location ____
Started 04/24/12 Completed 04/25/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.		SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
		56	2.5	2.5		26.5		Claystone (Residual)	
		60	5.0	4.7		31.5		Light Gray to Gray LIMESTONE, Thickly Bedded, Broken to Massive, Hard to Very Hard .Carbonaceous Shale From 28.6-28.7' .Dark Gray Carbonaceous Shale To Bluish-Gray Claystone From 31.5-31.8' And 32.6-33.0' .Brown Stains @ Fractures .Vertical Fracture From 27.5-27.7' .Carbonaceous From 30.3-31.5'	
-34		65	2.5	2.5		34.0	34.0	(RQD=60%)	
								Bottom of Boring @ 34.0'	

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 14.7 24 Hrs. Caved@17.9
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2
Orientation Vertical

Boring No. B-8 Surface Elevation 1216.0 Sheet No. 1 of 2 sheets
For
Location
Started 04/25/12 Completed 04/25/12 Project No. 11063
Driller's Log ☐ Geologist's Log ☒ RCN
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN-REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (FL)	DESCRIPTION	REMARKS
0						0.0	ASPHALT PAVEMENT	
-0.6						0.6	STONE BASE	
-1				3		1.0	Brown And Gray SILTY CLAY, Little Sand, Little Gravel (Rock Fragments), Stiff to Soft, Moist to Wet	
				5	1.5			
				3				
				4				
				4	4.5		.Coal Fragments From 18.5-19.0' And 21.0-21.5'	
							.Wet And Soft From 15.5-16.5' And 22.0-25.0'	
				4				
				5				
				8	7.5		(Fill)	
				5				
				5				
				6	10.5			
				5				
				7				
				5	13.5			
				3				
				2				
				2	16.5			
				2				
				2				
				6	19.5			
				2				
				2				
				1	22.5			
				3				
				2				

GEO-MECHANICS, INC.

TEST BORING RECORD

Driller: Matt Hart
Drill Rig: BK-51
Water Level: O-Hr. 14.7 24 Hrs. Caved@17.9
Casing Hammer: Wt. ____ lbs. Drop ____ in.
Sampler Hammer: Wt. 140 lbs. Drop 30 in.
Sampler Size 2 in. O.D. Casing Size 3¼" in. I.D.
Core Bit Size NQ2 Driller's Log ☐
Orientation Vertical Geologist's Log ☒ RCN

Boring No. B-8 Surface Elevation 1216.0 Sheet No. 2 of 2 sheets
For ____
Location ____
Started 04/25/12 Completed 04/25/12 Project No. 11063
Drilling Fluid Water

ELEVATION	In-situ Tests and Instrumentation	RQD %	RUN	REC.	SPOON BLOWS / INTERV.	BOTTOM DEPTH OF SAMPLE	DEPTH (Ft.)	DESCRIPTION	REMARKS
-25					2	25.5	25.0	Continued From Previous Page	
-27.1							27.1		
					50/.1	27.1		CONCRETE FOUNDATION	Top of Footing @ 27.0± Top of Rock @ 27.1'
-31.5							31.5		
		?	5.0	5.0		32.1		Light Gray And Gray LIMESTONE, Thickly Bedded, Broken to Massive, Hard to Very Hard	
								.Clayey Shale From 33.9-34.1'	
								.Clay Seam From 36.9-37.1'	
								.Carbonaceous From 32.5-33.9'	
		36	5.0	4.2		37.1		.High Angled And Vertical Fractures From 31.5-33.9'	
								(RQD=61%)	
-40		100	2.9	2.9		40.0	40.0		
								Bottom of Boring @ 40.0'	

GEOTECHNICAL APPENDIX C

LABORATORY TESTING

GeoMechanics, Inc.
ELIZABETH, PA. 15037
Phone: 724/379-5300
Fax: 724/379-4242

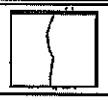
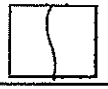
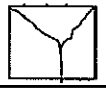
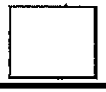
GEO-MECHANICS, INC

ASTM: D-7012 (METHOD C)

ROCK CORE COMPRESSION TEST DATA

PROJECT NO. 11063

PROJECT LOCATION: SHACOG - MT. LEBANON STATION

Sample Location	Type of Rock	Sample Diameter in.	Sample Length in.	Load lbs.	Uniaxial Compressive Strength		Sketch of Break	Remarks
					PSI	TSF		
B-1: 23.9'-24.3'	SHALE	1.976	4.114	4500	1467.40	105.65		
B-2: 20.7'-21.2'	SANDSTONE	1.985	4.126	28380	9170.66	660.29		
B-3: 31.2'-31.6'	SANDSTONE	1.988	4.109	27880	8981.92	646.70		
B-4: 26.0'-26.5'	LIMESTONE	1.989	4.059	24120	7762.77	558.92		
B-4: 29.5'-29.9'	CLAYSTONE	1.974	3.992	4400	1437.70	103.51		
B-6: 18.0'-18.5'	LIMESTONE	1.989	4.151	29020	9339.79	672.46		
B-7: 28.0'-28.5'	LIMESTONE	1.982	4.133	29240	9477.18	682.36		
								

GEOTECHNICAL APPENDIX D

CALCULATIONS

AECOM

End Bearing Resistance for Drilled Shaft
SHACOG - Multi-Use Facility - Mt. Lebanon
Project No. 60218008

MADE BY: RDR DATE: 6/5/2012
CHKD BY: BAS DATE: 6/18/2012

Assumptions: 4' diameter drilled shafts

Reference : R1 - AASHTO LRFD 2004
R2 - Lab testing results - GMI

Nominal Axial Compression Resistance of Single Drilled Shafts in Rock

$R_R=\phi_{qp}R_p$ R1 - 10.8.3.5-1
$R_p=q_pA_p$ R1 - 10.8.3.5-2
where:
R_R = factored shaft tip resistance (kips)
Φ_{qp} = resistance factor for tip resistance R1 - T10.5.5.2.4-1
R_p = nominal shaft tip resistance (kips)
q_p = unit tip resistance (ksf)
A_p = area of shaft tip (ft.^{2})

$q_p = [\sqrt{s}+\sqrt{(m\sqrt{s}+s)}]q_u$ R1 - 10.8.3.5.4c-2
where:
s, m = fractured rock mass parameters R1 - T10.4.6.4-4
q_u = unconfined compressive strength of rock (ksf)

Given: Sandstone q_u = 1301 ksf R2
m = 0.275 Rock Type C
s = 0.00009 Fair Quality Rock
Shaft Dia. = 4 ft

q_p = 79.1 ksf
A_p = 12.6 ft^2
R_p = 994.1 kips
Φ_{qp} = 0.55 R1 - 10.5.5.2.4-1

R_R = Φq_pR_p= 546.8 kips

Given: Limestone q_u = 1275 ksf R2
m = 0.128 Rock Type A
s = 0.00009 Fair Quality Rock
Shaft Dia. = 4 ft

q_p = 56.7 ksf
A_p = 12.6 ft^2
R_p = 713.0 kips
Φ_{qp} = 0.55 R1 - 10.5.5.2.4-1

R_R = Φq_pR_p= 392.1 kips

GEOTECHNICAL APPENDIX E

PRIOR BORING TEST INFORMATION

SUPPLEMENTAL SUBSURFACE INVESTIGATION
PROPOSED MT. LEBANON TOWN SQUARE
PROJECT SITE
WASHINGTON ROAD
MUNICIPALITY OF MT. LEBANON
ALLEGHENY COUNTY, PENNSYLVANIA

MT. LEBANON DEVELOPMENT GROUP

ENGINEERING MECHANICS, INC.
CONSULTING GEOTECHNICAL ENGINEERS
PITTSBURGH, PENNSYLVANIA

JANUARY, 1989

ENGINEERING MECHANICS, INC.
CONSULTING GEOTECHNICAL ENGINEERS
4636 CAMPBELLS RUN ROAD
PITTSBURGH PENNSYLVANIA 15205
PHONE: AREA CODE 412 / 923-1950

January 19, 1989

Mt. Lebanon Development Group
209 Ninth Street, Suite 500
Pittsburgh, PA 15222

Attn: William B. Bannow

Subject: Supplemental Subsurface Investigation
Proposed Mt. Lebanon Town Square Project Site
Washington Road, Municipality of Mt. Lebanon
Allegheny County, Pennsylvania
EMI Project 88072

Gentlemen:

Our March 23, 1988, Preliminary Foundation Considerations and April 22, 1988, Foundation Investigation for Parcel C reports present foundation considerations for the parking garage/Parcel C phase of the Mt. Lebanon Air Rights Development project. We have completed our supplemental subsurface investigation for the subject proposed Town Square phase of the project, a multi-story combination commercial, office and parking structure. This report describes the findings of the investigation and presents recommendations for the design and construction of foundations to support the building, and design considerations for underpinning, excavation and retaining structures.

SITE LOCATION AND CONDITIONS

The Mt. Lebanon Air Rights Development project includes a series of multi-story commercial, office and parking structures to be constructed above the Port Authority of Allegheny County (PAT) Mt. Lebanon LRT Station. As shown on the Site Location Plan of Fig. 1, the project area is essentially bounded by Washington Road on the west, Shady Drive East on the north and east, and Alfred Street on the south: it will span both the LRT Station and Parse Way. The proposed Town Square phase will encompass properties at 637 thru 661 Washington Road, an area centered on the existing Mt. Lebanon parking garage, where a 280-ft-wide, 2-story structure with a full basement will be constructed. It will also span over Parse Way and connect with an eight-

story "air rights" structure spanning the LRT Station. The existing Washington Road commercial structures will be razed to facilitate the proposed development.

Ground surface in the area investigated falls from maximum elev 1233 ft at its northwest corner (Boring 203) to minimum elev 1185 ft at its southeast corner (Boring 212) on an overall average grade of nine percent (9 ft vertical fall in 100 ft horizontal distance), although abrupt grade changes exist throughout at buildings and retaining walls. All elevations in this report are referenced to the ground surface elevations and contours shown on the untitled, undated site topographic survey provided by The Design Alliance (TDA), Project Architects. They appear to coincide with the United States Geological Survey (USGS) datum.

SUBSURFACE EXPLORATIONS

The Boring Location Plan of Fig. 1 shows the locations of 13 test borings drilled during Dec. 28, 1988, thru Jan. 9, 1989, by Terra Testing, Inc. to determine the physical properties of the site soils and rocks. Boring 202 was deleted during the course of the investigation due to utility interference. Upon penetrating the brick, concrete or bituminous pavements standard penetration tests (SPTs) were conducted at three-foot vertical intervals in the soil mantle of all borings in compliance with American Society for Testing and Materials (ASTM) Test Designation: D1586-84*. These tests provide a measure of the shearing resistance, or strength, of cohesive soils and the relative density of granular soils; they also provide soil specimens for laboratory evaluation. In all borings, the SPTs were continued to refusal on bedrock from which level 5 ft to 17 ft of continuous NX (2-1/8" dia) rock core were procured. Disrupted rock fragments along the edge of the LRT retaining wall excavation prevented completion of the Boring 211; it was offset two feet south, augered to a depth of 26.7 ft, then completed. The subsurface exploratory program entailed 214.8 lin ft of soil boring, 26.7 lin ft of soil augering, and 127.5 lin ft of rock coring.

**Under this test procedure, the number of blows (N) required to drive a two-inch outside diameter split barrel sampling tube a distance of one foot with a 140-pound hammer falling 30 inches is defined as "standard penetration test" (SPT).*

Borings 201 and 203 indicate that the soil mantle beneath the Washington Road sidewalk consists essentially of 3 ft to 6 ft of heterogeneous undifferentiated fill which directly overlies bedrock. Borings 204 thru 208, in the 2-story area between Washington Road and Parse Way, encountered 3 ft to 10 ft of fill overlying 10 ft (Borings 204 and 207) to 20 ft (Boring 208) of residual soil derived from the in-place decomposition of bedrock. The fill - a random mixture of slag, shale fragments, silt, organic silt, rock fragments, and burnt carbonaceous shale (reddog) - is mostly of soft consistency* where cohesive, and loose on the relative density scale** where granular particles prevail. The residual soil - mostly silt or decomposed siltstone which varies from stiff to hard - grades into bedrock, an interbedded sequence of carbonaceous sandy siltstone, carbonaceous siltstone, siltstone, sandy siltstone, clayey siltstone, and limestone which are extremely broken to massive and soft to hard, although mostly soft. Hard bedrock seams were encountered in the borings along Parse Way.

Borings 209 thru 211 were located in the sidewalk near the Parse Way east curb to avoid the foundation for the adjacent LRT retaining wall "B". These three borings encountered 15 ft to 26 ft of fill - a mixture of sandy silt, limy silt, cinders, rock fragments, carbonaceous rock fragments, sandy silt, slag, asphalt fragments, reddog, organic silt, gravel, carbonaceous rock fragments and a trace of wood - which varies from soft to very stiff. Concrete encountered in Boring 209 and difficulties encountered with spalling or loose rock layers in Boring 211 indicate that the LRT retaining wall foundation was over-excavated. The borings confirm that the retaining wall bears directly on bedrock in this area, limy or carbonaceous siltstone and limestone which are extremely broken to massive and soft to hard, although mostly hard with soft seams.

Borings 212 thru 214, adjacent to the Shady Drive East sidewalk east of the LRT Station, encountered 3 ft to 10 ft of fill overlying up to 4 ft of residual soil, consistent with previous borings along Shady Drive East. The fill

* *based on a scale of: very soft, soft, medium, stiff, very stiff, extremely stiff, hard*

** *based on a scale of: very loose, loose, medium dense, dense, very dense*

- mostly sandy silt with organic silt layers and concrete and rock fragments - varies in consistency from soft to stiff. The residual soil in these borings, stiff to hard decomposed sandy shale or sandy siltstone, grades into interbedded siltstone and limestone bedrock, with carbonaceous seams, which are moderately broken to massive and medium hard to hard with soft seams. Page 5 summarizes the subsurface explorations - detailed classification logs of the soils and rocks encountered are appended.

Observations for groundwater were conducted during the progress of the subsurface explorations and upon termination of boring operations. Groundwater was encountered only in Borings 204, 207, 208 and 214 at elevs 1203, 1193, 1197 and 1188, respectively. These levels generally represent groundwater from upper reaches migrating through the relatively porous lower layers of the residual soil. It should be controllable using conventional construction techniques such as sump pumping and surface diversions, and should not be a deterrent to the proposed development.

DISCUSSION AND RECOMMENDATIONS

It is our understanding that the Town Square phase of the Mt. Lebanon Air Rights development will include a 280-ft-wide, 2-story structure with full basement fronting on Washington Road in the area to be vacated by the present Mt. Lebanon parking garage and several adjacent structures. In addition, it will span over Parse Way and connect with an eight-story "Air Rights" structure spanning the present PAT LRT Mt. Lebanon Station. Profiles A-A thru C-C on Figs. 2 and 3 depict generalized subsurface conditions in the proposed construction area as developed from the isolated test borings. As shown on those profiles, the 2-story structure area will encounter bedrock along its west wall at proposed floor elevs 1210 on the south (Profile A-A) and 1217 on the north (Profile B-B). The remainder of the structure will overlie the soil mantle which is compressible relative to the rigid bedrock. As it does not appear feasible to undercut the bedrock along the west limit of the proposed structure to permit construction of a soil fill beneath its foundations, it is recommended that the entire structure be uniformly supported on bedrock.

SUMMARY OF SUBSURFACE EXPLORATIONS

BORING DESIGNATION	ELEVATION OF GROUND SURFACE (feet)	THICKNESS OF FILL (feet)	ELEVATION OF RESIDUAL SOIL SURFACE (feet)	THICKNESS OF RESIDUAL SOIL (feet)	ELEVATION OF COMPETENT RESIDUAL SOIL SURFACE (feet)	TOTAL DEPTH TO BEDROCK SURFACE (feet)	ELEVATION OF BEDROCK SURFACE (feet)	ELEVATION OF COMPETENT BEDROCK (feet)	ELEVATION OF GROUNDWATER SURFACE (feet)
201	1229	6	1223	1	1223	7	1222	-	NE*
202	- - -	- - -	- - -	- - -	-D E L E T E D-	- - -	- - -	- - -	- - -
203	1233	3	-	0	-	3	1230	1220	NE
204	1221	3	1218	19	1209	22	1199	-	1203
205	1233	6	1227	10	1227	16	1217	-	NE
206	1211	6	1205	12	1199	18	1193	1193	NE
207	1210	10**	1200	10	1197	20	1190	-	1193
208	1213	3	1210	20	1198	23	1190	1190	1197
209	1207	15	1192	9	1186	24	1183	1175	NE
210	1211	26***	-	0	-	26	1185	-	NE
211	1213	27	-	0	-	27	1186	1186	NE
212	1185	3	1182	4	1179	7	1178	1178	NE
213	1190	9	1181	4	1178	13	1177	1174	NE
214	1194	10	1184	2	-	12	1182	1182	1188

*none encountered
**includes 7 ft of colluvium
***includes 2 ft of concrete foundation

Where the depth to bedrock is five feet or less, the structure may be supported on conventional shallow isolated spread and/or continuous line footings designed for a net total combined load contact bearing pressure of five tons/-square foot. A minimum footing width of 18 in. should be maintained, and all exterior foundations should extend at least 42 in. below adjacent grade for frost penetration protection. Where the depth to bedrock is greater than five feet, it is recommended that the structure be supported on straight shaft cast-in-place drilled caissons (bored piles) extended to earth auger refusal* on bedrock or socketed three feet into bedrock, whichever first occurs, where they may be designed for a net total combined load contact bearing pressure of 15 tons/square foot. As the soil and bedrock at the site are carbonaceous, it is recommended that all foundations be constructed of acid-resistant concrete utilizing Type II or V portland cement with a pozzolan admixture. Temporary steel casings may be required to support the caisson excavations; the casings may be withdrawn during concrete placement operations. It is recommended that a minimum caisson diameter of 30 in. be maintained to facilitate cleaning and inspecting operations. Project specifications should require the caisson contractor to provide and man all necessary equipment to safely place workmen and/or inspectors in the caisson excavations in conformance with local, state, and federal regulations.

Due to the presence of carbonaceous strata at the site, it may be necessary to seal utility trenches penetrating through these materials with acid-resistant concrete as shown typically on Figure 4. In lieu of the sealing, the utility trench may be backfilled entirely with the acid-resistant concrete. The presence and extent of carbonaceous materials must be determined in the field during actual construction.

The proposed eight-story section of Town Square will be a column-supported structure spanning the existing LRT Station and tracks from the east side of Parse Way, which is supported by LRT retaining wall "B", to the lawn area

**Earth auger refusal is defined herein as material which cannot be excavated with foundation drilling rigs applying a minimum of 20,000 pounds of down force (crowd) and 50,000 foot-pounds of torque, such as a Hughes Tool Company LDH Digger or equal, on a suitable open-helix earth auger in good condition.*

along the Shady Drive East sidewalk. Due to their proximity to the retaining wall, and their anticipated high column loads, it is assumed that all foundations along Parse Way will consist of caissons bearing on bedrock at or below the retaining wall foundation bearing elevation. A net total combined load contact bearing pressure of 20 tons/sq ft can be achieved by extending the caissons for the Town Square high-rise area to earth auger refusal on bedrock or socketing them five feet into bedrock, whichever first occurs. All other caisson requirements described above also apply.

To prepare the two-story commercial area for floor slab-on-grade construction, it is recommended that all existing topsoil, pavement and debris be removed and that the existing fill subgrade be proof-rolled with a minimum of ten passes with a ten-ton steel-wheeled road roller or equivalent. Soft zones delineated by the proof-rolling should be undercut to competent material or to an additional depth of two feet, whichever first occurs. In addition, all existing building foundations should be removed to at least three feet below final floor elevation. The vacated volume may then be backfilled to final subgrade elevation utilizing suitable inert off-site borrow compacted to 95 percent of the maximum modified proctor dry density as determined by ASTM Test Designation: D1557-78, at water contents within three percent (±3%) of the optimum water content established by that test, if cohesive. If granular, the fill should be compacted to 70 percent relative density as determined by ASTM Test Designations: D4253- and 4254-83. Floor slab-on-grade construction is then permissible with non-bearing partition walls supported directly on thickened floor slab sections. All floor slabs and non-bearing elements should be divorced from all load-bearing members with isolation joints.

It is our understanding that the extent and elevations of basements and foundations of the existing buildings to remain north and south of the proposed structure have not yet been established. If underpinning is required, foundations for the adjacent buildings should be locally lowered

to material of similar, or greater, bearing capacity than their present bearing horizons - and to at least one foot below any adjacent Town Square excavation. The frost protection depth recommended above should also be maintained.

Underpinning is normally accomplished by transferring existing foundation loads to the proposed bearing horizon by digging nominal 3- to 4-ft-wide underpinning segments manually. Depending upon its depth, the underpinning excavation may require temporary shoring or other retaining support. Construction of the underpinning should be phased such that no underpinning segment is excavated within six feet of another until the concrete of the first segment has set for at least 72 hours. If the underpinning depth exceeds about five feet, more specialized construction techniques may be warranted. We would be pleased to consult with you regarding specific underpinning recommendations after the final design plans for the proposed structure and the existing conditions at the adjacent structures have been established.

All below-grade walls which will function as retaining walls should be provided with full-face minimum one-foot-thick blanket drains in conjunction with conventional foundation drains as shown typically on Figure 5. They may then be designed to resist lateral pressures based on an equivalent hydrostatic density of 45 lb/cu ft, plus applicable traffic surcharge loads.

Borings 201 and 203 indicate that the proposed basement excavation along Washington Road will mostly penetrate siltstone bedrock which ranges from medium hard with soft seams on the south (Boring 201) to mostly soft on the north. Our analysis indicates that the medium hard siltstone encountered in Boring 201 can be excavated on a slope of one vertical to three-fourths horizontal (1:3/4) for <u>temporary</u> cut slopes exposed three months or less - provided that the traffic lane adjacent to the sidewalk is blocked off. The soft siltstone encountered in Boring 203 should be cut no steeper than 1:1 for similar temporary excavations; the underlying medium hard siltstone can sustain a 1:3/4 slope also. As the excavation progresses east of Washington Road, the bedrock generally softens. The numerous utilities beneath the

sidewalk will also be considerations in excavation design and execution. Once your building design plans have been finalized and excavation procedures established, we would be pleased to provide you with lateral pressure diagrams for temporary retaining wall design, as required. The above recommendations are based on our understanding of preliminary building design considerations and available LRT construction information. We will be pleased to review your project designs as they are developed for compliance with the recommendations presented herein and to provide additional recommendations as necessary.

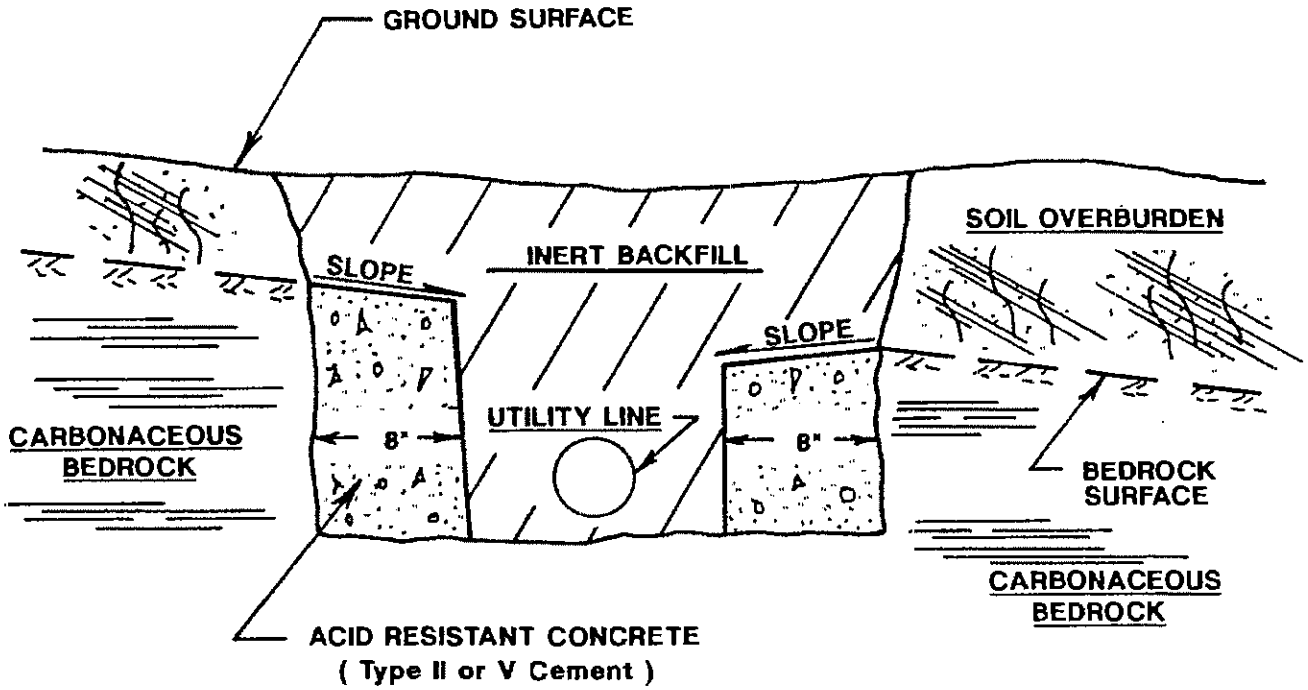
All foundation and underpinning construction and subgrade stabilization should be monitored on a full-time basis by a qualified soil technician under the direction of a professional (registered) geotechnical engineer to verify that the recommended bearing horizons and subgrade stabilization are consistently achieved. All recommendations presented herein are contingent upon such field verifications.

We sincerely appreciate the opportunity to be of service to you on this project and shall be pleased to meet with you to discuss our findings and recommendations in more detail. Should you have any questions in the meantime, please do not hesitate to contact us.

Respectfully submitted,
ENGINEERING MECHANICS, INC.

BY: Daniel Grieco Jr.
Daniel Grieco, Jr., P.E.
Principal Engineer

DG/pc



TYPICAL UTILITY TRENCH SEAL

(NOT TO SCALE)

NOTE:

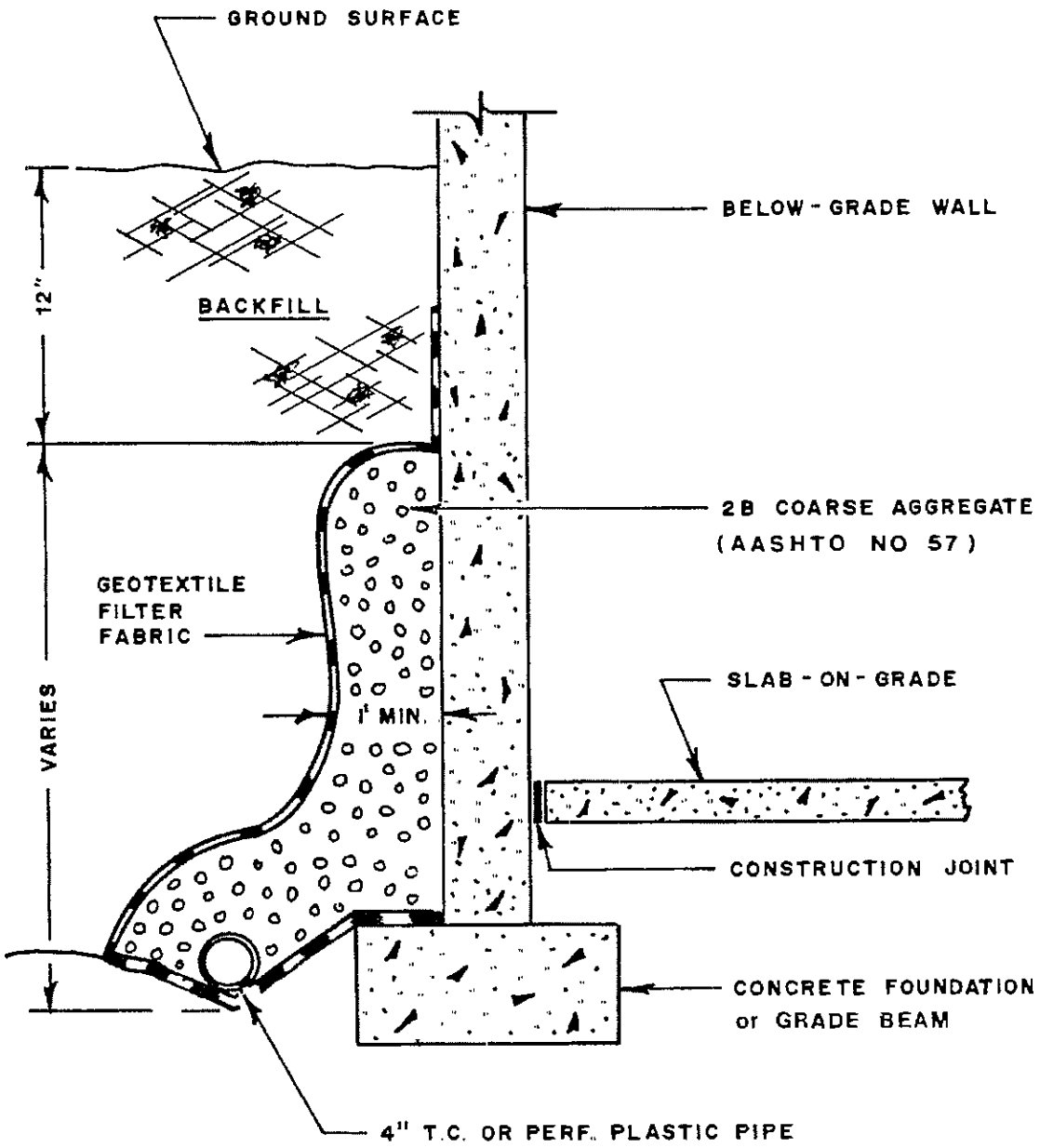
TO AVOID FORMING THE SEALS, THE LINE MAY BE ENCASED IN CONCRETE BY BACKFILLING THE TRENCH NEAT.

FIGURE 4

ENGINEERING MECHANICS, INC
Consulting Engineers · Pgh. Pa.

MOUNT LEBANON
TOWN SQUARE

EMI PROJECT No. 88072 - F



TYPICAL FOUNDATION DRAIN

(NOT TO SCALE)

FIGURE 5

ENGINEERING MECHANICS, INC.
Consulting Engineers · Pitts. Pa.

MOUNT LEBANON
TOWN SQUARE

EMI PROJECT No: 88072 - G

BORING 209

Ground Surface Elevation: 1207.1'

Groundwater Elevation: None Encountered

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 0.3	Auger	Asphalt pavement
0.5 - 1.0	3/0.5'	Slag base course
1.0 - 2.0	7	Brown and gray limy sandy silt, some rock fragments - medium, moist (FILL)
3.0 - 4.5	17	Brown sandy silt, some rock fragments and cinders - stiff, moist
6.0 - 7.5	7	Brown limy sandy silt, some rock fragments and carbonaceous rock fragments - soft, moist
9.0 - 10.5	10	Brown sandy silt, some rock fragments, trace of wood - stiff, moist
12.0 - 13.5	15	Brown and gray limy sandy silt, some rock fragments - stiff, moist
15.0 - 16.5	15	Black and brown silt and carbonaceous silt - stiff, damp (RESIDUAL)
18.0 - 19.5	13	Light brown decomposed limestone - stiff, moist
21.0 - 22.5	44	Light brown decomposed limestone - hard, moist
24.0 - 24.0	50/0	Refusal

(continued)

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

BORING 209 (cont'd)

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
24.0 - 27.8	NX core	Gray and brown limy siltstone, stained, trace of vertical fractures - extremely to moderately broken, soft to medium hard with hard seams (100)*
27.8 - 31.8	"	Gray sandy siltstone with limy seams, stained, trace of vertical fractures - moderately to occasionally broken, medium hard to hard with trace of soft seams (100)
31.8 - 34.0	"	Dark gray carbonaceous sandy siltstone with limy seams - moderately to occasionally broken, hard (100)
(bottom of boring)		

*percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

BORING 210

Ground Surface Elevation: 1211.4'

Groundwater Elevation: None Encountered

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 0.4	Auger	Asphalt pavement
1.0 - 2.0	7	Tan, gray and black slag, rock fragments and aspahlt fragments - loose, damp (FILL)
3.0 - 4.5	21	Brown and dark gray silt, sand, slag, gravel and rock fragments, some burnt carbonaceous shale (reddog) - stiff, damp
6.0 - 7.5	17	Brown limy silt, trace of rock fragments, reddog and carbonaceous silt - very stiff, damp
9.0 - 10.5	21	Brown and dark brown organic sandy silt and rock fragments, some slag, trace of carbonaceous silt - medium dense, moist
12.0 - 13.5	9	Brown sandy silt, some organic silt and rock fragments, trace of roots - stiff, damp
15.0 - 16.5	11	Dark brown and gray organic limy sandy silt and rock fragments, some gravel - loose, moist
18.0 - 19.5	11	Light brown limy silt, some rock fragments, trace of wood - stiff, moist
21.0 - 22.5	7	Brown limy silt, trace of rock fragments - medium, moist

(continued)

B O R I N G 210 (cont'd)

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
24.0 - 24.0	50/0	Concrete obstruction
24.0 - 26.2	NX core	Concrete obstruction
26.2 - 34.0	"	Brown and gray limestone with carbonaceous seams, stained, trace of vertical fractures - moderately to occasionally broken, hard with some soft seams (100)*
34.0 - 36.5	"	Gray sandy siltstone with limy seams, stained - moderately to occasionally broken, hard with soft seams (92)
(bottom of boring)		

Note: 25% drill water loss at 29.0 ft

*percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

BORING 211

Ground Surface Elevation: 1213.2'

Groundwater Elevation: None Encountered

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 0.5	Auger	Asphalt pavement
0.5 - 1.0	2/0.5'	Slag base course
1.0 - 2.0	10	Brown and dark brown sandy silt and rock fragments - stiff, damp (FILL)
3.0 - 4.5	14	Brown and dark brown organic sandy silt, some rock fragments, trace of roots - stiff, moist
6.0 - 7.5	12	Brown and gray organic silt, sand and rock fragments - stiff, moist
9.0 - 10.5	12	Brown silt, trace of slag and rock fragments - stiff, moist
12.0 - 13.5	11	Dark brown and brown silt and limy silt, some rock fragments - stiff, moist
15.0 - 16.5	5	Dark brown organic sandy silt, rock fragments and gravel - soft, moist
18.0 - 19.5	6	Brown and dark brown limy silt, some rock fragments, trace of carbonaceous silt - medium, wet
21.0 - 22.5	5	Brown silt, trace of rock fragments - soft, wet

(continued)

B O R I N G 211 (cont'd)

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
24.0 - 25.5	12	Brown and black sandy silt, some carbonaceous rock fragments - medium, moist
25.5 - 26.7*	Auger	Auger refusal at 26.7 ft
26.7 - 36.7	NX core	Gray limestone with carbonaceous seams, trace of angular joints - moderately to occasionally broken with massive seams, hard with trace of soft seams (98)**
(bottom of boring)		

Note: 100% drill water loss at 23.5 ft

* Encountered restriction at 23.5 ft beyond which drill tools could not be advanced, offset boring 2' west, augered to 26.7 ft and continued boring

**percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

B O R I N G 212

Ground Surface Elevation: 1184.6'

Groundwater Elevation: None Encountered

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 0.3	-	Topsoil
1.0 - 1.5	3	Brown organic silt, some rock fragments, trace of roots - soft, moist (FILL)
3.0 - 4.5	15	Brown decomposed siltstone - stiff, damp (RESIDUAL)
6.0 - 7.1	76/0.6'	Brown decomposed sandy siltstone - refusal, damp
7.1 - 12.1	NX core	Brown and gray siltstone with sandy seams, extremely stained, trace of vertical fractures and angular joints - moderately to occasionally broken, medium hard to hard with trace of soft seams (96)*
12.1 - 17.1	"	Gray and dark gray sandy siltstone with carbonaceous and limy seams, trace of stains and vertical fractures - moderately broken to massive, medium hard to hard (96)

(bottom of boring)

Note: 20% drill water loss at 10.5 ft

*percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

B O R I N G 213

Ground Surface Elevation: 1189.8'

Groundwater Elevation: None Encountered

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 1.0	7	Topsoil
1.0 - 1.5	7/0.5'	Brown silt, some rock fragments, trace of organic silt - stiff, moist (FILL)
3.0 - 4.5	15	Brown sandy silt - stiff, moist
6.0 - 7.5	9	Brown sandy silt, some carbonaceous silt and rock fragments - stiff, moist
9.0 - 10.5	12	Orange and tan silt - stiff, moist (RESIDUAL)
12.0 - 12.5	13/0.5'	Tan decomposed sandy shale - medium dense, damp
12.5 - 12.8	50/0.3'	Tan dcomposed sandy shale - refusal, damp
12.8 - 16.0	NX core	Gray and brown limy siltstone with carbonaceous seams, stained - extremely to moderately broken, soft with medium hard seams (100)*
16.0 - 22.8	"	Dark gray carbonaceous sandy siltstone - moderately broken to massive, hard with medium hard seams (100)

(bottom of boring)

*percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

BORING 214

Ground Surface Elevation: 1193.6'

Groundwater Elevation: 1188'

DEPTH (feet)	N (blows/foot)	DESCRIPTION AND REMARKS
0.0 - 1.0	7	Topsoil
1.0 - 1.5	7/0.5'	Dark brown and gray organic silt and concrete fragments, trace of wood - loose, moist (FILL)
3.0 - 4.5	4	Brown and gray silt, some organic silt and rock fragments, trace of carbonaceous silt - soft, moist
6.0 - 7.5	5	Gray and brown limy silt and rock fragments - very soft, saturated
9.0 - 10.0	2	Orange silt, some wood and rock fragments - very soft, wet
10.0 - 10.5	14/0.5'	Brown decomposed limestone - stiff, wet (RESIDUAL)
12.0 - 12.0	50/0	Refusal
12.0 - 19.0	NX core	Gray limestone with carbonaceous seams, stained, some angular joints - moderately broken to massive, hard with some soft seams (100)*
19.0 - 22.0	"	Gray limy siltstone with carbonaceous seams - extremely to moderately broken, soft with medium hard seams (100)

(bottom of boring)

*percent core recovery

MT. LEBANON - TOWN SQUARE
EMI PROJECT 88072

APPENDIX E
MEETING MINUTES

AECOM

Project: **Mt. Lebanon/Dormont Transit Oriented Development**

Client: **SHACOG – South Hills Area Council of Governments**

Purpose: **Project Kickoff Meeting**
Location: **Mt. Lebanon Municipal Building – Conference Room C**

Date & Time: June 27, 10:30 AM

I. Introduction of Project Personnel and their Primary Role in the Project
- A. Design Team
- B. SHACOG
- C. Mt. Lebanon
- D. Dormont

II. Project Scope / Program Confirmation
- A. Mt. Lebanon – Design, Survey, Geotechnical
- B. Dormont – Design, Survey, Geotechnical
- C. Information collected
- D. Additional information available

III. Deliverables
- A. Mt. Lebanon
- B. Dormont

IV. Client Expectations and Objectives
- A. Mt. Lebanon
- B. Dormont

V. Budget
- A. Mt. Lebanon - $130, 895
- B. Dormont - $67,105

VI. Project Schedule
- A. Mt. Lebanon
- B. Dormont

VII. Communication Protocols and Procedures

VIII. Billing Arrangements

IX. Client Input / Community Input

AECOM

AECOM
7 Saint Paul Street
17th Floor
Baltimore, Maryland 21202
www.aecom.com

410.637.1700 tel
410.576.1305 fax

Meeting Minutes – Subway Box

Date: **June 27, 2011**
To: SHACOG
From: Enrique Villa
Location: Mt. Lebanon Municipal Building – Conference Room C
Subject: **Mt. Lebanon / Dormont TOD Kickoff Meeting**

Distribution: All Attendees

ATTENDEE NAME	INITIALS	AFFILIATION	PHONE NUMBER
Dan Deiseroth	DD	Mt. Lebanon / Gateway Engineers	412-921-4030x110
Keith McGill	KM	Mt. Lebanon / Planner	410343-3684
Eric Milliron	EM	Mt. Lebanon / Economic Development	412-343-3412
Gino Rizza	GR	Dormont	412-561-3554
Ruthann Omer	RO	Dormont / Gateway Engineers	412-921-4030x102
Louis Gorski	LG	SHACOG	412-341-3750
Al Raine	AR	AECOM	617-290-9155
Robert Victor	RV	AECOM	412-395-8888
Bill Crawford	BC	J.W.Engineering	412-369-7400
Wayne Turner	WT	AECOM	617-371-4465
Enrique Villa	EV	AECOM	410-637-1706
Jud Herter	JH	AECOM	412-316-3588

ITEM	DESCRIPTION
1	Meeting started with an overview of Mt. Lebanon and the need to look at high density design
2	Have not talked to building owners about air rights
3	Port Authority currently has an arrangement where the Municipality maintains stairs and elevators
4	DD emphasized the importance of accomplishing the highest density possible
5	Hotel currently uses 88 parking spaces and leases 11 from Municipality

6 The goal is to make it "fit" to what's currently at Shady Drive East

7 The property line is defined by the edge of Parcel Way

8 The hotel created a 10' ROW set of stairs. The developer paid particular attention to Shady Drive East. The hotel design has as much a front to Washington Road, as it does to Shady Drive East.

9 The goal of this effort is to take the existing TRID study to the next level. The final deliverable will be taken to developers for interest and further refinement.

10 May need to look at alternatives to staircase, as shown on the TRID study.

11 AECOM team requested a copy of the Site Plan. It was recommended to stay at the Air Rights Datum.

12 Geotechnical work will follow main structure work.

Dormont Comments

13 Dormont is currently working with various developers

14 A traffic study was conducted by the new CVS. Information will be shared with the team

15 Currently, Dormont is trying to define the balance of retail, to commercial, to parking.

16 Deed of Trust – it appears the records were lost and it has become an issue of time validity. The conclusion of the TRID was Burough owes air rights

17 Port Authority would like a 1:1 parking replacement (believed to be 143 spaces)

18 Survey, roadway, topo information layout will come from developers

19 Dormont will send traffic counts from recent study.

20 Deliverable for Potomac: Take TRID study and see what next steps are required, synopsis. It is meant to be a written description with no graphic information.

Structural Comments

21 Mt. Lebanon lends itself well to a bay design configuration that is 25' O.C. by 60' in length. It is expected that the study will generate what is considered to be a reasonable estimate, with the goal to have the Port Authority reach a level of comfort with the touch down points.

22 Permint requirements are expected to include temporary easements

23 The size of the T-Beam frames is a concern, in terms of its constructability, timing of down time / setting time – construction staging. Construction staging is expected to be challenging in the available site.

Dormont Comments

24 Agenda for public meetings remains to be determined. The survey will be generated first

25 Currently, there are two developers at Dormont, with two different ideas.

Communication Protocols

26 Will publish a schedule

27 No standard billing form is needed. Generated report needs to reflect % completion

28 Wednesdays seem to work best for WEBEX coordination efforts.

APPENDIX F
APPROVAL PROCESS

Municipality of Mt. Lebanon

710 Washington Road
Pittsburgh, PA 15228
(412) 343-3684 FAX (412) 343-3753

LD 201__ - ____

Land Development Application Checklist

Final Application Checklist

Name of Land Development Plan:

_____

			Yes	No	N/A
1	506.1.	Ten (10) copies of the completed application form.			
2	506.2.	Application filing fee.			
3	506.3.	Evidence of ownership or proprietary interest.			
4	506.4.	One (1) copy of the approved preliminary plat, unless the application is for combined preliminary and final approval authorized in Chapter 16.			
5	506.5.	Ten (10) copies of a final plat drawn in accordance with the specifications shown in the applicable diagrams in Appendix II at a scale of not less than one inch equals one hundred feet (1"=100'). The final plat shall show or be accompanied by the following information.			
6	506.5.1.	Date, name and location of the land development, the name of the owner, graphic scale and the words "final land development plan."			
7	506.5.2.	Tract boundary lines, right-of-way lines of streets, street names, easements and other rights-of-way, land reserved or dedicated to public use, all lot lines and other boundary lines; with accurate dimensions, bearing or deflection angles, and radii, arcs and central angles of curves; and the area of each lot.			
8	506.5.3.	The names, exact location and widths of all existing and recorded streets intersecting or paralleling the plot boundaries within a distance of two hundred (200) feet or the next nearest intersection.			
9	506.5.4.	The purpose location and dimensions of any easement or land reserved or dedicated to public use shall be designated.			
10	506.5.5.	Lot and block numbers assigned to the property by the County Assessment Office, including lot and block numbers of immediately abutting property.			
11	506.5.6.	Certification by the applicant's surveyor as to accuracy of details of plat. The error of closure shall not be more than one (1) in ten thousand (10,000).			
12	506.5.7.	Dates of preparation and dates of all revisions to the plan.			
13	506.5.8.	Name and business address of the registered architect, landscape architect or professional engineer who prepared the plan.			
14	506.5.9.	Evidence of required permits from applicable Federal, State and County agencies.			
15	506.5.10.	Certification of service from all applicable utility companies.			
16	506.5.11.	A design view of the front, side and rear elevations of the proposed structures. Design view elevations are also to be shown where proposed additions or alterations affect such elevations.			
17	506.5.12.	Location, height and use of all existing and proposed structures on the property, indicating structures to be removed, if any, and the distances between proposed structures or additions to existing structures and adjacent property lines.			

			Yes	No	N/A
18	506.5.13.	A site lighting plan showing details of all exterior lighting fixtures and supports, the location of exterior lighting fixtures proposed to light the buildings, parking areas, sidewalks and any other areas proposed for public use; documentation that proposed lighting will be shielded and reflect away from adjacent streets and residential properties; a photometric plan.			
19	506.5.14.	Layout and design of proposed parking and loading areas, including the gradient of proposed driveways and parking facilities and the proposed pattern of traffic circulation on the site, including pavement markings, islands, curbs, bumper guards and similar facilities.			
20	506.5.15.	Sidewalks or walkways, if any, proposed for pedestrian circulation on the site.			
21	506.5.16.	The type of paving material to be used for all sidewalks, walkways, driveways and parking facilities.			
22	506.5.17.	A final landscaping plan showing the type, size and location of any plant material proposed, a planting schedule, all areas proposed to be seeded, and the parties responsible for future maintenance.			
23	506.5.18.	Construction materials of all fences, walls or screens.			
24	506.5.19.	A final grading plan, as required by Chapter VI (Grading and Excavating and Development of Slopes), including erosion and sedimentation control measures, as required by Section 804.1 of Chapter 16			
25	506.5.20.	If applicable, a notation on the plat that access to a State highway shall only be authorized by a highway occupancy permit issued by the Pennsylvania Department of Transportation under Section 420 of the State Highway Law (P.L. 1242, No. 428 of June 1, 1945).			
26	506.5.21.	If applicable, a notation on the plat that access to a County owned road shall only be authorized by a highway occupancy permit issued by the Allegheny County Department of Public Works.			
27	506.5.22.	If applicable, an N.P.D.E.S. Permit.			
28	506.5.23.	If applicable, final stormwater management calculations and construction drawings for stormwater management facilities as required by Section 809 of Chapter 16.			
29	506.5.24.	Storm drainage plan, including location, size, slope, direction of flow, capacity and material of all storm sewers and connections to existing systems; location of all catch basins, manholes, culverts and other appurtenances; location and width of all storm drainage easements; and location of surface swales, if any.			
30	506.5.25.	Written evidence that an amenities bond for private improvements, as required by Section 510 of Chapter 16, will be submitted at the time of execution of the development agreement			
31	506.5.26.	An executed development agreement in a form approved by the municipality.			
32	506.5.26.1	Petition for improvements. When street and other improvements have not been made previously in accordance with municipal specifications, including any streets which were not built originally to municipal specifications, there shall be submitted to the manager, at the time the final plat is submitted to him for approval, the following executed documents			
33	506.5.26.1.1	A petition from the developer to the Commission requesting the municipality to grade, pave, curb and storm sewer the streets in the proposed subdivision or land development and to install the necessary sanitary sewers required in the proposed subdivision or land development.			
34	506.5.26.1.2	A release of damages by the developer, releasing the municipality from claims for damages arising from street improvements and the installation of sanitary sewers and storm sewers.			

			Yes	No	N/A
35	506.5.26.1.3	An agreement between the developer and the municipality providing either (a) a cash deposit with the municipality or (b) an irrevocable letter of credit payable to the municipality, from a commercial bank organized under the Pennsylvania Banking Code of 1965 or the National Banking Act, having its principal place of business in the Commonwealth of Pennsylvania, and having unimpaired capital and surplus of at least one hundred (100) times the face amount of the letter of credit. The cash deposit or letter of credit shall be in an amount as determined by the Municipal Engineer, equal to one hundred ten percent (110%) of the engineering installation of the improvements in accordance with the standards and specification of the municipality.			
36	506.5.26.2	Forms for the petition, release of damages, and agreement (including the letter of credit, if used) shall be obtained from the manager.			
37	506.5.27	Spaces for signatures of the President and Secretary of the Commission; the Chairman and Secretary of the Planning Board; the Municipal Engineer; and dates of approval.			

Does the preliminary plan include, or is it accompanied by, the following:

	√		√
Scale of 1" to 100'		Graphic Scale	
Date of Preparation		Map and Parcel Number	
Name of Development		Name and Address of Record Owner	
North Arrow		Name and Address of Applicant	
Location map		Name, Address, License Number, and Seal and Signature of Person Preparing the Survey	

Submitted by:

Signature

Date

APPENDIX G
CODES AND REQUIRED PERMITS

Codes and Required Permits

Codes

Building Code.....2006 IBC Fire Protection Code as amended
Mechanical Code.....2006 IBC Mechanical Code as amended
Electrical Code.....2006 IBC Electrical Code as amended and
National Building Code as amended
Plumbing Code.....Plumbing Code Allegheny County – Article XV

Mt. Lebanon Ordinances and Regulations

Zoning Ordinance
Subdivision Ordinance and Regulations
Demolition Regulations
Grading Ordinance
Street Excavation Ordinance

Permits and Fees

Building Permit – Fee coincides with state fee
Commercial & Multi-family Building Permit – Fee based upon formula based upon formula
Commercial Demolition Permit – Base fee plus additional based upon number of square feet
Commercial Occupancy Permit – Fee for initial inspection and re-inspections if necessary
Dye Test – Fixed fee
Grading and Excavation Permit -Fee based upon amount of earth to be moved
Building Inspector Fees – Fee based upon cost/hour
Sign Permit – Fee based upon size of sign
Temporary Sign Permit – Fixed fee
Plumbing Permit - Inspection Fee – Allegheny County Health Department
Electrical Permit - Inspection Fee – Middle Department Inspection Agency

Utilities

Duquesne Light
Equitable Gas
Columbia Gas
Peoples Gas
PA American Water
ALCOSAN