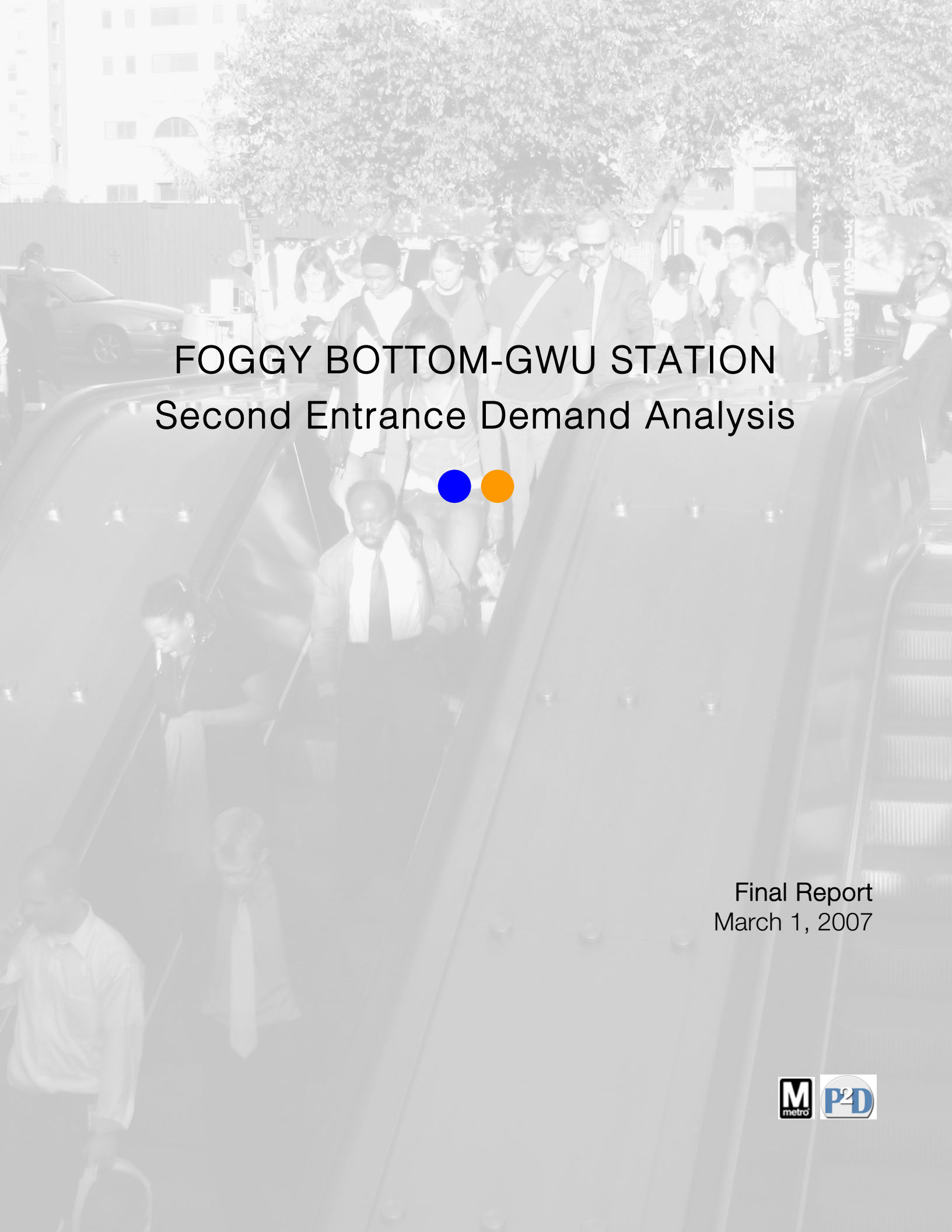

FOGGY BOTTOM-GWU STATION
Second Entrance Demand Analysis

Final Report
March 1, 2007

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FOGGY BOTTOM-GWU STATION
Second Entrance Demand Analysis

Washington Metropolitan Area Transit Authority

Final Report

March 1, 2007

a joint venture of:

- Parsons Transportation Group Inc.
- Parsons Brinckerhoff Quade & Douglas, Inc.
- Delon Hampton & Associates, Chartered

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EXECUTIVE SUMMARY

The Foggy Bottom-GWU station carried the eighth highest number of daily riders in the Metrorail system in 2006. Though the station efficiently handles passengers during typical peak hours, its emergency egress capabilities do not meet industry standards. In addition, ridership at the station is expected to increase approximately 15 percent by 2030. The addition of a second entrance to the Foggy Bottom-GWU Metrorail station would improve access to the station, the future efficiency of the station, and emergency evacuation time.

This study compared alternative entrance configurations by analyzing existing and future land uses, existing and projected future ridership, capacity constraints of the various station facilities, physical constraints of the site, and emergency egress performance.

Station Area Land Use and Ridership

Due to its central location in the District, the station area is home to more office than residential development. In addition, the majority of parcels within the station area are already developed. The DC Office of Planning, however, does anticipate an approximately 20 percent increase in station area households and two percent increase in employment by 2030.

The addition of a second station entrance at the intersection of 22nd and I Streets NW would not measurably increase the catchment area for walk-access passengers, which are the majority of Foggy Bottom-GWU riders. However, an entrance at this location would improve access for passengers located to the east of the station.

Forecasted ridership trends at the station are presented in the table below. Passenger volumes at the station are expected to increase by approximately 15 percent, which is similar to expected land use increases.

Table 1: Foggy Bottom-GWU Station Ridership Forecasts

	Time	2005	2010	2020	2030	% Change 2005-2030
Boardings Peak ½ Hour	5:00 PM - 5:30 PM	1,943	2,005	2,217	2,232	14.9
Boardings Peak Hour	5:00 PM - 6:00 PM	3,666	3,731	4,165	4,207	14.8
Alightings Peak ½ Hour	8:30 AM - 9:00 AM	2,133	2,173	2,413	2,445	14.6
Alightings Peak Hour	8:00 AM - 9:00 AM	4,220	4,249	4,700	4,751	12.6

Source: WMATA Station Access and Capacity Study data, 2006

Station Entrance Alternatives

The study explored the following alternatives:

1. Entrance at northwest corner of 22nd and I Streets NW
2. Entrance at southeast corner of 22nd and I Streets NW
3. Entrance locations near the corner of 24th and I Streets NW

A new entrance at the southeast corner of 22nd and I Streets NW is recommended. A new entrance at this location could be integrated into a future building, as the GWU Campus Plan proposes the redevelopment of this block.

The recommended entrance would include two escalators, a stair, and two elevators from the surface. These vertical access features would lead to a new mezzanine level outside the station tunnel, which would contain the faregate array for entry to the station. A short pedestrian tunnel would lead to two ADA-compliant elevators and a new stair leading down to the platform level.

An entrance at the northwest corner of 22nd and I Streets would provide needed additional station capacity, but it is not recommended. A new entrance here would require more-extensive construction because of the site topography, as well as a redesign of the buildings already planned for the site. An entrance west of the station is not recommended for several reasons. A new entrance to the west would not provide necessary added station capacity because all passengers would still have to move through the single internal mezzanine. In addition, each location for a new entrance west of the station would have at least one serious physical or construction drawback.

Implementation

Construction of a second entrance at the east end of the Foggy Bottom-GWU station would require architectural and structural modifications to the existing station as well as changes to the mechanical and electrical systems. All would be designed to comply with the applicable WMATA design criteria.

Order-of-magnitude costs were estimated for the construction of a second entrance at the east end of the Foggy Bottom-GWU Metrorail station. They total $21.2 million.

This study assumed that a second entrance to the Foggy Bottom-GWU station would be jointly developed by WMATA and The George Washington University (GWU). Because GWU is planning to redevelop the site recommended for a new entrance, developing the site concurrently would decrease construction time and costs and would provide for efficient use of infrastructure.

1 INTRODUCTION

The Foggy Bottom-GWU Metrorail station, located on the Metrorail Orange and Blue Lines, is the primary Metrorail station for residents and workers in the Foggy Bottom neighborhood and The George Washington University (GWU) campus in Washington, DC. The station has a single entrance, located at the northwest corner of 23rd and I Streets NW. In 2006, the station served the eighth highest number of daily riders in the Metrorail system; by 2030, the Washington Metropolitan Area Transit Authority (WMATA) expects ridership to grow by about 15 percent. According to the WMATA *Core Capacity Study*, the station is located in the Metrorail "core," making its capacity and access critical to expected system ridership growth.

The platform of the Foggy Bottom-GWU station runs under I Street NW from 22nd Street to between 23rd and 24th Streets NW. The existing station entrance is near the west end of the platform, just west of 23rd Street NW.

1.1 Purpose and Methods

Of the nine busiest Metrorail stations, Foggy Bottom-GWU is the only one with a single entrance. The creation of a second entrance would help improve station access to and from the surrounding area and increase the station's capacity to handle passengers during peak and emergency conditions. Therefore, the District of Columbia government requested that WMATA study the feasibility of adding a second entrance to the Foggy Bottom-GWU station.

The study compared alternative entrance configurations by analyzing existing and future land uses, existing and projected future ridership, capacity constraints of the various station facilities, and emergency egress performance. Based on this information, a new station entrance was conceptually designed and its costs were estimated.

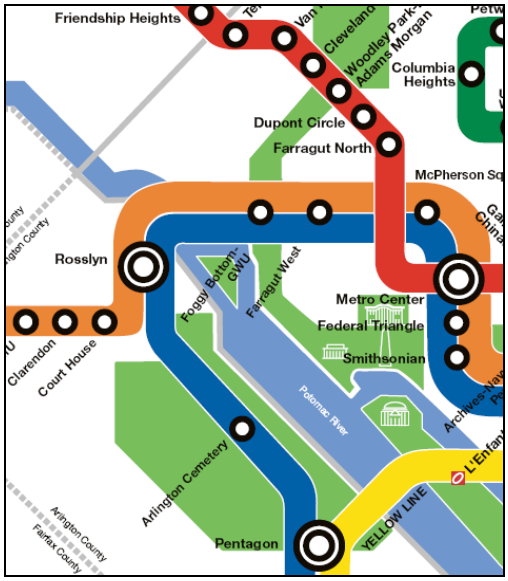

Figure 1: Foggy Bottom-GWU and Surrounding Metrorail Stations
Source: WMATA, 2006

2 STATION CHARACTERISTICS TODAY

2.1 Station Area Land Use

The Foggy Bottom-GWU Metrorail station is located close to the Potomac River, the Downtown Business Improvement District (BID), the Golden Triangle BID, and the West End neighborhood. The GWU campus and the GW Hospital, which opened in 2002, surround the station. Due to its central location in the District, the station area is home to more office than residential development. In addition, the majority of parcels within the station area are already developed. Recent station-area developments include mixed-use residential and retail at the former Columbia Hospital for Women site and a specialty grocery store, both at 24th and L Streets NW.

The DC Office of Planning provided land use information at the traffic analysis zone (TAZ) level. The station area TAZs are shown in Figure 2 and summarized in Table 2. Figure 3 shows the station-area neighborhoods.

Table 2: 2005 Station Area Land Use

	Households		Employment	
	2005	% of Total	2005	% of Total
¼ Mile Radius	6,072	12	44,656	88
½ Mile Radius	9,128	6	144,026	94

Source: DC Office of Planning (based on MWCOG Round 7.1 household and employment forecasts)

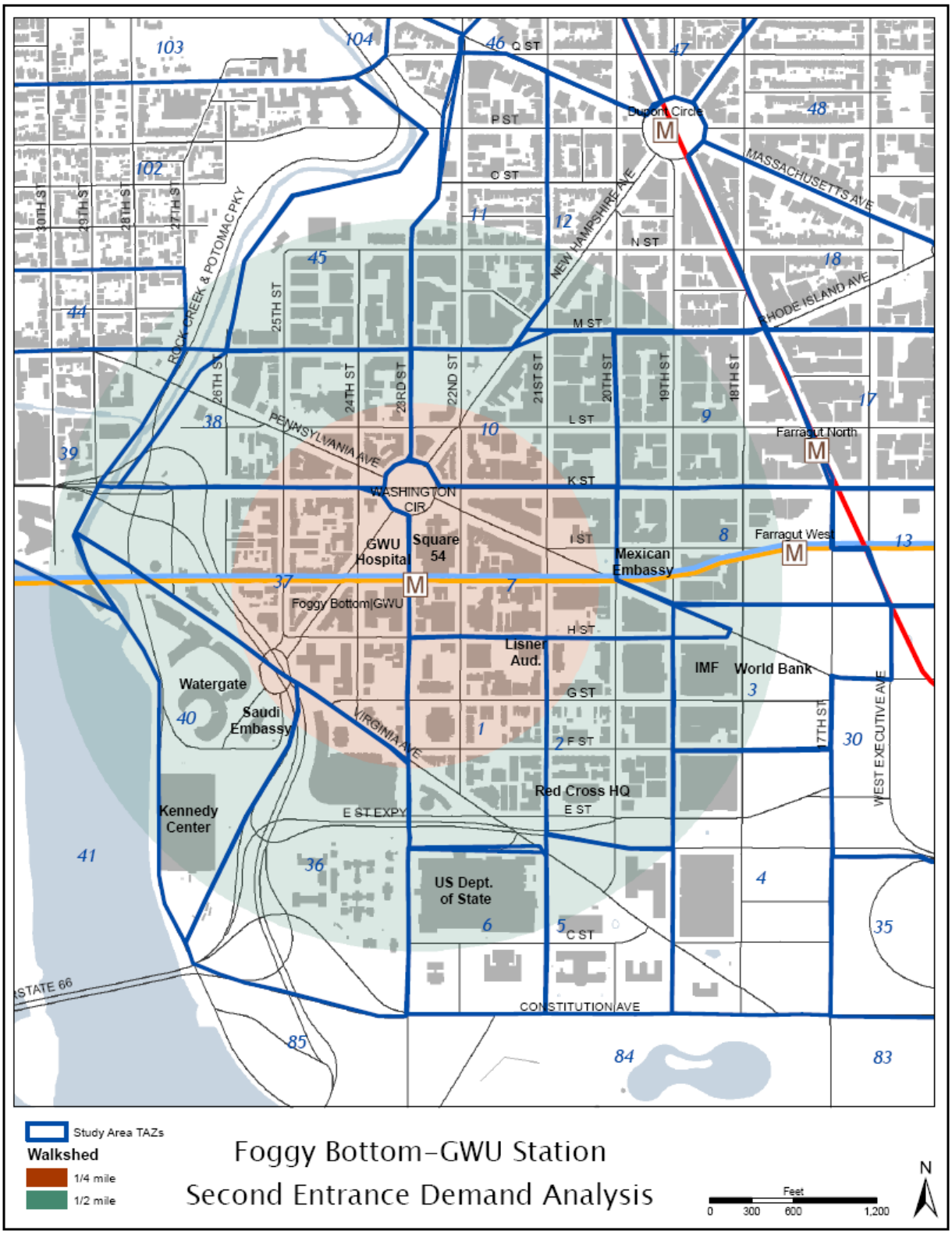

Figure 2: Station Area Walkshed and TAZs
Source: DC-OCTO-GIS, MWCOG, PB, 2006

Figure 3: Aerial View of the Foggy Bottom-GWU Area
Source: DC-OTCO-GIS, 1999

2.2 Existing Ridership

The Foggy Bottom-GWU station carried an average of 40,864 passengers per day in 2006, making it the eighth busiest Metrorail station. The existing ridership patterns at the Foggy Bottom-GWU station are shown in Figure 5. As expected from the predominance of jobs near the station, station exits, or alightings, are highest in the morning when riders are traveling to work and entries, or boardings, are highest in the evenings when riders are leaving work.

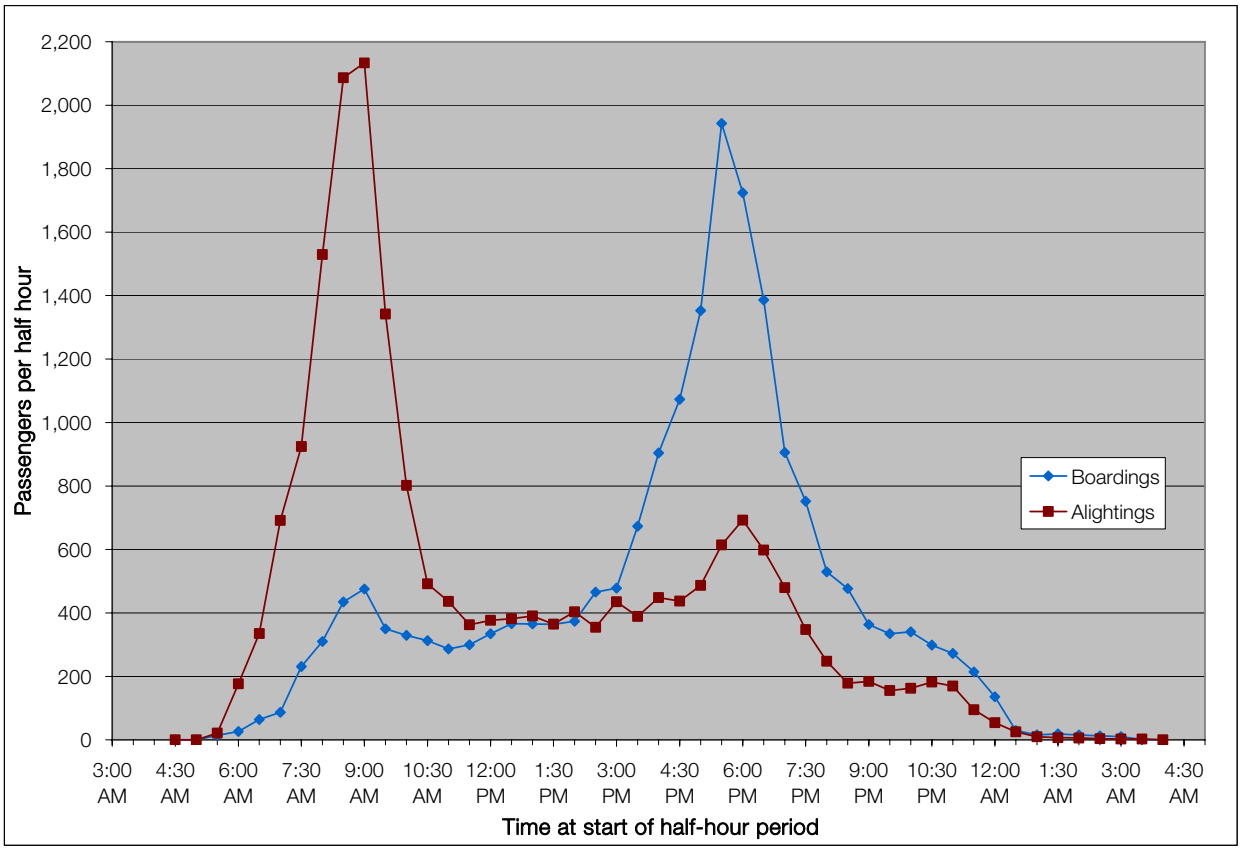

Figure 4: Existing Foggy Bottom-GWU Metrorail Station Boardings and Alightings
Source: WMATA Faregate data, May 2005

Figure 5: Riders entering the Foggy Bottom-GWU station during the evening peak hour
Source: PB, 2006

Ridership data collected from WMATA shows that the existing peak hours are 8:00-9:00 a.m. and 5:00-6:00 p.m.; similarly, peak half hours are 8:30-9:00 a.m. and 5:00-5:30 p.m.

Table 3: Average Weekday Boardings and Alightings, 2006

Time Period		Boardings	Alightings	Total
AM Peak Half Hour	8:30–9:00 AM	475	2,133	2,608
AM Peak Hour	8:00–9:00 AM	910	4,220	5,130
PM Peak Half Hour	5:00–5:30 PM	1,943	614	2,557
PM Peak Hour	5:00–6:00 PM	3,666	1,307	4,973

Source: WMATA Faregate data, May 2006

The majority of riders accessing the station arrive by walking (89 percent in the PM peak period), followed by bus, as shown in Table 4 and Figure 6. Because most riders already walk to the station, a new entrance located close to the existing entrance is not likely to attract a different balance of modes than exists today.

Table 4: Foggy Bottom Access Modes

Time Period	Total	Bicycle	Kiss 'n Ride	Drove & Parked	Metrobus	Other bus	Rode w/ someone, parked	Taxi	Walk
AM Peak	1,955	0	130	65	260	32	19	0	1,448
Percentage	-	0.00%	6.64%	3.32%	13.29%	1.66%	1.00%	0.00%	**74.09%**
Midday	4,112	13	107	134	107	134	0	40	3,576
Percentage	-	0.33%	2.61%	3.26%	2.61%	3.26%	0.00%	0.98%	**86.97%**
PM Peak	10,579	0	91	110	292	713	0		9,373
Percentage	-	0.00%	0.86%	1.04%	2.76%	6.74%	0.00%	0.00%	**88.60%**
Evening	4,872	0	34	51	102	392	0	17	4,276
Percentage	-	0.00%	0.70%	1.05%	2.10%	8.04%	0.00%	0.35%	**87.76%**

Source: WMATA 2002 Metrorail Passenger Survey

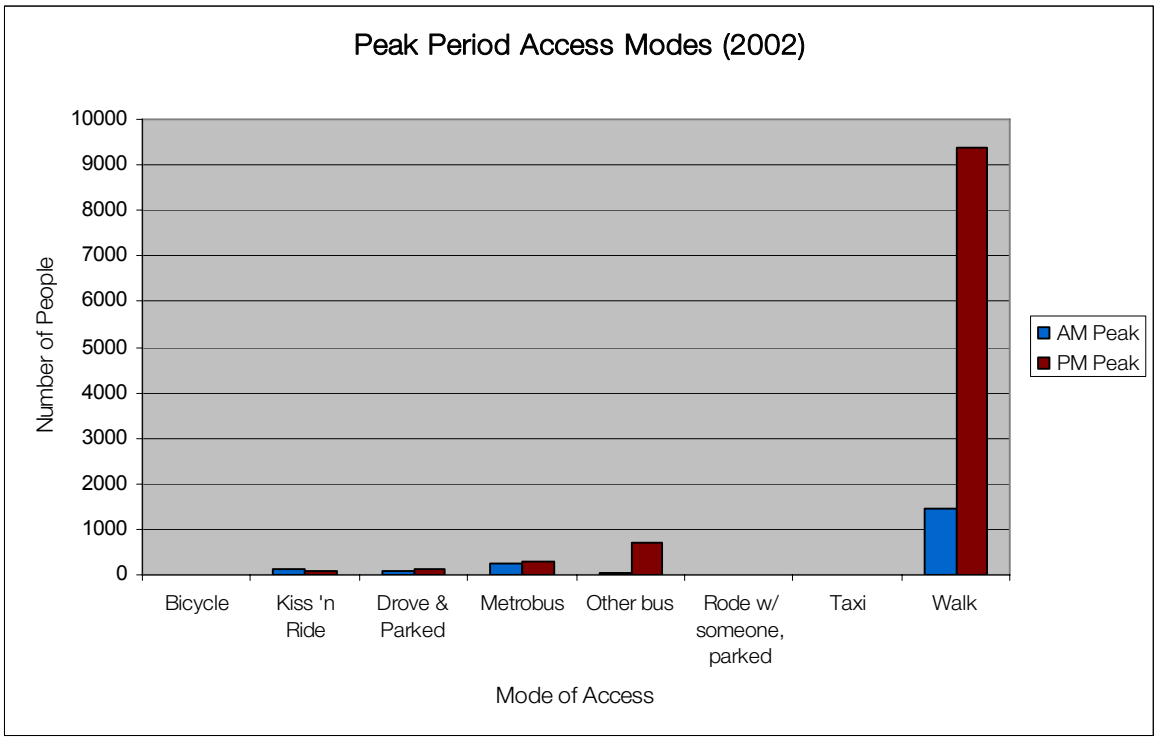

Figure 6: Foggy Bottom-GWU Station Peak Period Access Modes
Source: WMATA 2002 Metrorail Passenger Survey

2.2.1 Station Bus Service

As shown in Figure 7, Metrobus routes H1, L1, and N3 serve the Foggy Bottom-GWU station. Peak-period headways for these routes range from 15 to 30 minutes. Other Metrobus routes and the DC Circulator, with shorter headways, run within one block of the station. Bus access to the station is highest in the AM peak period.

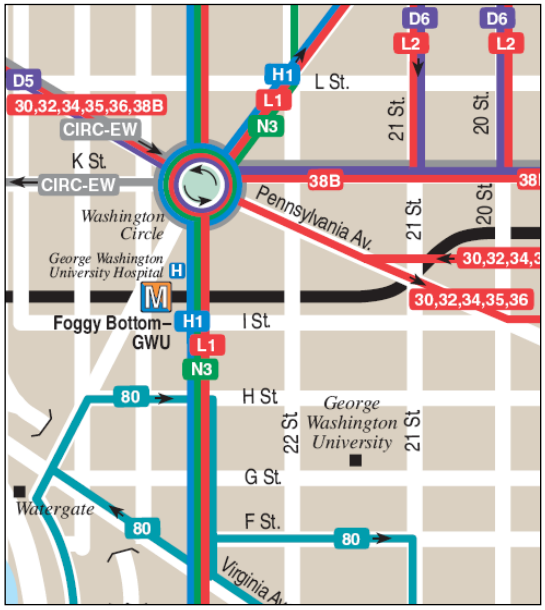

Figure 7: Bus Routes near Foggy Bottom-GWU
Source: WMATA, 2006

2.2.2 Pedestrian and Bicyclist Facilities

There are both pedestrian and bicyclist amenities at the Foggy Bottom-GWU Metrorail station. Based on a 2006 field survey performed by WMATA, 55 percent of the 20 bike lockers and 100 percent of the 10 bike racks at the station were utilized. There are no designated bike routes leading to the Foggy Bottom-GWU station, but the District Department of Transportation (DDOT) considers most station area roads as "fair" for bicycling. The absence of bicyclists accessing the station during the peak hours suggests a need for bicycle improvements to the station, such as additional bike racks.

In general, the roads leading to the station have wide sidewalks, crosswalks, pedestrian countdown signals, and wheelchair ramps.

Figure 8: Bike Racks at the Station

Figure 9: Pedestrians Approaching the Station

2.3 Existing Capacity

The Foggy Bottom-GWU station has adequate capacity for present ridership. Some elements, such as the escalators and farecard vending machines, are near capacity.

Table 5: Existing Infrastructure Capacity Summary

Infrastructure Element			Number of Elements Required	Number of Existing Elements
Vertical Circulation	Street to Mezzanine	Escalators	3	3
		Elevators	1	1
		Stairs	0	0
	Mezzanine to Platform	Escalators	3	3
		Elevators	1	1
		Stairs	0	0
Farecard Vendors			7	12
Faregate Aisles		Standard	5	15
		ADA	1	1
		Total	6	16

Source: PB, 2007

The mezzanine-to-platform escalator is near capacity during the PM peak period, as shown in Figure 10. Although boarding passengers are the dominant flow during this period, WMATA operates only one of the three escalators in this direction. This configuration maintains two escalators for alighting passengers to accommodate surges, such as when two trains arrive at the platform at the same time.

Figure 10: Mezzanine-to-Platform Flow in the Evening
Source: PB, 2006

Though the station efficiently handles average volumes of passengers, its emergency egress capabilities do not meet the standards set by the National Fire Protection Association (NFPA) *Standard for Fixed Guideway Transit and Passenger Rail Systems 2007* (NFPA 130), which call for clearing the platform in four minutes and evacuating the station in six minutes. The construction of the Foggy Bottom-GWU station predates this standard; therefore, WMATA is not required to meet these evacuation times, but uses them as design goals.

Table 6 shows that in the PM peak hour, the Foggy Bottom-GWU station's evacuation times are two to three times that of the aforementioned standards. This is largely because the platform-to-mezzanine escalators are located at the west end of the platform, requiring all passengers to exit the station at the same location.

Table 6: Existing Emergency Egress Results

	AM Peak	PM Peak
Time to Clear platform (min)	8.3	10.6
Evacuation Time (min)	14.7	19.6

Source: PB, 2007

A more detailed discussion of existing and future capacity is in Section 4.2 and 4.3 of this report.

3 FUTURE STATION CHARACTERISTICS

The future station configuration would include two entrances. Because the existing station entrance is near the west end of the platform, logical options for a second station entrance include 22nd Street NW and near the existing entrance. The analysis in this section takes into account the possibility of a second entrance at the intersection of 22nd and I Streets NW.

3.1 Projected Land Use

The DC Office of Planning, as part of the regional cooperative land-use forecasting process, expects minimal office and moderate residential growth in the station area. Table 7 shows the projected number of households and jobs within one-quarter and one-half mile of the station.

Table 7: Household and Employment Forecasts with Station Walkshed

	Households				Employment			
	2005	2010	2030	**% change, 2005 to 2030**	2005	2010	2030	**% change, 2005 to 2030**
¼ Mile Radius	6,072	6,690	7,197	**18.53**	44,656	45,076	45,636	**2.19**
½ Mile Radius	9,128	10,062	11,247	**23.21**	144,026	146,086	147,651	**2.52**

Source: DC Office of Planning (based on MWCOG Round 7.1 household and employment forecasts)

Figures 11 and 12 spatially show the future households and jobs. Most of the households will be to the west and north of the station, whereas most of the employment will be located to the east, north, and south of the station. These figures show the walkshed of a second entrance at the intersection of 22nd and I Streets NW, which is similar to the existing station entrance walkshed. The future ridership would not measurably increase as a result of a second entrance.

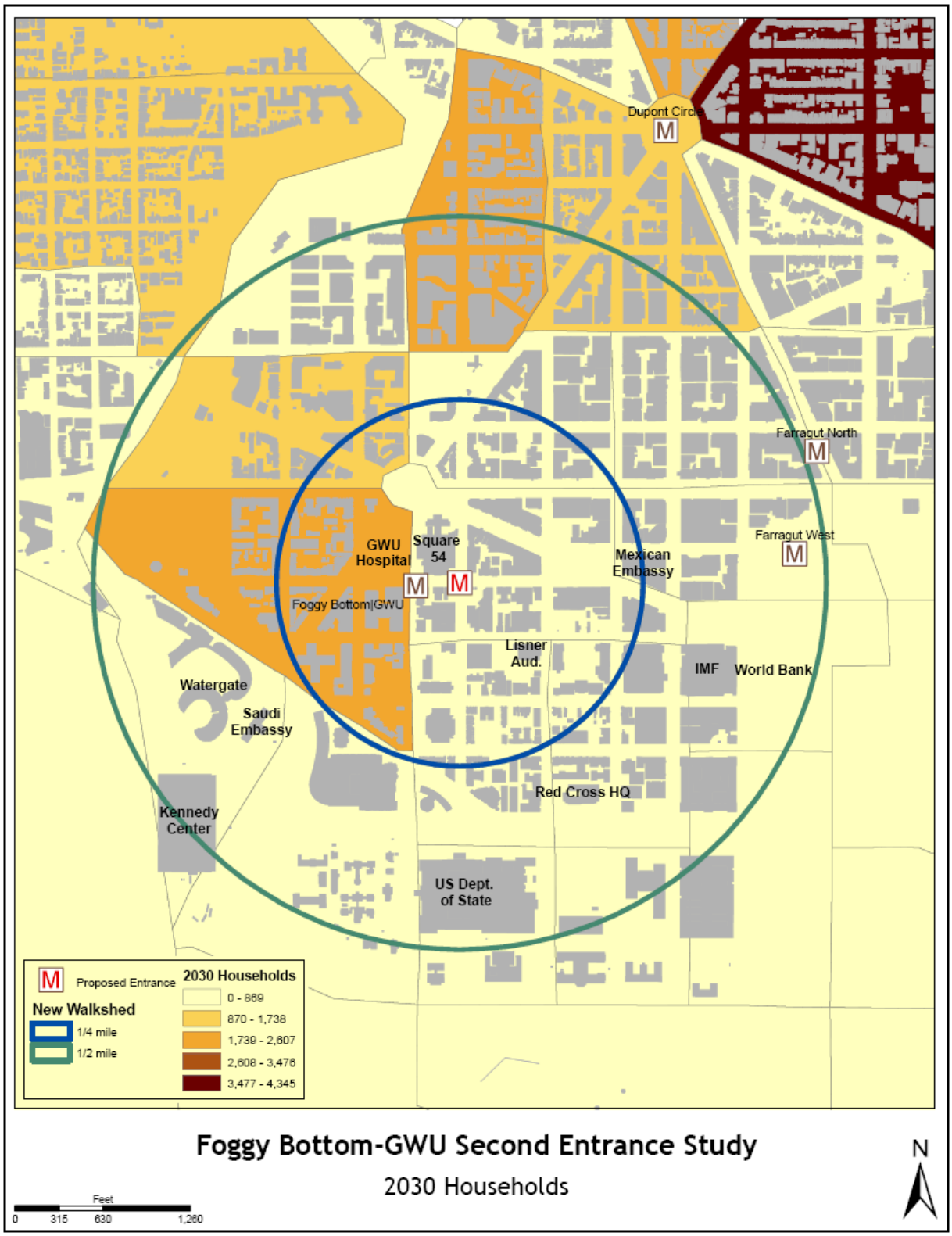

Figure 11: Distribution of Households in 2030
Source: DC-OCTO-GIS, PB, 2006

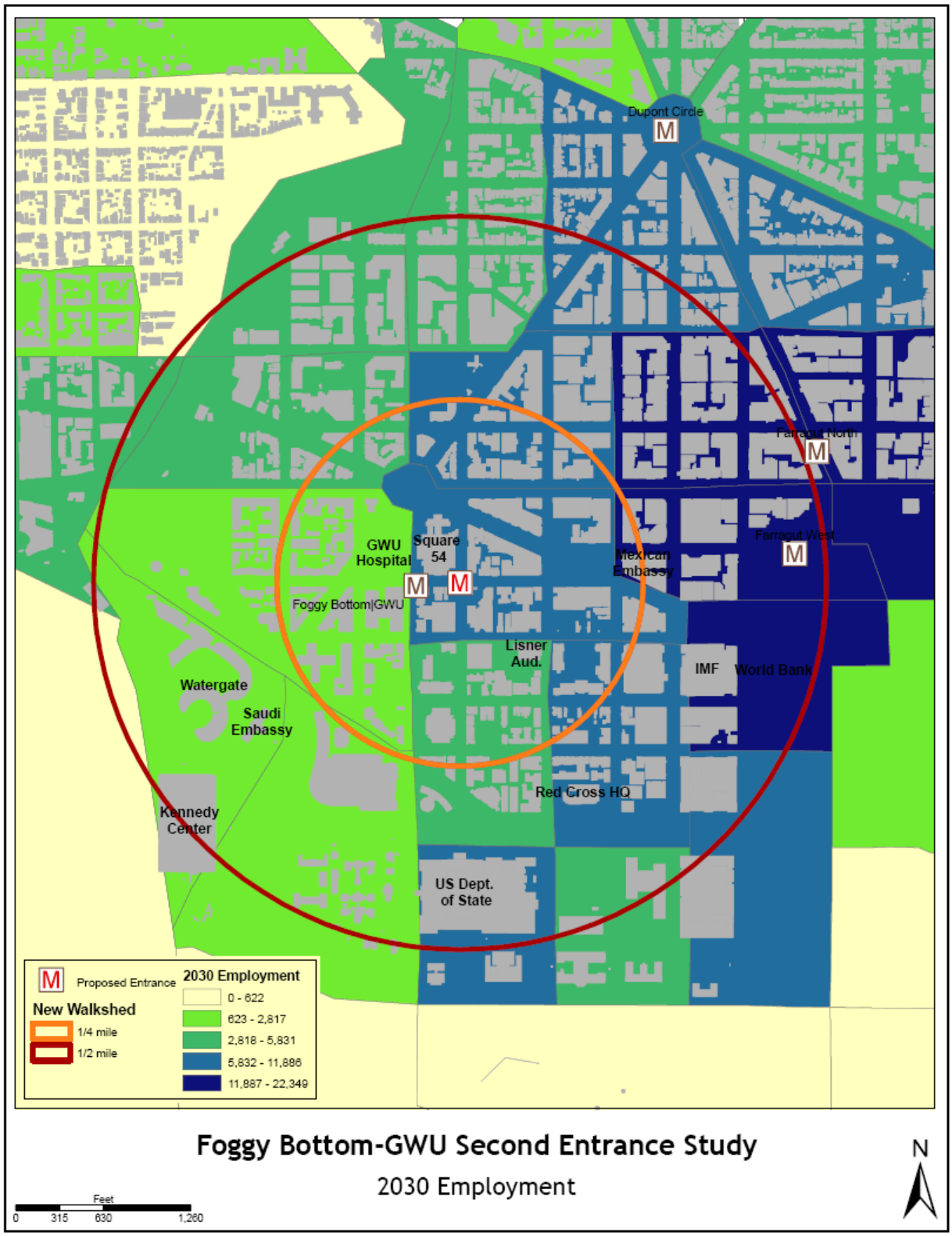

Figure 12: Distribution of Employment around Station in 2030
Source: DC-OCTO-GIS, PB, 2006

A station-area project presently in the development pipeline is Square 54, which is across 23rd Street from the existing station entrance. *The George Washington University Foggy Bottom Campus Plan* calls for academic/administrative/ medical uses along much of I Street. GWU envisions Square 54, shown as hatched area in Figure 13, as mixed-use development and a town center. The university and the DC Office of Planning worked together to submit a first-stage Planned Unit Development (PUD) application for Square 54 to the DC Zoning Commission in May 2006.

In addition, the Campus Plan designates I Street as a vibrant retail corridor, calling for the development of ground-floor retail uses along the street.

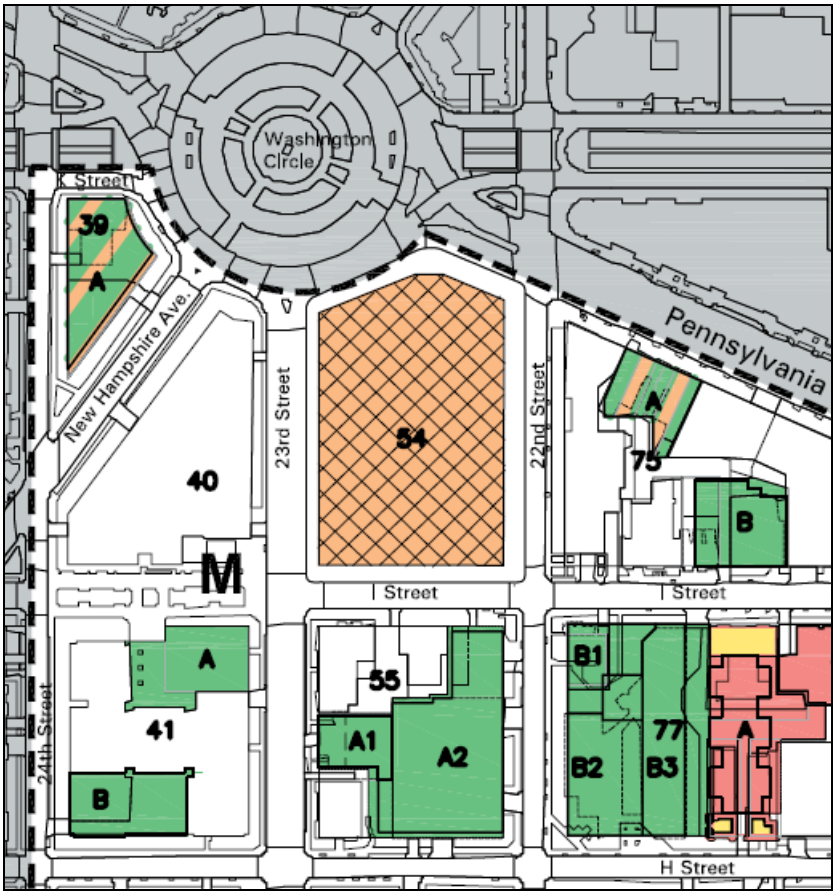

Figure 13: GWU Campus Plan Development Framework
Source: GWU, 2006

3.2 Forecasted Ridership

As part of the WMATA Station Access and Capacity Study, ridership in 2030 was forecasted at all 86 Metrorail stations using the MWCOG regional model as a base. By 2030, the Foggy Bottom-GWU station boardings and alightings are expected to increase by 12 to 15 percent, as shown in Table 8. This number is similar to the expected land use growth.

Table 8: Foggy Bottom-GWU Station Ridership

	Time	2005	2010	2020	2030	% Change 2005-2030
Boardings Peak ½ Hour	5:00 PM - 5:30 PM	1,943	2,005	2,217	2,232	14.9
Boardings Peak Hour	5:00 PM - 6:00 PM	3,666	3,731	4,165	4,207	14.8
Alightings Peak ½ Hour	8:30 AM - 9:00 AM	2,133	2,173	2,413	2,445	14.6
Alightings Peak Hour	8:00 AM - 9:00 AM	4,220	4,249	4,700	4,751	12.6

Source: WMATA Station Access and Capacity Study data, 2006

The analysis in this study assumed that boardings and alightings in the AM and PM peak hour and half hour would be divided between the existing and the proposed entrance based on the percent distribution of walk trips by the riders within each TAZ. Details of this process can be found in Appendix A. As shown in Table 9, the majority of future riders (65 percent) would use the proposed second entrance because of the concentration of jobs to the east of the station.

Table 9: 2030 Forecasted Ridership Distributed Between Existing and Proposed Entrances

		Boardings			*Alightings*		
Time Period		**Total**	Existing Entrance	New Entrance	**Total**	Existing Entrance	New Entrance
AM Peak Half Hour	8:30 AM - 9:00 AM	**538**	190	348	**2,445**	830	1,615
AM Peak Hour	8:00 AM - 9:00 AM	**1,045**	369	677	**4,751**	1,612	3,139
PM Peak Half Hour	5:00 PM - 5:30 PM	**2,232**	757	1,475	**714**	252	462
PM Peak Hour	5:00 PM - 6:00 PM	**4,207**	1,427	2,780	**1,515**	534	980

Source: WMATA Station Access and Capacity Study data, 2006

4 STATION ENTRANCE ALTERNATIVES

Based on the station configuration and the land use and ridership analysis, this study explored several alternatives for a new station entrance. The analysis established the required infrastructure within a new station entrance and allowed for a comparison between different entrance alternatives.

4.1 Initial Alternatives

The study explored the following alternatives:

1. Entrance at northwest corner of 22nd and I Streets NW
2. Entrance at southeast corner of 22nd and I Streets NW
3. Entrance locations near the corner of 24th and I Streets NW

Because of the platform configuration and the lack of station access at the east end of the platform, two sites adjacent to the east end of the station were identified as possible locations for the new entry. The first alternative was located at the northwest corner of the intersection of 22nd and I Streets NW on a plot designated as Square 54. The southeast corner of the intersection of 22nd and I Streets NW served as the second initial alternative. For both alternatives, an external-entry mezzanine was proposed in order to minimize construction interference with the operation of the station.

Representatives from GWU requested an analysis of adding entry capacity at the west end of the station through an unutilized pedestrian tunnel near the existing entry. The study developed and analyzed several such alternatives, which are shown in Appendix A.

4.2 Capacity Analysis of Alternatives

Infrastructure requirements at each entrance to the Foggy Bottom-GWU station were evaluated based on existing and predicted ridership levels and the requirements set by WMATA and the *Transit Capacity and Quality of Service Manual*. The capacity analyses of the vertical and horizontal elements of the station were performed for the following scenarios:

- **2006 Existing:** the existing station facilities were evaluated using the current (2006) ridership data.
- **2030 No Build:** the existing station facilities were evaluated using the projected 2030 ridership data.
- **2030 Build 1:** the facilities for a proposed east and the existing west entrances were evaluated using the 2030 ridership data.
- **2030 Build 2:** the facilities for a new west and the existing west entrances were evaluated using the 2030 ridership data.

The capacity analyses of the entrances were performed focusing on farecard vendors, faregate aisles, elevators, escalators, stairways, and the platform. All station elements were analyzed for the peak 15-minute passenger volume.

In 2030 Build 1, which includes an eastern entrance, an east mezzanine separate from the existing west mezzanine is required. As a result, the horizontal and vertical capacity analyses for the elements

between the platform and the street for the east entrance would be separate from those of the existing conditions.

In 2030 Build 2, the new west entrance would connect to the existing mezzanine. Consequently, the capacity analyses of the elements between the mezzanine and the platform correspond to those of the 2030 No Build.

4.2.1 Analysis Assumptions

The design criteria used in the capacity analyses are presented in Table 10.

Table 10: Assumed Metrorail Station Capacity Criteria

Item		Units	*Source*
Peaking factor for alighting passengers	1.28		WMATA, Project scope
Escalator flow rate	90	p/min	WMATA, Station Access and Capacity Study
Stair-way flow rate per width	10	p/ft/min	Transit Capacity and Quality of Service Manual
Percent Passengers using farecard vendor	20	%	PB, Field measurements
Farecard vendor transactions per minute	2.5	p/min	WMATA, Bi-County Transitway/ Bethesda Station Access Demand Analysis
Faregate aisle flow rate	35	p/min	WMATA, Field measurements
Elevator Speed	75	ft/min	WMATA
Percent Passengers using Elevator	5	%	PB, Field measurements

Other general assumptions used throughout the analysis include:

- Design year: 2030
- Future Metrorail service at station: 2.5-minute headways
- Future Metrorail train consists: 8-car trains

Table 11: Summary of Existing Station Elements

Entrance	Regular Faregates	ADA Faregates	Exitfare	Fare Vendors	Platform Width (ft)	Platform Length (ft)	No. of Platform Elevators	No. of Mezzanine Elevators	No. of Platform Escalators	No. of Mezzanine Escalators	No. of Platform Stairs	No. of Mezzanine Stairs
Existing West	15	1	2	12	27	600	1	1	3	3	0	0

Source: WMATA Faregate Inventory, 2005; WMATA Elevator and Escalator Inventory, 2003

4.2.2 Analysis Results

Table 12 summarizes the station infrastructure requirements for the existing and future scenarios analyzed. This is based on the capacity criteria and WMATA standards previously cited.

Table 12: Infrastructure Requirements Summary

Infrastructure Element			Number of Elements Required					
			Existing	*2030 No Build*	*2030 Build 1*		*2030 Build 2*	
					West	*East*	*West*	*New West*
Vertical Circulation	Street to Mezzanine	Escalators	3	3	2	2	2	2
		Elevators	1	1	1	1	1	1
		Stairs				5'		5'
	Mezzanine to Platform	Escalators	3	3	2		3	
		Elevators	1	1	1	1	1	
		Stairs				10'		
Farecard Vendors			7	8	3	6	4	4
Faregate Aisles		Standard	4	5	3	4	3	
		ADA	1	1	1	1	1	
		Total	5	6	4	5	4	

Source: PB, 2007

#	Indicates that the number of elements required is greater than the number of existing elements.

According to the capacity analysis, the 2030 No Build and the 2030 Build 2 alternatives would have inadequate capacity in 2030. Although the existing total number of mezzanine-to-platform escalators is equal to the required number in both scenarios, WMATA prefers to run two escalators up and one down to accommodate alighting passengers at this station; both the 2030 No Build and 2030 Build 2 scenarios would require two escalators going down and one going up.

The platform, shown in Figure 14, was found to have more than enough standing room capacity in all scenarios. The details of this analysis are in Appendix A.

Figure 14: Foggy Bottom-GWU Station platform during evening peak
Source: PB, 2006

4.3 NFPA 130 Emergency Egress Analysis

The egress capacity of the existing and future conditions of the station was analyzed based on the requirements set by the National Fire Protection Association (NFPA) *Standard for Fixed Guideway Transit and Passenger Rail Systems 2007* (NFPA 130).

For new transit facilities, the NFPA 130 requires the platform to be evacuated in four minutes and allow people to reach a point of safety in six minutes. As this study does not call for changes in the existing platform and station, WMATA is not required to meet NFPA 130 exiting times, but can use them as design goals. In addition, the NFPA 130 times can be used to compare the current and future ridership exiting times, and ensure the station exiting times for future ridership to not exceed the exiting times of the current ridership.

Table 13: Emergency Egress Analysis Results

NFPA 130 Measures	AM Peak			
	Existing	*No Build*	*Build 1*	*Build 2*
	2005	2030	2030	2030
Time to Clear platform (min)	**8.3**	**10.9**	**4.8**	**10.9**
Evacuation Time (min)	**14.7**	**20.2**	**10.7**	**14.9**
	PM Peak			
	Existing	*No Build*	*Build 1*	*Build 2*
	2005	2030	2030	2030
Time to Clear platform (min)	**10.6**	**13.6**	**6.0**	**13.6**
Evacuation Time (min)	**19.6**	**25.9**	**14.0**	**18.8**

Source: PB, 2007

As shown in Table 13, both the time to clear the platform and the time to evacuate the station is lowest in the Build 1 alternative. Although the addition of an eastern station entrance would not make the station compliant with NFPA 130 requirements, it would nearly meet the platform clearing standard in the AM peak and substantially improve emergency egress time during other periods.

NFPA 130 also sets requirements for station elements and their configuration. Section 5.5.6.3.2 allows escalators to account for more than one-half of egress capacity if a portion of the egress capacity at each station level is provided by stairs. This is the case with Build 2, in which a stairway would connect all station levels.

WMATA should address other emergency evacuation details, such as coordination with emergency responders, as this project progresses through the design stage.

4.4 Recommended Alternative

A new entrance at the southeast corner of 22nd and I Streets NW is recommended. A new entrance at this location could be integrated into a future building, as the GWU Campus Plan proposes the redevelopment of this block. The small townhouse that now occupies the location for a new entrance stair/escalator array is planned to be demolished.

Figure 15: Proposed New Entrance at 22nd and I Streets
Source: KGP Design Studio, 2007

The recommended entrance would provide access to the station from the east end for the first time. Two escalators, a stair, and two elevators from the surface would be located at the southeast corner of 22nd and I Streets NW. These vertical access features would lead to a new mezzanine level external to the station tunnel containing the faregate array for entry to the station. A short pedestrian tunnel would lead to two ADA-compliant elevators and a new stair leading down to the platform level from an added mezzanine at the end wall of the tunnel. The entrance at this end would allow workers from the nearby business district and students with classes at the eastern part of campus to more directly access their destinations without crossing high-traffic-volume intersections and separates this pedestrian traffic stream from patrons accessing the station from the residential district that abuts the west side of campus.

The two surface-to-mezzanine elevators would be WMATA standard elevators, while the two mezzanine-to-platform elevators would be smaller. These elevators meet ADA requirements but are small to fit within the existing structure of the east-end service rooms. Using these small elevators will require a variance from WMATA criteria. One standard elevator could be used instead.

An entrance at the northwest corner of 22nd and I Streets NW would provide needed additional station capacity, but it is not recommended. A new entrance here would require more-extensive construction because of the site topography. It would also require redesigning the buildings planned for the site.

An entrance west of the station is not recommended for several reasons. A new entrance to the west would not provide necessary added station capacity because all passengers would still have to move through the single internal mezzanine. In addition, each location for a new entrance west of the station would have at least one serious physical or construction drawback. Some locations would require acquisition and demolition of private residences within the Foggy Bottom historic district. Other locations would cause construction conflicts with existing university buildings. Still others would block entry into an existing university building. Locating an entrance on the only vacant parcel west of the station would require a long and expensive underground passageway.

Finally, the No Build option is not recommended for similar reasons; demand for its mezzanine-to-platform escalator would exceed available capacity, its elevators would be near capacity, and its emergency egress times are much worse than today.

5 IMPLEMENTATION

The addition of a second station entrance at the corner of 22nd and I Streets NW would require specific architectural, structural, mechanical, and electrical features. This study investigated these requirements and estimated the cost of the project.

5.1 Architectural Features

The following outlines the vertical connections to the surface, the new external mezzanine space, the passageway between the external mezzanine and the train room mezzanine, and the vertical connections from the mezzanine to the platform.

5.1.1 Vertical Connection between the Surface and the New External Mezzanine

The main vertical access to the underground fare area would be provided by a stair/escalator array on the southeast corner of 22nd and I Streets NW. The stair/escalator array would be oriented on an east-west axis with the upper landing facing east. The proposed array would be located where a brick townhouse that has been converted to educational use now sits; this structure has already been slated for removal in the GWU Master Plan. The array is arranged with two escalators and a stair. The stair should meet new WMATA standards with stainless steel, lighted balustrades. Two side-by-side WMATA standard elevators would be located to the south from the stair/escalator array enclosure. The entry to the elevators would be to the west, facing 22nd Street. The elevators would be aligned with the sidewalk edge, approximately 20 feet in from the curb. The array and elevators would traverse a vertical distance of approximately 27 feet to the mezzanine below.

The arrangement of the stair/escalator array and the elevators has the potential to fit into a future joint development commercial/office, classroom or dormitory building at GWU. The university plans to develop the entire parcel on which these new entry features would sit, Square 77. The stair/escalator array are placed and oriented in such a way so as to fit into a typical column bay structure that would allow a large building to sit over these elements, and the elevators are situated to fit into the first floor of such a building while remaining accessible from the street. This conceptual design anticipates the redevelopment of this parcel and thus does not propose a canopy system for the vertical entry elements.

5.1.2 New External Mezzanine

A new entry mezzanine would be constructed underground, at an elevation equal to the existing upper-level east service area. The new external mezzanine would be constructed as a cut-and-cover operation and, except with respect to the vertical entry elements discussed above, sit entirely under 22nd Street and the sidewalks to the east and west of 22nd Street, south of the I Street intersection. The size and layout of the mezzanine are specifically constrained so as not to interfere with the foundations of existing buildings and future development.

The main part of the mezzanine contains approximately 4,900 square feet of open area. The array of faregates, farecard vendors, add-fare vendors, and the station attendant kiosk would sit within the main space. The external mezzanine would also contain a limited number of service rooms associated with operation of the mezzanine and an area of rescue assistance

(AORA) for emergency protection. The connection to the tunnel would be through the south wall of the mechanical equipment room in the upper-level east service area of the existing station. The service rooms in the new external mezzanine would sit on the south side of this wall.

Figure 16: Proposed Mezzanine
Source: KGP Design Studio, 2007

The stair/escalator array and elevators would enter through the east wall of the mezzanine, with the faregates and attendant kiosk directly ahead. The farecard and add-fare vendors would line the south wall of the mezzanine. The entrance to the train room passage is located in the northwest corner of the space. The service rooms would line the north wall of the mezzanine to the east of the opening leading to the station and make use of the entire length of the existing tunnel wall. The service room area would contain an AORA, a men's and a women's restroom, a cleaners' room with ejector pit, a fire-equipment closet, new air-conditioning equipment room, electrical room, and an elevator machine room. The elevator machine and AC equipment rooms are located on an upper level. These rooms are all necessary to service the new mezzanine area and do not currently exist within the existing station at this end. The elevator room is meant to service both the new elevators to the surface and to the platform.

5.1.3 New Passageway to Station

The new passageway reflects the typical Metrorail station entrance passage design with curved concrete base and bronze railings and would connect the new external mezzanine to a new mezzanine to be constructed within the train room. This passageway would penetrate the existing tunnel wall enclosing the east service area and pass through space currently comprising the upper-level mechanical equipment room. The remaining space within the service area after the addition of the passageway and new elevators would serve as the reduced mechanical equipment room and a relocated communications room.

The passageway would end in a vestibule for the two new ADA-compliant elevators between the mezzanine and platform. These elevators would be built outside the station vault within the confines of the existing service-room area. The end wall of the train room would be opened to allow entry from the passageway onto a new mezzanine to be built at the east end of the vaulted tunnel space. The new internal mezzanine would be smaller than a typical station mezzanine, projecting only approximately 29 feet into the train room. The internal mezzanine would end in a 10-foot-wide stair leading to the platform below.

5.1.4 Vertical Connections from the Mezzanine to the Platform

Because there is no current entrance at the east end of the station and all of the new work within the station would occur either within the service-room area or in the first 75 feet of the platform (an area utilized only for eight-car trains), construction of these station improvements should have little effect on the ongoing operations of the station. On the platform, the elevators and elevator vestibule would be carved out from the former communication area of the train control room. Sidewalls would be left in place to shield patrons from the track area and separate the vestibule from the service catwalks.

Figure 17: Proposed Mezzanine-to-Platform Stairway
Source: KGP Design Studio, 2007

The internal mezzanine should be of standard WMATA construction, with details to match the existing mezzanine toward the west end of the station. The new stair would be centered on the mezzanine and extend from the mezzanine end. The stair should conform to WMATA standard, with bronze-and-glass handrails. The location of the new stair would require the removal of one pylon and at least one bench. A second bench that would sit approximately underneath the upper landing of the stairs would not require removal but may be removed for aesthetic reasons.

The following pages illustrate the existing site plan, the proposed architectural features, and the existing utilities at the site.

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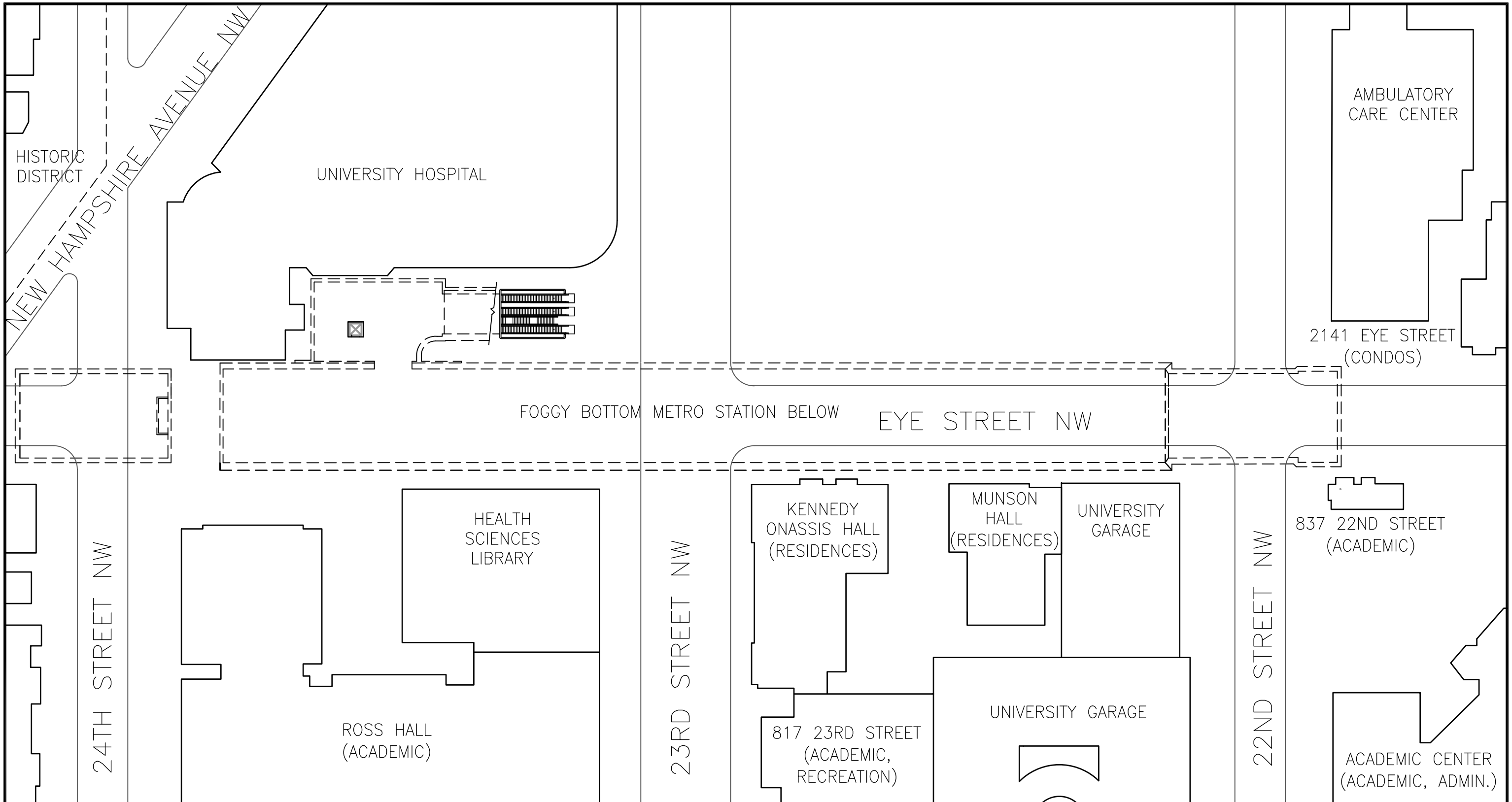

1 STREET LEVEL SITE PLAN

Scale: 1" = 60'-0"

30 0 30 60

CONTRACT NO.

DESIGNED	W.GALLAGHER	30Aug06 DATE
DRAWN	S.GARLAND	30Aug06 DATE
CHECKED		DATE
APPROVED		DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION

REVISIONS

DATE	BY	DESCRIPTION

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OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM

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P2D

SUBMITTED

a joint venture of:
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- Parson Brinckerhoff Quade & Douglas, Inc
- Delon Hampton & Associates, Chartered

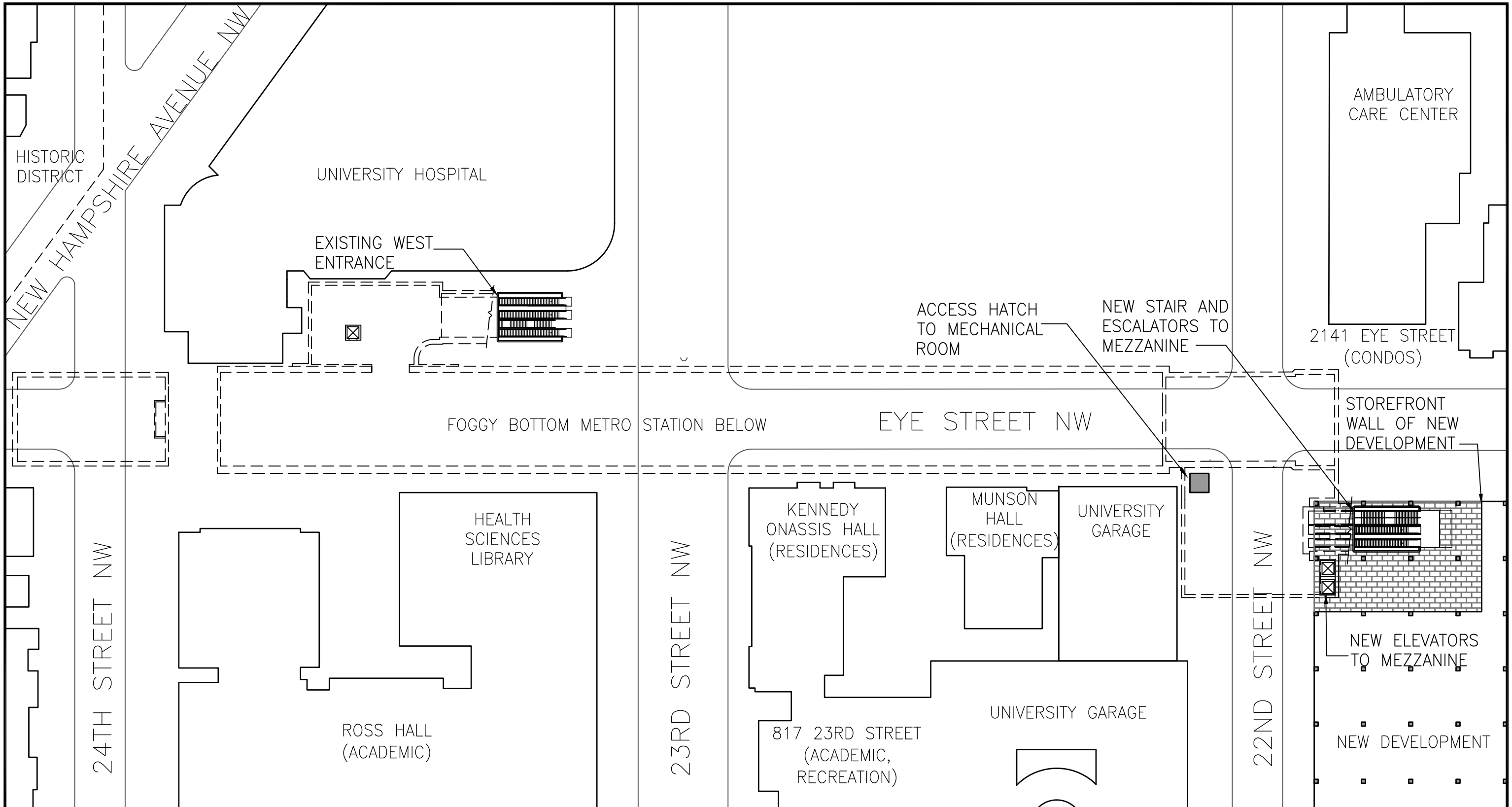
PROJECT MANAGER

FOGGY BOTTOM

SITE PLAN – EXISTING CONDITIONS

SCALE 1"=60'-0"

DRAWING NO. A-01



1 STREET LEVEL SITE PLAN

Scale: 1" = 60'-0"

30 0 30 60

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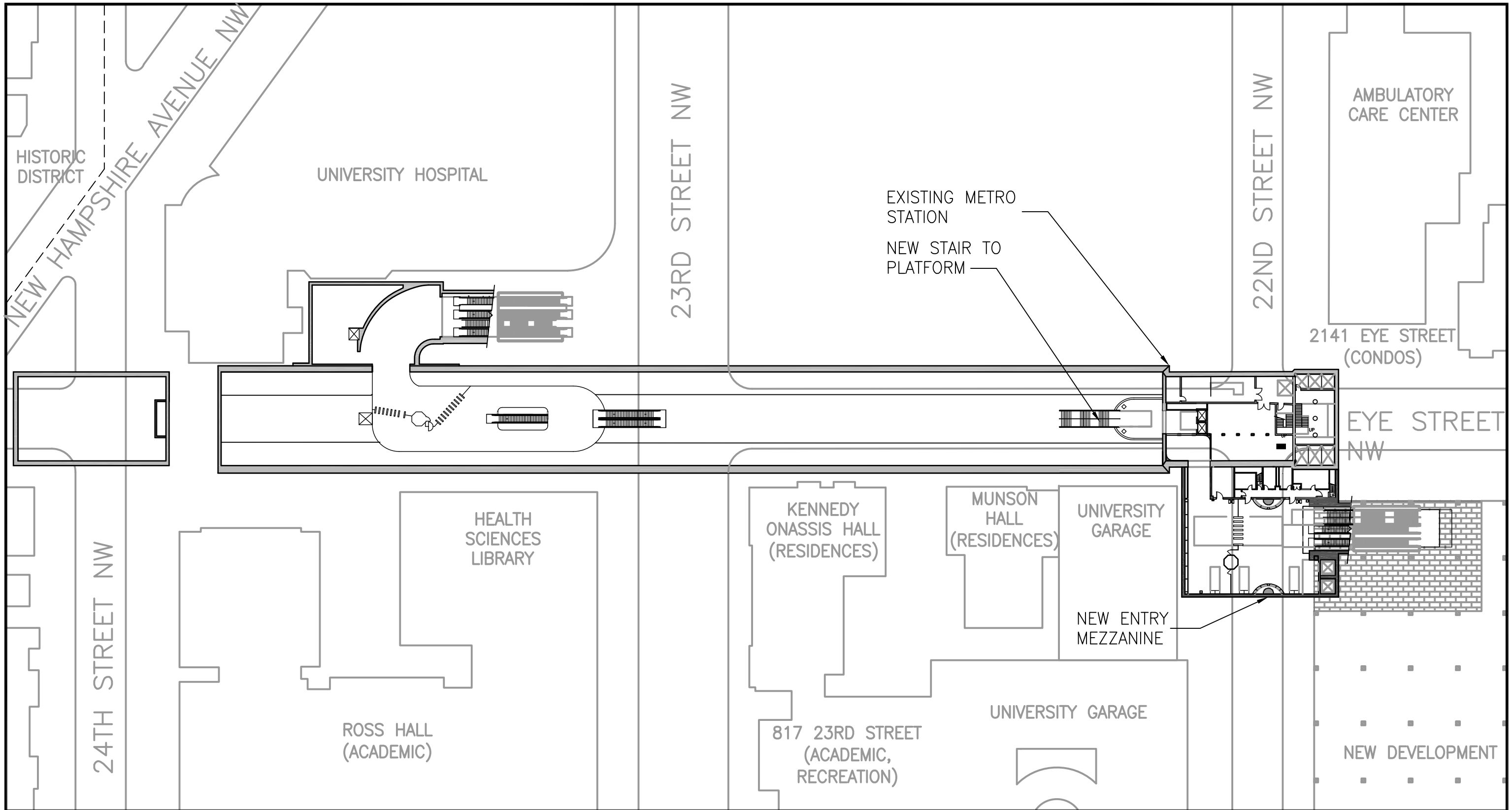
SITE PLAN – POTENTIAL REDEVELOPMENT

SCALE 1"= 60-0"

DRAWING NO. A-02



1 MEZZANINE LEVEL STATION PLAN

Scale: 1" = 60'-0"

30 0 30 60

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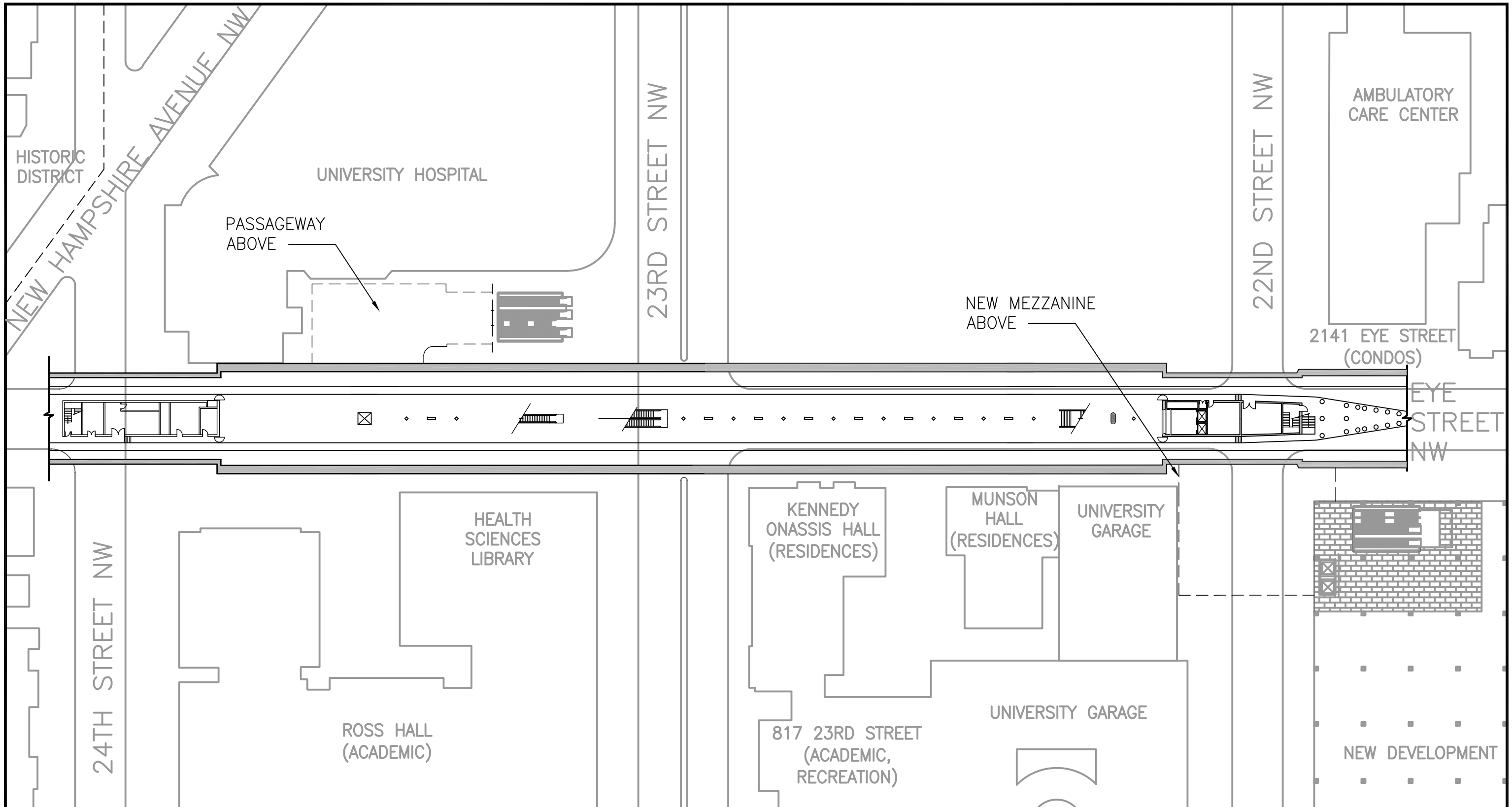
MEZZANINE LEVEL STATION PLAN

SCALE 1"= 60-0"

DRAWING NO. A-03



1

PLATFORM LEVEL STATION PLAN

Scale: 1" = 60'-0"

30 0 30 60

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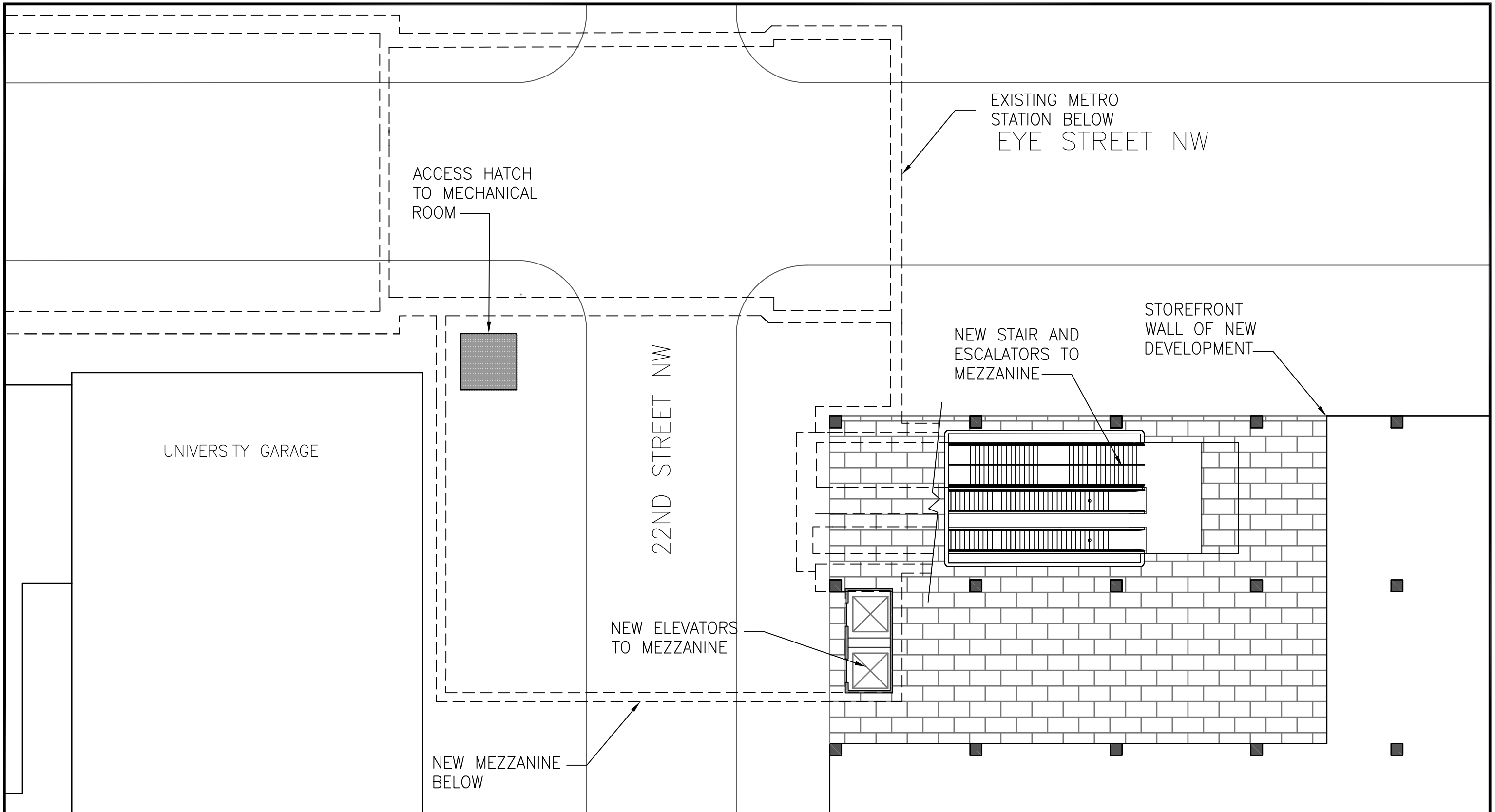
PLATFORM LEVEL STATION PLAN

SCALE 1"= 60-0"

DRAWING NO. A-04



1 ENTRY PAVILION PLAN

Scale: 1" = 20'

10 0 10 20

CONTRACT NO.

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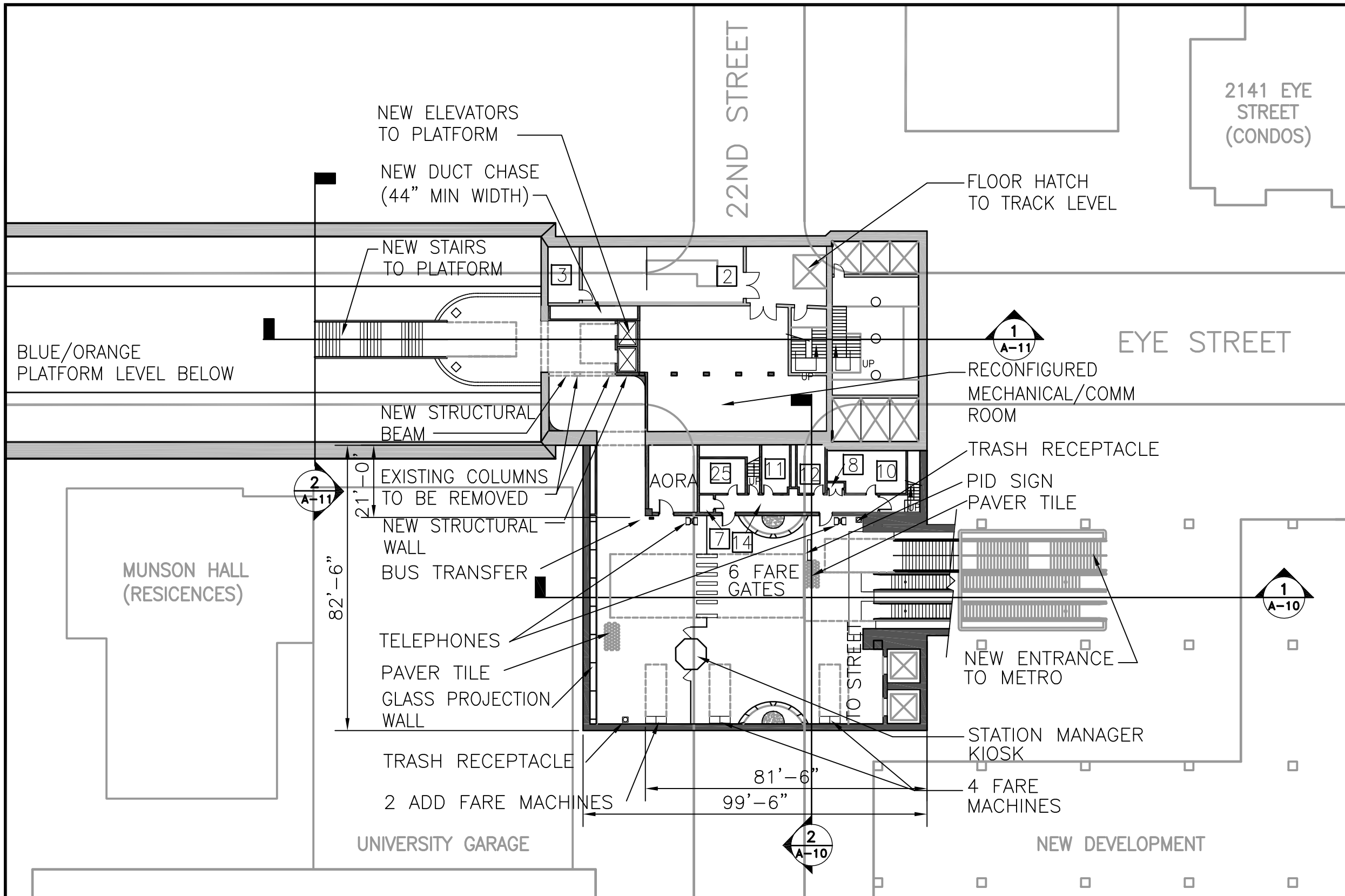
PARTIAL SITE PLAN – POTENTIAL REDEVELOPMENT

SCALE 1"= 20'

DRAWING NO. A–05



ROOM LEGEND

- 1 MECHANICAL/FAN ROOM
- 2 AC SWITCH
- 3 BATTERY ROOM
- 4 COMM ROOM
- 7 TELEPHONE CLOSET
- 8 FIRE EQUIPMENT CABINET
- 10 EJECTOR RM/CLEANERS RM.
- 11 STAFF TOILET
- 12 PUBLIC TOILET
- 14 SERVICE CORRIDOR
- 22 ELEVATOR MACHINE ROOM
- 25 ELECTRICAL CLOSET

QUEUING REQUIREMENTS:

1. ESCALATOR: 20 FT.
2. STAIR: 20 FT.
3. ELEVATOR: 10 FT.
4. FARE GATES: 25 FT.
5. FARE MACHINES: 20 FT.

EXISTING WALL

NEW WALL

REMOVED WALL

1 MEZZANINE LEVEL PLAN

Scale: 1" = 30'-0"

CONTRACT NO.

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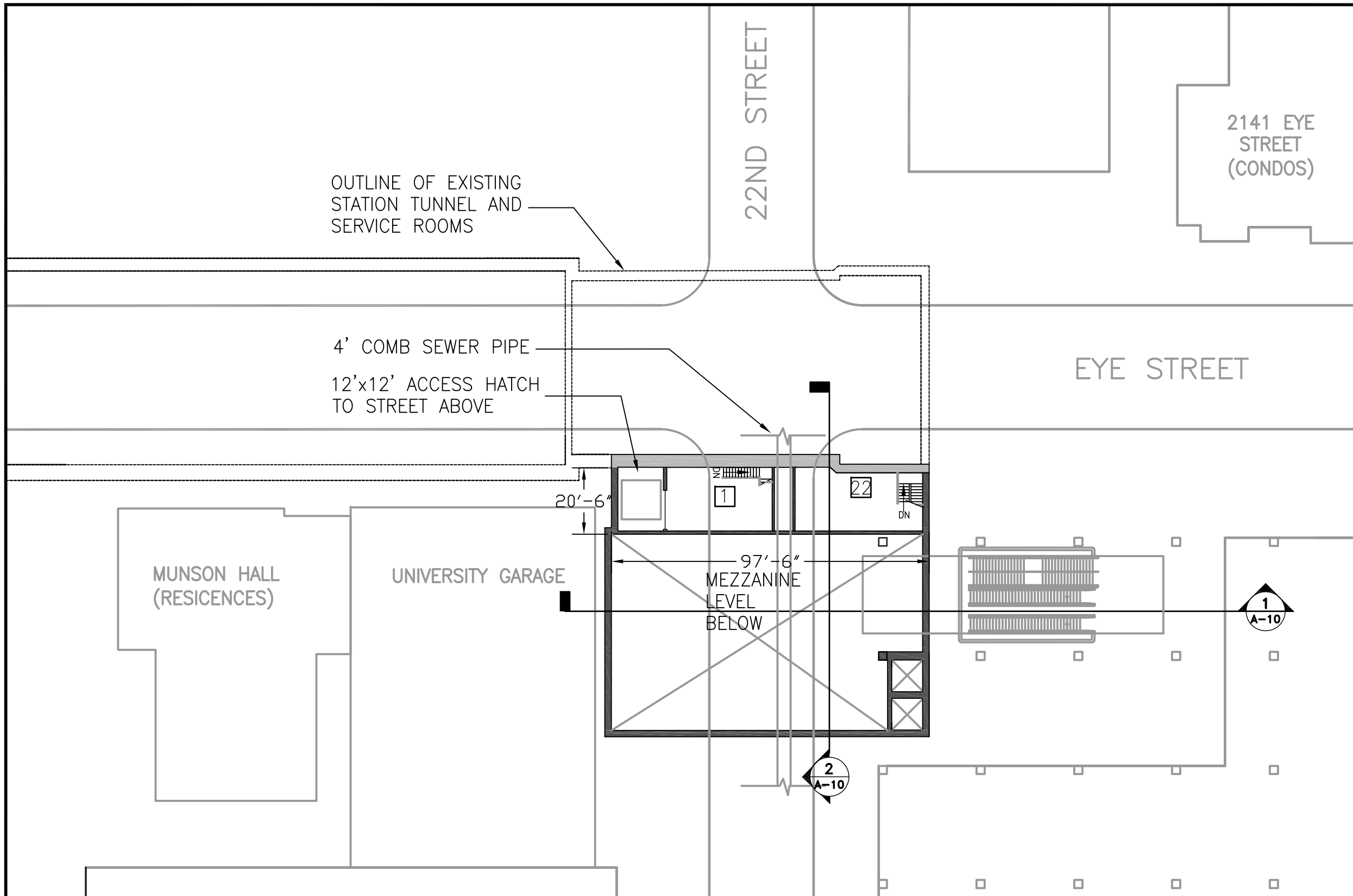
EAST MEZZANINE LEVEL PLAN

SCALE 1"= 30'

DRAWING NO. A-06



ROOM LEGEND

- 1 MECHANICAL/FAN ROOM
- 2 AC SWITCH
- 3 BATTERY ROOM
- 4 COMM ROOM
- 7 TELEPHONE CLOSET
- 8 FIRE EQUIPMENT CABINET
- 10 EJECTOR RM/CLEANERS RM.
- 11 STAFF TOILET
- 12 PUBLIC TOILET
- 14 SERVICE CORRIDOR
- 22 ELEVATOR MACHINE ROOM
- 25 ELECTRICAL CLOSET

QUEUING REQUIREMENTS:

1. ESCALATOR: 20 FT.
2. STAIR: 20 FT.
3. ELEVATOR: 10 FT.
4. FARE GATES: 25 FT.
5. FARE MACHINES: 20 FT.

EXISTING WALL

NEW WALL

1 SERVICE LEVEL PLAN

Scale: 1" = 30'-0"

15 0 15 30

CONTRACT NO.

DESIGNED W.GALLAGHER 29Jan07 DATE
DRAWN S.GARLAND 07Feb07 DATE
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APPROVED DATE

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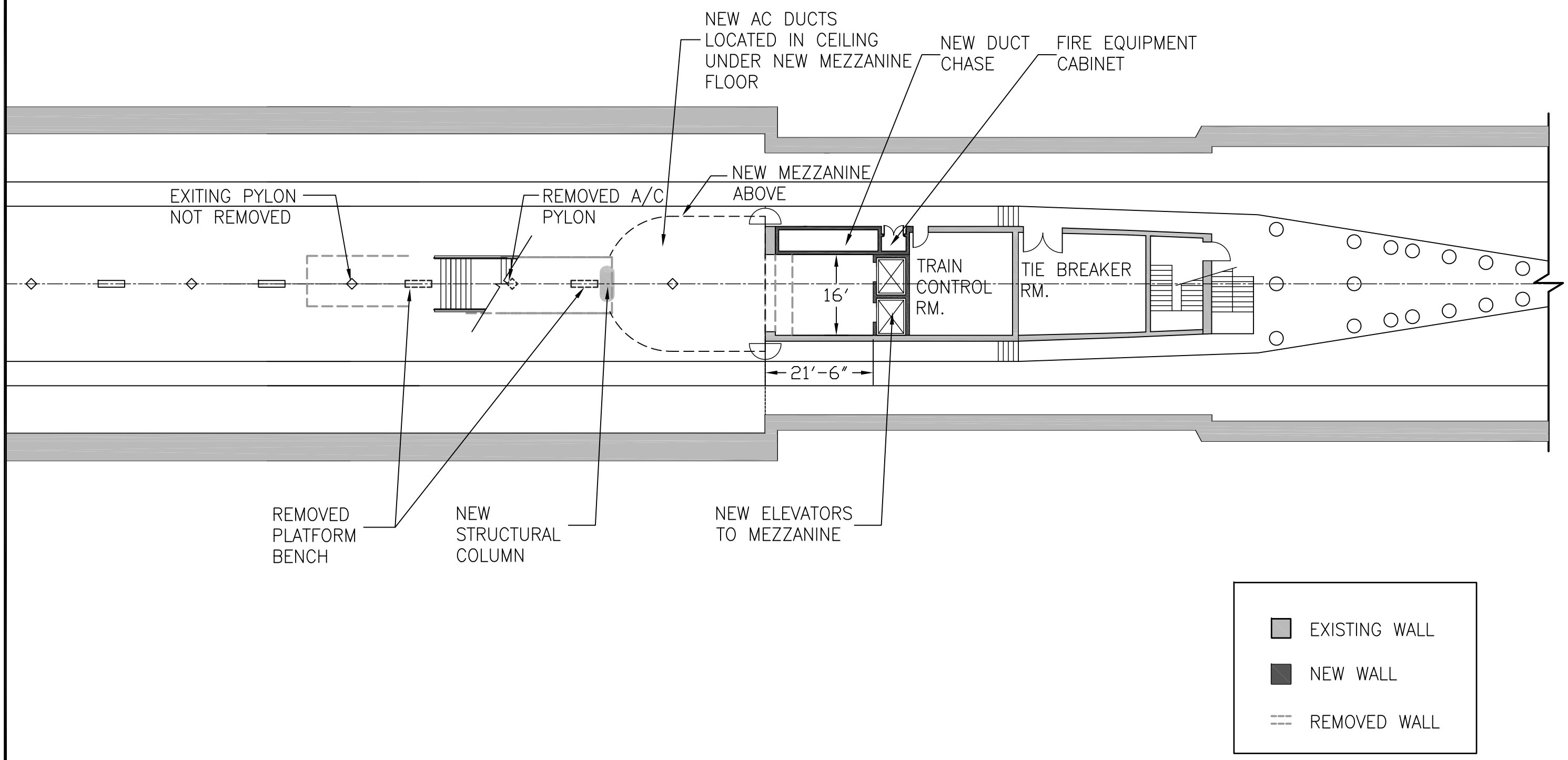
MEZZANINE SERVICE LEVEL PLAN

SCALE 1"= 30'

DRAWING NO. A-07



1 PLATFORM LEVEL PLAN

Scale: 1" = 20'

10 0 10 20

CONTRACT NO.

DESIGNED	W.GALLAGHER	30Aug06 DATE
DRAWN	S.GARLAND	30Aug06 DATE
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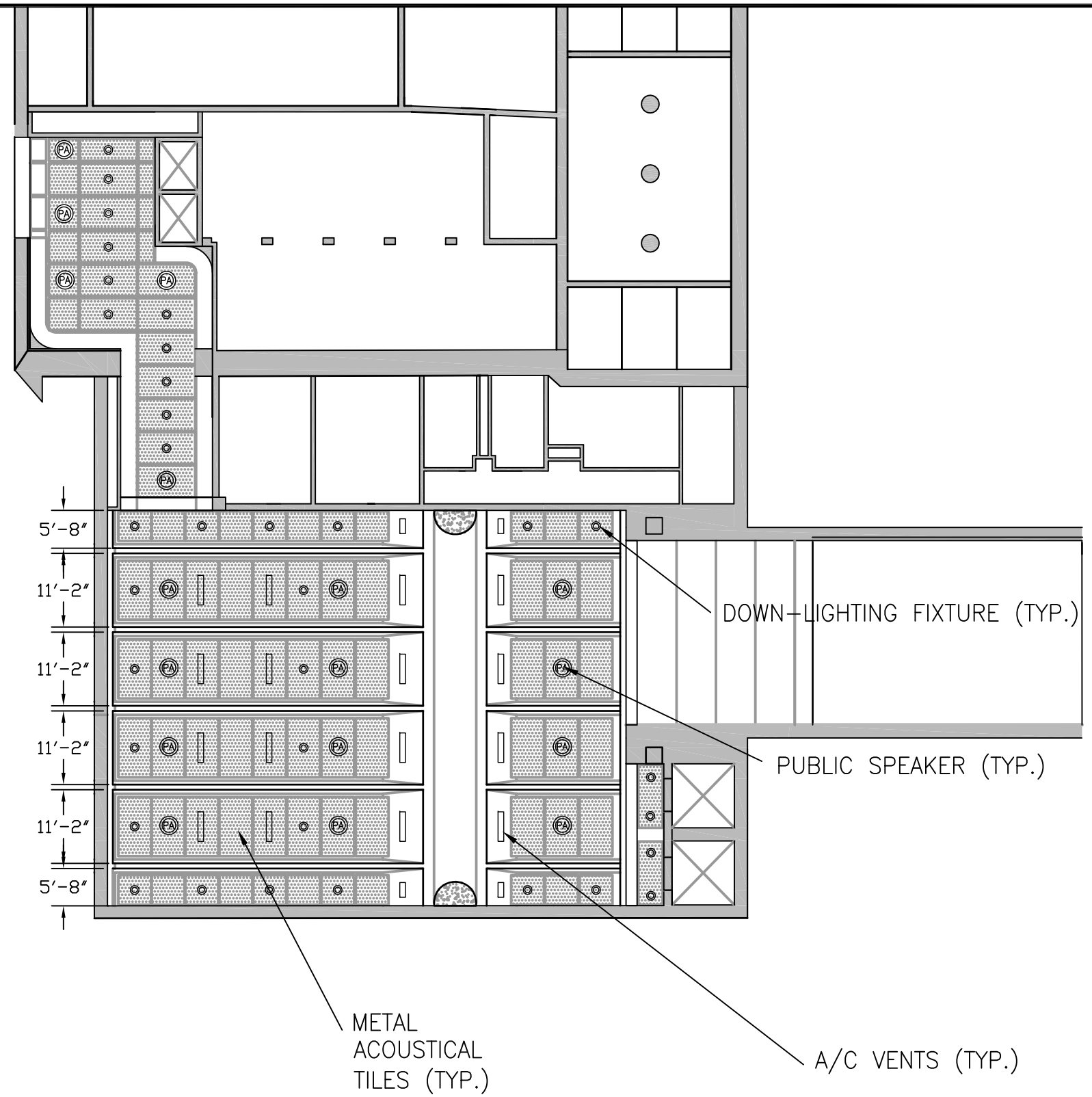
EAST PLATFORM LEVEL PLAN

SCALE 1"= 20'

DRAWING NO. A-08



NOTE: INDIRECT LIGHTING EXCEPT AS OTHERWISE NOTED

1 MEZZANINE LEVEL REFLECTED CEILING PLAN

Scale: 1" = 20'

10 0 10 20

CONTRACT NO.

DESIGNED	W.GALLAGHER	29Jan07 DATE
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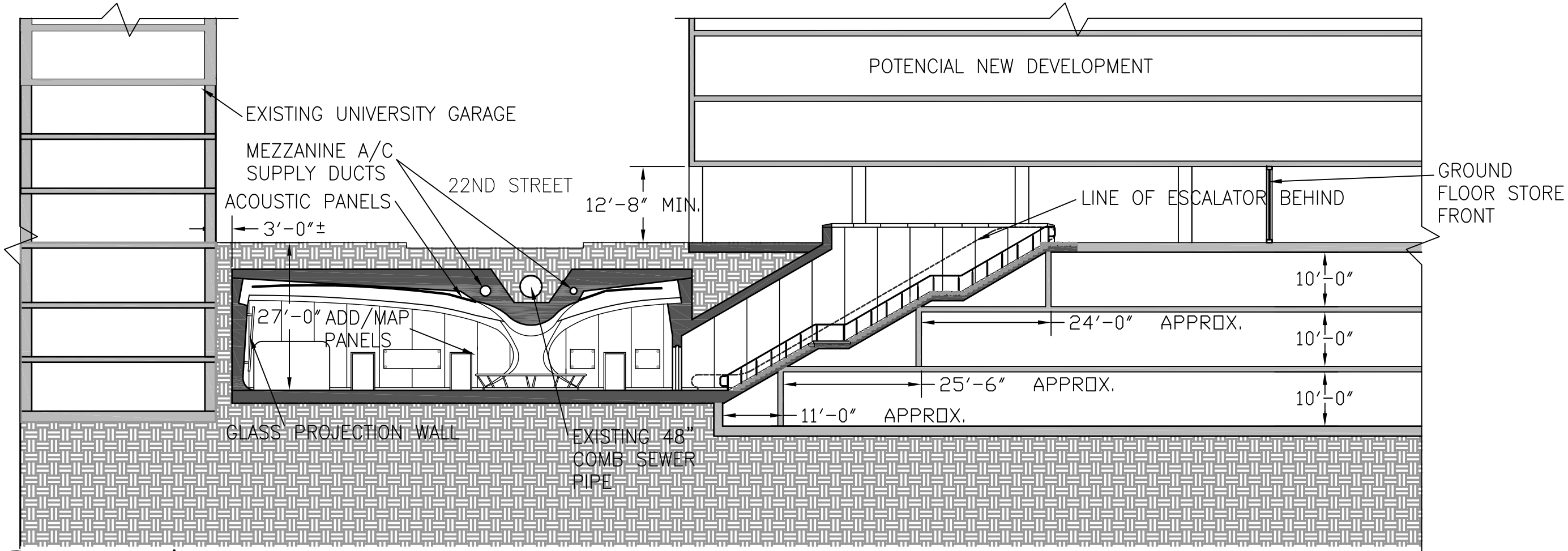
EAST MEZZANINE LEVEL REFLECTED CEILING PLAN

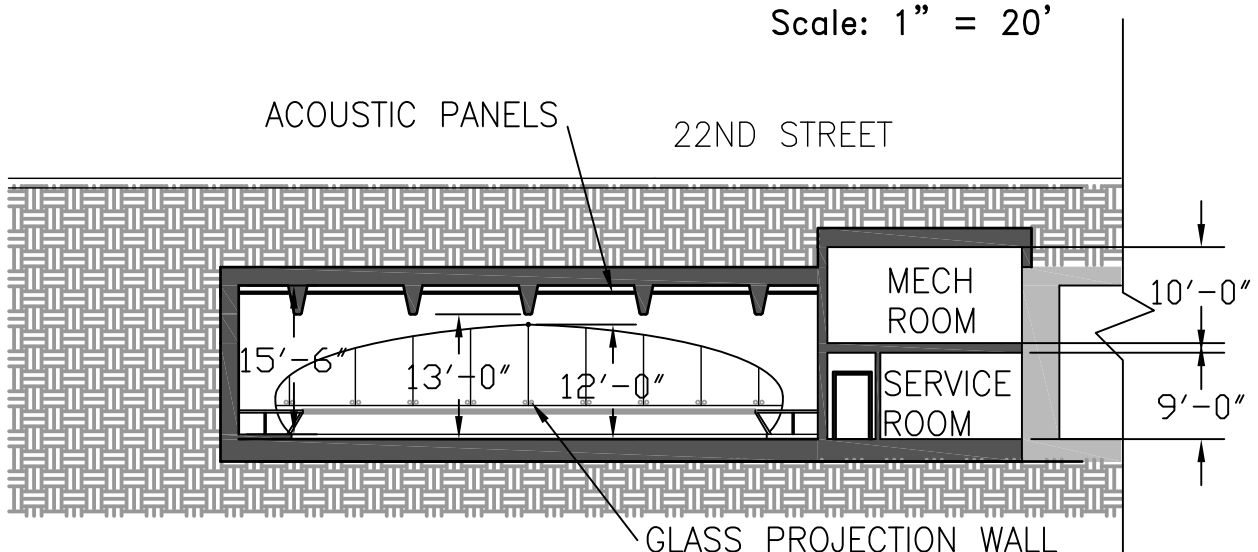
SCALE 1"= 20'

DRAWING NO. A-09



1 ENTRY/MEZZANINE LONGITUDINAL SECTION

Scale: 1" = 20'



2 MEZZANINE CROSS PLAN

Scale: 1" = 20'

EXISTING WALL

NEW WALL

10 0 10 20

CONTRACT NO.

DESIGNED	W. GALLAGHER	09Oct06 DATE
DRAWN	S.GARLAND	09Oct06 DATE
CHECKED		DATE
APPROVED		DATE

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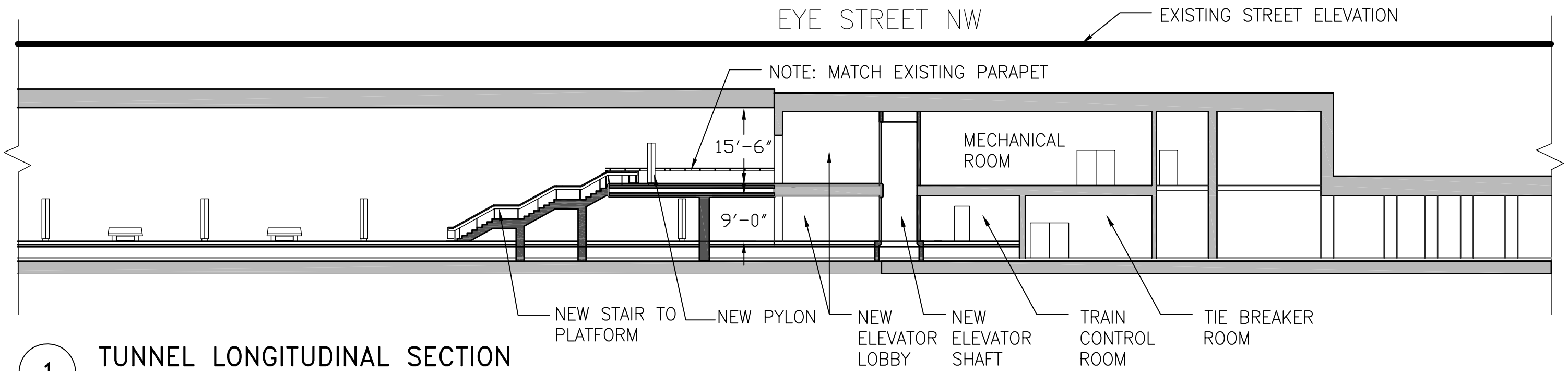
MEZZANINE SECTIONS

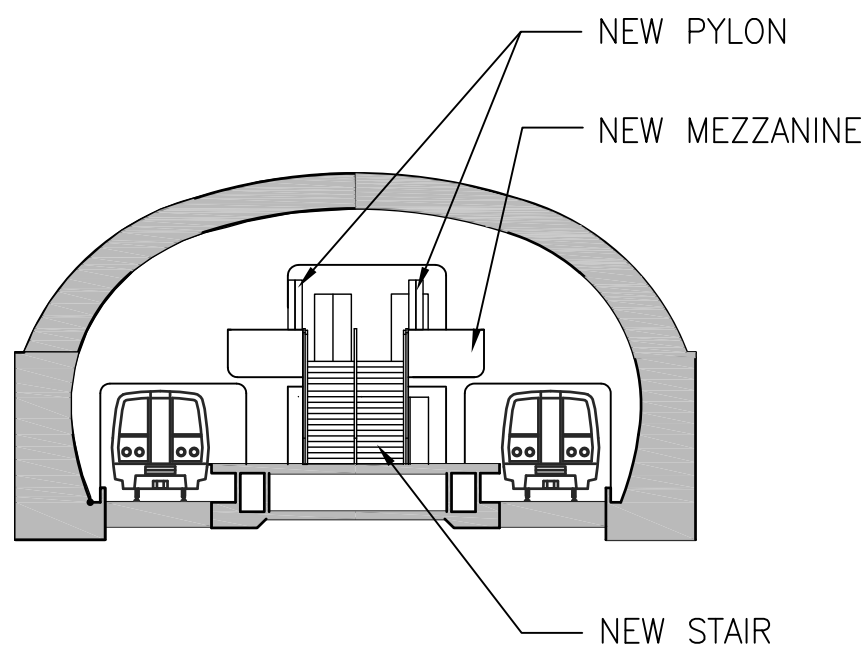
SCALE 1"= 20'

DRAWING NO. A-10



1 TUNNEL LONGITUDINAL SECTION

Scale: 1" = 20'-0"



2 TUNNEL TRANSVERSE SECTION

Scale: 1" = 20'-0"

EXISTING WALL

NEW WALL

10 0 10 20

CONTRACT NO.

DESIGNED	W. GALLAGHER	30Aug06 DATE
DRAWN	S.GARLAND	30Aug06 DATE
CHECKED		DATE
APPROVED		DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION

REVISIONS

DATE	BY	DESCRIPTION

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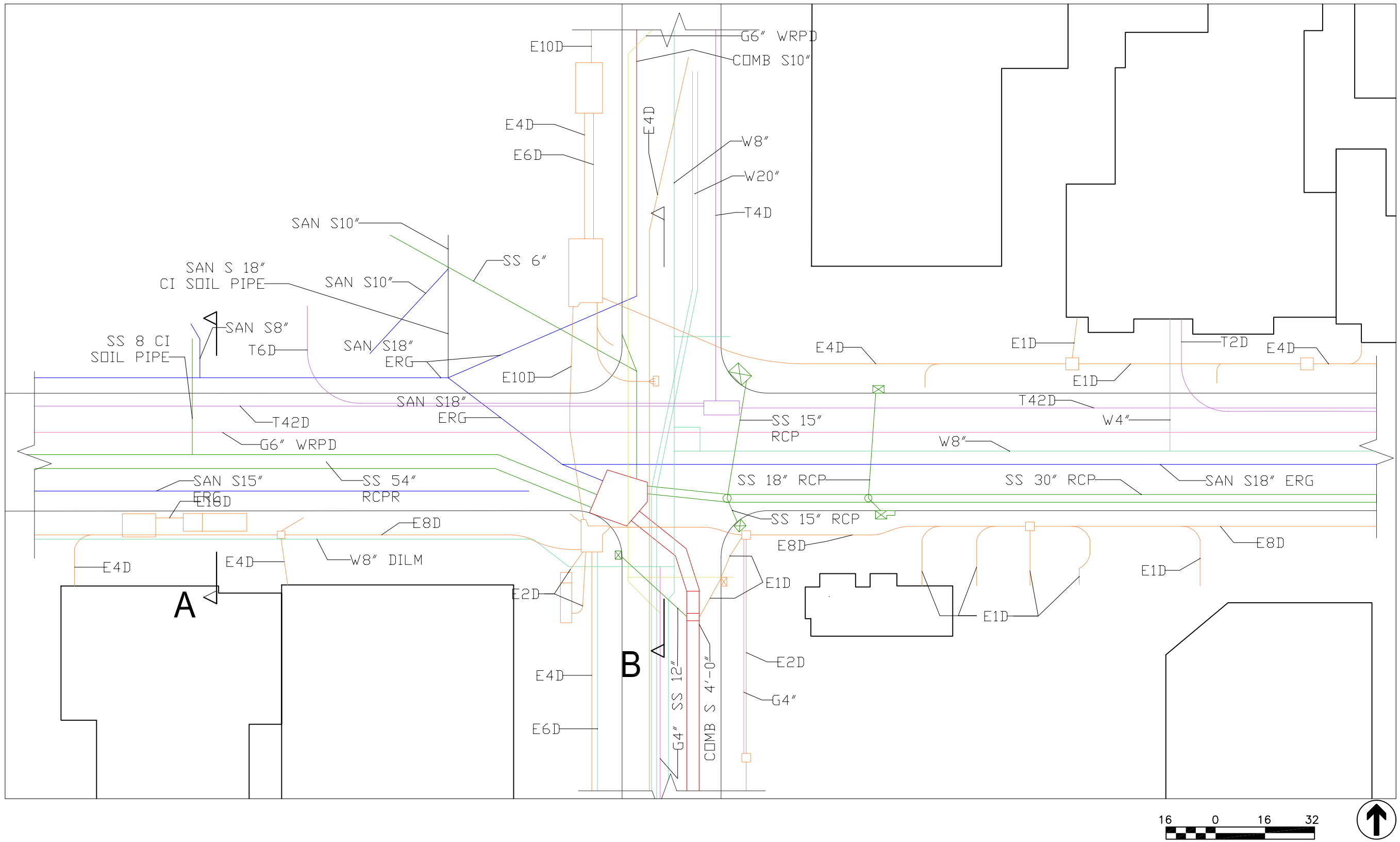
FOGGY BOTTOM

EAST TUNNEL SECTION

SCALE 1"= 20'-0"

DRAWING NO. A-11



CONTRACT NO.

DESIGNED		DATE	
DRAWN	SG	DATE	06Oct06
CHECKED		DATE	
APPROVED		DATE	

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NUMBER	DESCRIPTION

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DATE	BY	DESCRIPTION

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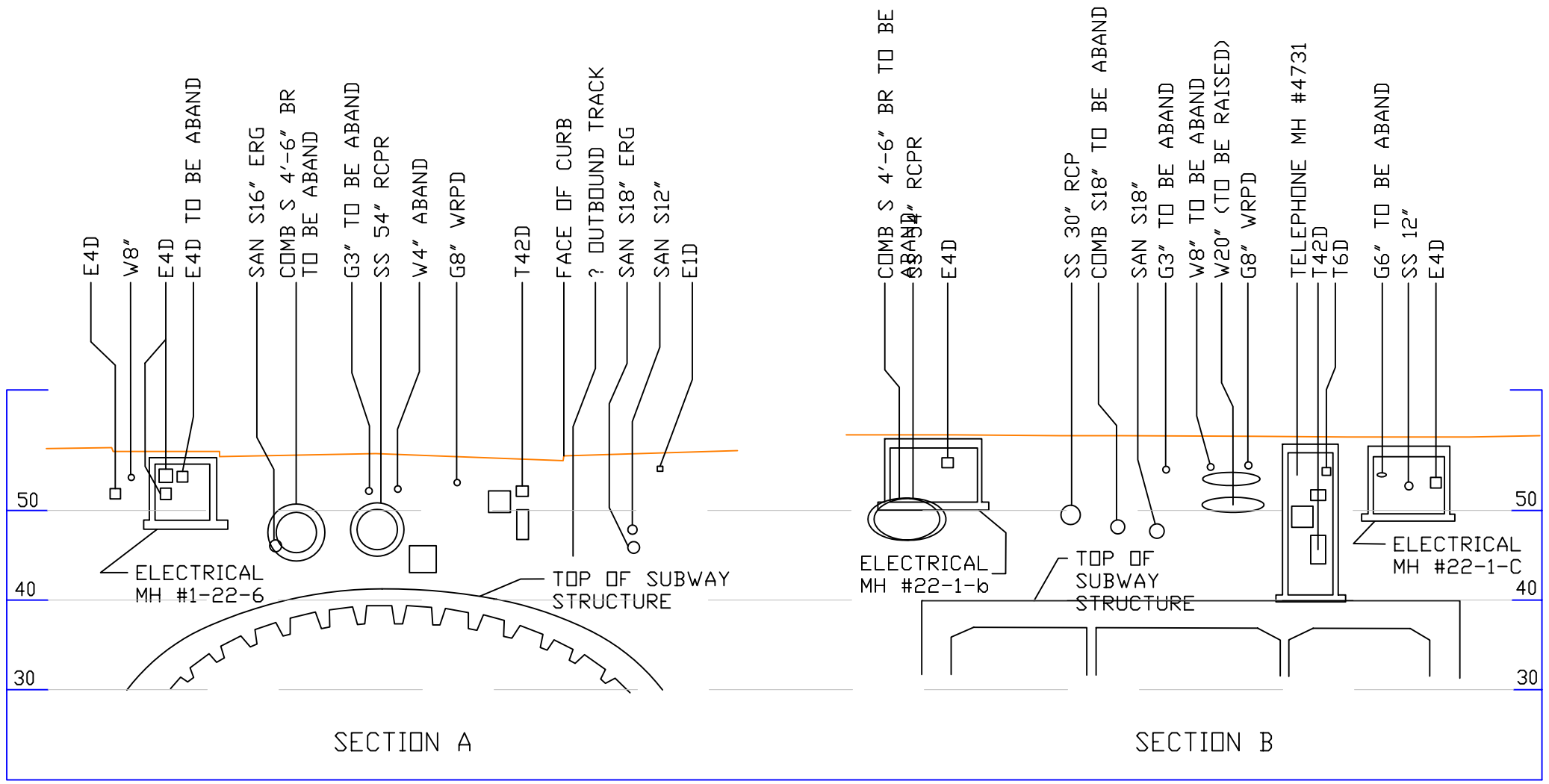
FOGGY BOTTOM

EXISTING UTILITY PLAN

SCALE 1"= 32'

DRAWING NO. C-01



8 0 8 16

CONTRACT NO.

DESIGNED			DATE
DRAWN	SG	06Oct06	DATE
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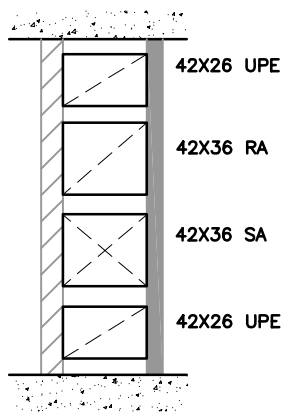
FOGGY BOTTOM

EXISTING UTILITY SECTIONS

SCALE 1"= 16'

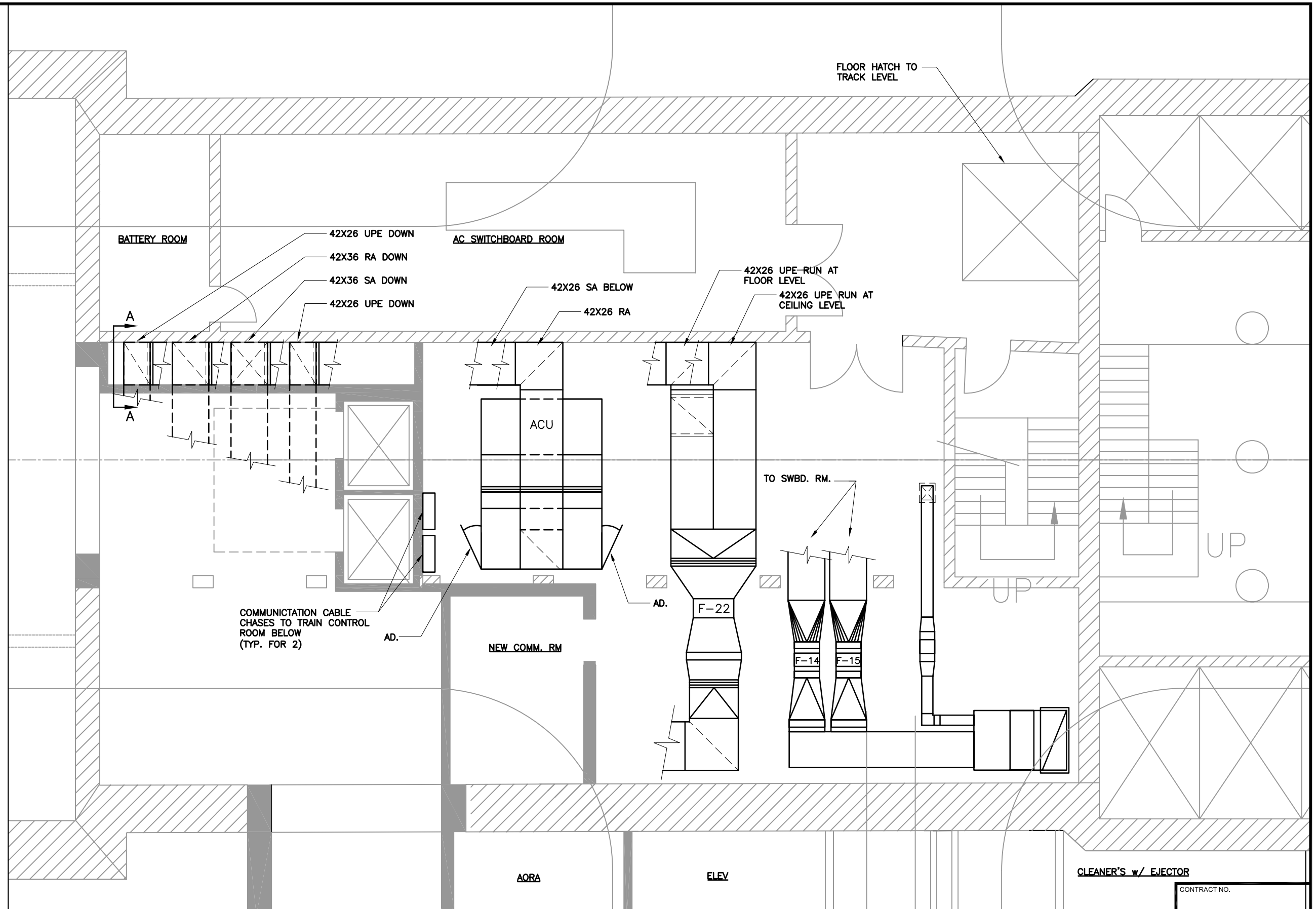
DRAWING NO. C-02



SECTION A–A

LEGEND

UPE – UNDERPLATFORM EXHAUST
RA – RETURN AIR
SA – SUPPLY AIR
COMM. – COMMUNICATION
AD. – ACCESS DOOR
ACU – AIR CONDITIONING UNIT
SWBD. – SWITCHBOARD



CONTRACT NO.

DESIGNED _____ DATE
DRAWN _____ DATE
CHECKED _____ DATE
APPROVED _____ DATE

REFERENCE DRAWINGS	
NUMBER	DESCRIPTION

REVISIONS		
DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM

APPROVED _____

SUBMITTED

a joint venture of:
• Parsons Transportation Group Inc.
• Parson Brinckerhoff Quade & Douglas, Inc
• Delon Hampton & Associates, Chartered

PROJECT MANAGER

FOGGY BOTTOM

EAST MEZZANINE LEVEL PLAN MECHANICAL/COMMUNICATIONS CONCEPT

SCALE

DRAWING NO. SYS–01

5.2 Structural Features

Construction of a second entrance at the east end of the Foggy Bottom-GWU station would require structural modifications to the existing station structure.

5.2.1 General Construction

Construction of the new east entrance and access for demolition of the south wall of the east service-room structure would require an open-pit excavation across the full width of the 22nd Street roadway and sidewalks and the sidewalk on the south side of I Street, requiring their closure. A slurry wall may be necessary if construction extends below the ground-water table.

Excavation for construction on the south side of the existing east service room structure would create an unbalanced earth loading condition that would require further analysis during final design.

5.2.2 Trainroom

New East Mezzanine Level and stair down to platform level

The columns and walls for the new east mezzanine level and stair should be designed considering the location of the return air plenums and walls that run directly below and support the platform slab. Any modification of the platform support structure and air plenums should be designed and coordinated with the mechanical requirements.

5.2.3 East Service Rooms

New passageway from trainroom to new east entrance and new elevators

At the mezzanine level, access for the new passageway through the east service room would require demolition to create openings in the 2'-0"-thick concrete station end wall and the 3'-0"-thick east service room south exterior wall and, at the platform level, demolition to create an opening in the 2'-0"-thick concrete station end wall to provide an entryway to the new elevators and lobby.

The new wall openings would require the design of a structural frame to support the vertical loading from the structure and earth overburden dead loads and live loads that were supported by the removed wall section.

Since the existing walls, columns, and plenum floor openings conflict with the proposed layout of the new elevators and the open elevator lobby areas at the mezzanine and platform levels, the demolition of existing and the design and construction of new platform-level walls, new duct chase, new columns, and a new mezzanine-level slab would be required. The existing outer (north and south) walls of the platform-level communication room support upper-level structural walls and columns and should remain in place.

The two existing mezzanine-level concrete columns at the west end of the east service room would be demolished to provide open space for the elevator lobby. To replace the removed columns a new load bearing wall would be constructed on the south side of the elevators and a frame constructed between the new wall and the end wall to support the roof that was supported by the columns.

5.2.4 New External Mezzanine

A new entry mezzanine would be constructed underground as a cut-and-cover operation under 22nd Street and the sidewalks to the east and west of 22nd Street, at an elevation equal to the existing upper-level east service area. The external mezzanine structure would be constructed integrally with the existing east service area structure to the north and constructed up against the University Garage to the west. The size and layout of the mezzanine would be constrained so as not to interfere with the foundations of existing buildings and future development.

The new mezzanine structure would consist of an open cast-in-place concrete structure with a central north-south arched roof beam spanning the mezzanine area and transverse roof beams framing into the arched beam. The shape and location of the arched roof beam would provide a notch in the roof mezzanine structure that would accommodate the existing 48-inch combined sewer pipe that runs beneath 22nd Street.

5.2.5 East Entrance/Elevator/Stair

The main vertical access to the new external mezzanine would be provided by a cut-and-cover, cast-in-place concrete structure for the stair/escalator array and elevators. The stair/escalator array and elevator would be incorporated into the first floor of a building that is in the GWU redevelopment plans for this parcel.

5.2.6 Temporary Support of Utilities

Temporary support of the 48-inch combined sewer pipe will be required during construction of the new external mezzanine structure. Interruption of the combined sewer service will not be allowed during construction.

5.3 Mechanical Features

Construction of a second entrance at the east end of the Foggy Bottom-GWU Metrorail station would require the mechanical features described below.

5.3.1 Station Mechanical Modifications

The proposed platform-to-mezzanine elevators would preclude using the space currently serving as a duct chase between the mezzanine and platform levels. This chase houses the under-platform exhaust and platform air conditioning system ductwork. The proposed modification would require construction of a new appropriately sized duct chase located to the north and directly adjacent to the new mezzanine-to-platform elevator hoistway. The proposed station modifications will result in the removal of an air conditioning pylon that currently serves the platform. Compensating for the loss of this pylon will require provision of a supply air outlet sized to deliver approximately 3,000 cubic feet per minute of conditioned air to the platform.

Required modifications to existing Foggy Bottom/GWU east mezzanine-level mechanical room would consist of the following:

- Replace and relocate the existing station platform air conditioning unit serving the east platform (AC-1) and reconfigure the ductwork in accordance with the new duct chase location.

Replacement of AC-1 would most likely be necessary to account for the increased pressure drop associated with ductwork modifications and the use of bag filters required by the WMATA Manual of Design Criteria (Release 7).

- Relocate the existing under-platform exhaust fan serving the east platform (F-22) and reconfigure the ductwork in accordance with the new duct chase location. A new exhaust shaft is required.
- If necessary, relocate existing AC Switchboard room ventilation fans (F-14 and F-15) to better accommodate relocated fan F-22 and air conditioning unit AC-1.
- Install new direct expansion air conditioning systems to accommodate the reconfiguration of the existing platform level Train Control room and the relocation of the existing Communications room to the mezzanine level.

5.3.2 HVAC

The new mezzanine will require air conditioning. Heating is typically not provided in station public areas. Options for a suitable air conditioning system consist of the following:

- An air conditioning system utilizing the existing station chilled water systems. The components involved would consist of the additional chilled water piping, air handling units and/or fan coil units. Unless the capacity of the chiller plant serving Foggy Bottom/GWU was increased, this option would divert chilled water from the rest of the station and result in a loss of available cooling capacity for the station platform and the existing mezzanine. Maintaining the current station platform and existing mezzanine chilled water capacity would require an upgrade to the existing chiller plant.
- An air conditioning system utilizing chilled water provided by a dedicated air-cooled liquid chiller. This system would be sized to provide the required cooling for the new mezzanine and would operate independently of the station chilled water systems. The components involved would consist of the chiller, associated chilled-water piping, chilled-water pump and air handling unit. The air-cooled chiller would preferably be located on the roof of a nearby building. In addition, mounting a chiller on a building roof would also require a pipe chase within the building for routing chilled supply and return piping. While it is possible to mount a chiller in an open areaway, this option would complicate maintenance and could also adversely impact performance as a result of short circuiting of condenser intake and discharge air.
- An air conditioning system utilizing a split-system-type air conditioner that consists of a fan coil unit and a remotely located condensing unit. Air distribution would utilize supply and return air. As is the case with an air-cooled chiller, the condenser unit would preferably be located on the roof of a nearby building. The building would also require a pipe chase for routing refrigerant piping. Due to restrictions on refrigerant piping lengths, the condenser would have to be mounted relatively close to the fan-coil unit.
- An air conditioning system utilizing a self-contained-type air conditioner that can be completely installed within a mechanical equipment room. Air distribution would utilize supply and return air ductwork routed through the mezzanine. Condenser air shafts to the surface are required. These shafts will also provide a means of equipment access.

Of the four options listed above, the self-contained air conditioning system option is preferred. This option does not require space within an adjacent building and does not affect the existing station chilled-water systems.

The new mezzanine would be air conditioned with a self-contained air conditioning unit. The estimated air conditioning requirement is approximately 15 tons. This is based on a floor area of approximately 5,000 square feet, a passenger heat load of 1,000 British thermal units per hour (Btuh) per person, a density of 40 square feet per person, and a miscellaneous electric and lighting load of 3 watts per square foot. The air distribution system would utilize both supply and return air ductwork. A new mezzanine level mechanical room is required and associated air intake and exhaust shafts are required to house the air conditioning equipment.

New elevator machine rooms would be provided with air conditioning. A change to the current version of the WMATA Manual of Design Criteria is required since the criteria contain requirements only for ventilation. Heating is not required in underground locations by the WMATA Manual of Design Criteria.

The new mezzanine-level men's, women's, and cleaners' rooms would be ventilated and heated in accordance with the WMATA Manual of Design Criteria.

Per the WMATA Manual of Design Criteria, the area of rescue assistance (AORA) requires positive ventilation using air drawn from a source located outside the subway. The WMATA Manual of Design Criteria does not requiring heating in an AORA.

5.3.3 Fire Protection

Per the WMATA Manual of Design Criteria, limited-area sprinkler systems are required for the men's, women's, and cleaners' rooms.

5.3.4 Plumbing and Drainage

In general, area drains would be provided in all shafts and the exit stairways. Due to problems associated with connecting to the existing station drainage systems, sump pumps would be provided and would discharge to the city sewer.

Because the washrooms and cleaners' room would be at mezzanine level, a sewage ejector and a water service are required. In addition to provision of domestic water, the water service will also need to supply the sprinkler system required for the new mezzanine level men's, women's, and cleaners' rooms.

5.4 Electrical and Systems Features

5.4.1 Station Electrical Modifications

Required electrical modifications include those listed below.

- New electrical equipment would be required in a mezzanine service room to provide power to lights, kiosk, fare vending equipment, emergency lights, and mechanical equipment. Electrical distribution equipment would be required in the elevator machine room. Electrical circuits installed in conduit would run from the nearest source of power in the existing passenger station AC switchgear rooms. Some modifications would be required in the AC switchgear rooms such as adding new circuit breakers, evaluating the impact of adding new loads on the existing equipment, and increasing the size of the UPS where necessary. Conduits would be concealed or embedded wherever feasible.
- Electric power equipment to drive the new elevators plus additional power for associated elevator equipment requiring electricity would come from the passenger station.

5.4.2 Station Systems Modifications

Required systems modifications are listed below.

- The new elevators would require that the existing communication room at track level be relocated to within the mechanical room at the mezzanine level. Existing communication cables would have to be extended to the new communication room, or existing cables may have to be replaced and new cables installed.
- The train-control room would have to be reconfigured because of the new elevators.
- Reconfigured train-control room needs to be operational at all times.
- New communication room and new equipment needs to be installed and operational before any changes are made to the existing communication room. At no time can this equipment be taken out of service.
- Closed-circuit television (CCTV) cameras would be needed to monitor elevator and escalator access. Conduits/cables would be required between these cameras and the corresponding communication room. Additional conduits/cable would be required from the communication room to the passenger station kiosk.
- Additional fare collection equipment would be needed.
- Intrusion devices would be needed on all access doors. Conduits/cables would be required between these devices and the corresponding communication room. Additional conduits/cable may be required from the communication room to the passenger station kiosk.
- Fire-alarm devices would be required in station service rooms and with elevator equipment. Conduits/cables would be required between these devices and the corresponding communication room. Additional conduits/cable may be required from the communication room to the passenger station kiosk.
- The passenger information display system (PIDS) may require conduits/cables between the displays and the corresponding communication room.
- The passenger emergency reporting system (PERS) may require conduits/cables between the system and the corresponding communication room.

- Public address speakers may require conduits/cables between the speakers and the corresponding communication room.
- The two-way communication system in the AORA will require conduits/cables between the system and the corresponding communication room. Additional conduits/cable may be required from the communication room to the passenger station kiosk.
- Modifications will be needed to the existing kiosk to accommodate additional elevators, escalators, CCTV camera, intrusion, fire, and communication equipment. This is to be coordinated with the new kiosk.
- The location of equipment will be based on WMATA's latest Design Criteria.
- The new CCTV, fire-alarm, intrusion, public address and other communication equipment may not be compatible with the existing equipment. The existing equipment will have to be modified or replaced to operate with the new communication equipment

5.5 Cost Estimate

Order-of-magnitude costs were estimated for the construction of a second entrance at the east end of the Foggy Bottom-GWU Metrorail station. Table 14 summarizes these costs, which total $21.2 million.

Table 14: Foggy Bottom-GWU Second Entrance Cost Estimate

Category	Cost ($1,000)
Construction Type	
Architectural	2,185
Civil	3,195
Electrical & Elevators	2,712
Mechanical	288
Structural	3,391
General Conditions	2,943
Design Contingency	4,415
Profit	1,913
Escalation (2007)	176
Total	**21,220**

Source: PB, 2007

The costs include the following:

- A 25 percent general conditions, or indirect costs, allowance. These include supervision, engineering, and administration required by the contractor to proceed with the work. The indirects also includes costs for labor supplies and subcontracts, as well as taxes, insurance and performance bond.
- A 30 percent contingency because the design is at the concept level.
- A 10 percent profit allowance, which is an additional factor applied to the total project cost to reflect the anticipated profit. This is based on the risk evaluation of the work.
- The civil cost includes maintenance of traffic, site preparation, earthwork, utilities, drainage, foundation support, and pavement. This category also includes the temporary support of the 48-inch sanitary sewer during construction.
- The electrical cost includes power, lighting, communications, sound, video, and elevators.
- The mechanical cost includes fire protection, automation systems, piping, plumbing, and HVAC.

The cost estimate does not include fees for engineering, construction management, or right-of-way. In addition, escalation beyond the second quarter of fiscal year 2007 is not included.

Because the new station entrance would be built concurrent with the redevelopment of Square 77 and covered by a new building, the estimate does not include the cost of a separate station entrance canopy.

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REFERENCES

DDOT, Washington DC Bicycle Map, 2004.

National Fire Protection Association, *NFPA 130, Standard for Fixed Guideway Transit and Passenger Rail Systems*, 2007.

Square 54 Development Team, http://www.square54.com, 2006.

The George Washington University. *The George Washington University Foggy Bottom Campus Plan: 2006-2025.* June 2006.

Transportation Research Board, *TCRP Report 100: Transit Capacity and Quality of Service Manual 2nd Edition*, 2003

WMATA, *Ballston-MU Station Exiting*, April 2006.

WMATA, Station Access and Capacity Study Data, 2006.

WMATA, Faregate Data, 2005-2006.

WMATA, *Metrorail Passenger Survey, 2002.*

WMATA, *Core Capacity Study*, 2001.

WMATA, *Manual of Design Criteria*, April 2001.

WMATA, *Bi-County Transitway/Bethesda Station Access Demand Analysis*, May 2005.

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APPENDIX A: ANALYSIS DETAILS

Station Area Land Use

Details on the number of station area population, households, and employment forecasted for 2005, 2010, and 2030 are shown in Table 15.

Table 15: Station Area Land Use Forecasts by TAZ

	Population			*Households*			*Employment*		
Year	**2005**	**2010**	**2030**	**2005**	**2010**	**2030**	**2005**	**2010**	**2030**
City Total	577,828	600,830	711,472	253,378	264132	315,832	745,300	783,710	881,420
TAZ									
1	1,089	1,152	1,393	367	367	545	3,431	3,431	3,431
2	1,870	1,979	2,401	666	666	704	8,926	8,926	8,926
3	0	0	0	0	0	24	15,028	15,028	15,028
4	0	0	0	0	0	195	8,252	8,252	8,332
5	0	0	0	0	0	0	3,380	3,380	3,380
6	0	0	0	0	0	0	11,236	11,236	11,386
7	1,426	1,534	1,912	259	259	412	10,858	11,268	11,643
8	0	0	0	0	0	23	19,120	20,760	20,915
9	1	1	1	1	1	132	22,084	22,084	22,349
10	1,402	1,433	1,603	662	662	750	11,144	11,144	11,319
11	2,108	2,124	2,336	1,546	1587	1,884	4,341	4,341	4,341
12	1,330	1,340	1,484	1,079	1354	1,354	11,531	11,531	11,886
36	1,067	1,075	1,182	770	770	770	1,974	1,974	1,974
37	3,447	3,572	4,162	1,793	1793	1,827	1,289	1,289	1,289
38	1,201	1,875	2,018	1,031	1529	1,545	4,227	4,227	4,237
40	702	708	779	524	644	644	2,807	2,817	2,817
45	634	639	693	430	430	438	4,398	4,398	4,398
¼ Mile	12,204	13,328	15,450	6,072	6,690	7,197	44,656	45,076	45,636
½ Mile	16,277	17,432	19,964	9,128	10,062	11,247	144,026	146,086	147,651

Source: DC Office of Planning (based on MWCOG Round 7.1 household and employment forecasts), PB

Because riders primarily access the Foggy Bottom-GWU Metrorail station by walking, 2030 ridership volumes were split between the existing and proposed entrance using TAZ-level land use forecasts. The peak PM peak hour and one-half hour boardings and alightings were distributed between the two entrances based on the percent of total households and employment assumed to be walking to each entrance.

Table 16 : Percent Distribution of Walk Trips by Entrance

TAZ	AM Boardings and PM Alightings		PM Boardings and AM Alightings	
	Existing Entrance	Proposed Entrance	Existing Entrance	Proposed Entrance
1	70	30	30	70
2	100	0	0	100
3	20	0	0	20
4	100	0	0	100
5	50	50	50	50
6	70	30	30	70
7	80	20	20	80
8	30	0	0	30
9	40	0	0	40
10	60	40	40	60
11	60	40	40	60
12	50	50	50	50
36	0	100	100	0
37	0	100	100	0
38	0	100	100	0
40	0	100	100	0
45	0	100	100	0

Note: These percentages were based on where riders would walk from. Thus, since this area has a higher proportion of jobs than it does households, this distribution would apply to AM alightings and PM boardings.

Alternative Analysis Details

Table 17: Input Data for All Alternatives

Input			
A	Alighting peaking factor[1]	1.28	
B	Escalator flow rate	90	p/min
C	LOS C flow rate per stair width	10	p/ft/min
D	Peak analysis period	15	min
E	Faregate flow rate	35	p/min
F	Passengers using farecard vendor	20	%
G	Farecard vendor flow rate	2.5	p/min

1. Factor only applies to alighting volumes.

The capacity analysis used peak-hour factors based on 2006 ridership data provided by WMATA.

Table 18: Summary of 2006 Existing Capacity Analysis

Entrance(s): Existing West

15-min. Peak Hour Factor (PHF)		
	AM	PM
Boarding	0.38	0.35
Alighting	0.27	0.27

		AM			PM			Critical		Actual[2]		
		Alighting[1]	Boarding	Total	Alighting[1]	Boarding	Total	Alighting	Boarding	Alighting	Boarding	
H	Passengers, 1-hr. peak	4,220	910	5,130	1,307	3,666	4,973					
I	Passengers, 15-min. peak	1,139	346	1,485	353	1,283	1,636					H x PHF
J	Platform Escalators Required	2	1	3	1	1	2	2	1	2	1	(A x I) / (B x D)
K	Mezzanine Escalators Required	2	1	3	1	1	2	2	1	2(1)	1(2)	(A x I) / (B x D)
L	Elevator(s) Required[3]			1			1	1		1		
M	Faregate Aisles Required[4]	3	1	4	1	3	4	3	3	9	6	(A x I) / (D x E)
N	Farecard Vendors Required		2	2		7	7	7		12		(F x I) / (D x G)

Notes:
1. Alighting factor applies.
2. AM values (PM values) i.e. (2)1: two alighting escalators available in the AM and only one in the PM
3. Per WMATA standards, two elevators are required for redundancy. See Elevator Analysis spreadsheet for details.
4. In addition to standard faregate aisles, WMATA requires one ADA aisle that can accommodate passenger flow in both directions.

Table 19: Summary of 2030 No Build Capacity Analysis

Entrance: Existing West

15-min. Peak Hour Factor (PHF)		
	AM	PM
Boarding	0.38	0.35
Alighting	0.27	0.27

		AM			PM			Critical		Actual[2]		
		Alighting[1]	Boarding	Total	Alighting[1]	Boarding	Total	Alighting	Boarding	Alighting	Boarding	
H	Passengers, 1-hr. peak	4,751	1,045	5,796	1,515	4,207	5,722					
I	Passengers, 15-min. peak	1,283	397	1,680	409	1,472	1,882					H x PHF
J	Platform Escalators Required	2	1	3	1	2	3	2	2	2	1	(A x I) / (B x D)
K	Mezzanine Escalators Required	2	1	3	1	2	3	2	2	2(1)	1(2)	(A x I) / (B x D)
L	Elevator(s) Required[3]			1			1	1		1		
M	Faregate Aisles Required[4]	4	1	5	1	3	4	4	3	9	6	(A x I) / (D x E)
N	Farecard Vendors Required	3		3	8		8	8		12		(F x I) / (D x G)

Notes:
1. Alighting factor applies.
2. AM values (PM values) i.e. (2)1: two alighting escalators available in the AM and only one in the PM
3. Per WMATA standards, two elevators are required for redundancy. See Elevator Analysis spreadsheet for details.
4. In addition to standard faregate aisles, WMATA requires one ADA aisle that can accommodate passenger flow in both directions.

Table 20: Summary of 2030 Build 1 Capacity Analysis

Entrance: Existing West and Proposed East Entrances

15-min. Peak Hour Factor (PHF)		
	AM	PM
Boarding	0.38	0.35
Alighting	0.27	0.27

Split Factors for Volumes (SF)		
	West	East
Boarding	0.35	0.65
Alighting	0.35	0.65

		AM			PM					
		Alighting[1]	Boarding	Total	Alighting[1]	Boarding	Total			
H	Passengers, 1-hr. peak	4,751	1,045	5,796	1,515	4,207	5,722			
I	Passengers, 15-min. peak	1,283	397	1,680	409	1,472	1,882	H x PHF		
	Existing West Entrance									
J	Passengers, 15-min. peak	449	139	588	143	515	659	I x SF		
	Proposed East Entrance									
K	Passengers, 15-min. peak	834	258	1092	266	957	1223	I x SF		
								Critical		
	Existing West Entrance							Alighting	Boarding	
L	Platform Escalators Required	1	1	2	1	1	2	1	1	(A x J) / (B x D)
M	Mezzanine Escalators Required	1	1	2	1	1	2	1	1	(A x J) / (B x D)
N	Elevator(s) Required[2]			1			1	1		
O	Faregate Aisles Required[3]	2	1	3	1	1	2	2	1	(A x J) / (D x E)
P	Farecard Vendors Required		1	1		3	3		3	(F x J) / (D x G)
	Proposed East Entrance							Alighting	Boarding	
Q	Platform Stair Width Required (ft.)	10	5		5	9		10	9	(A x K)/(C x D)+30"
R	Mezzanine Escalators Required[4]	1	1	2	1	1	2	1	1	(A x K) / (B x D)
S	Elevator(s) Required[2]			1			1	1		
T	Faregate Aisles Required[3]	3	1	4	1	2	3	3	2	(A x K) / (D x E)
U	Farecard Vendors Required		3	2		6	6		6	(F x K) / (D x G)

Notes:
1. Alighting factor applies.
2. Per WMATA standards, two elevators are required for redundancy. See Elevator Analysis spreadsheet for details.
3. In addition to standard faregate aisles, WMATA requires one ADA aisle that can accommodate passenger flow in both directions.
4. WMATA prefers to install a stairway with new escalator banks.

Table 21: Summary of 2030 Build 2 Capacity Analysis

Entrance: **Existing West and Proposed West Entrances**

15-min. Peak Hour Factor (PHF)		
	AM	PM
Boarding	0.38	0.35
Alighting	0.27	0.27

Split Factors for Volumes (SF)		
	West	New West
Boarding	0.5	0.5
Alighting	0.5	0.5

		AM			**PM**					
		Alighting	Boarding	Total	Alighting	Boarding	Total			
H	Passengers, 1-hr. peak	4,751	1,045	5,796	1,515	4,207	5,722			
I	Passengers, 15-min. peak	1,283	397	1,680	409	1,472	1,882	H x PHF		
	Existing West Entrance									
J	Passengers, 15-min. peak	641	199	840	205	736	941	I x SF		
	New West Entrance									
K	Passengers, 15-min. peak	641	199	840	205	736	941	I x SF		
								Critical		
	Existing West Entrance							Alighting	Boarding	
L	Platform Escalators Required[2]	2	1	3	1	2	3	2	2	(A x I) / (B x D)
M	Mezzanine Escalators Required	1	1	2	1	1	2	1	1	(A x J) / (B x D)
N	Elevator(s) Required[3]			1			1	1		
O	Faregate Aisles Required[4]	2	1	3	1	2	3	2	2	(A x J) / (D x E)
P	Farecard Vendors Required		2	2		4	4		4	(F x J) / (D x G)
	New West Entrance							Alighting	Boarding	
Q	Mezzanine Escalators Required[5]	1	1	2	1	1	2	1	1	(A x K) / (B x D)
R	Elevator(s) Required[3]			1			1	1		
S	Faregate Aisles Required[4]	2	1	3	1	2	3	2	2	(A x K) / (D x E)
T	Farecard Vendors Required		2	2		4	4		4	(F x K) / (D x G)

Note:
1. Alighting factor applies.
2. Escalators required between platform to mezzanine will serve passengers transiting to-and-from both entrances.
3. Per WMATA standards, two elevators are required for redundancy. See Elevator Analysis spreadsheet for details.
4. Additional to the normal faregate aisles, the mezzanine call for one ADA aisle that can accommodate passenger flow in both directions.
5. WMATA prefers to install a stairway with new escalator banks.

Vertical Capacity Analysis

Table 22: Vertical Capacity Analysis - AM Peak Exits

Escalator Flow Rate	90	p/min
Stair (5' wide) Flow Rate	25	p/min
Stair (10' wide) Flow Rate	75	p/min
LOS C Stairway Capacity	10	p/ft/min
Peak Analysis Period	15	minutes
Peaking Factor	1.28	
Peak 1-Hour Factor	0.27	
Peak Hour Volume (2006)	4220	passengers
Peak Hour Volume (2030)	4751	passengers

Split Factors for Alighting Volumes (2030 Build 1)	
West	0.35
East	0.65

Split Factors for Alighting Volumes (2030 Build 2)	
West	0.5
New West	0.5

SCENARIO	EXIT	STREET TO MEZZANINE						MEZZANINE TO PLATFORM					
		Peak 15 min. Volume	Required Number of Escalators	Actual Number of Escalators	Required Width of Stairs	Vertical Capacity	V/C	Peak 15 min. Volume	Required Number of Escalators	Actual Number of Escalators	Required Width of Stairs	Vertical Capacity	V/C
2006	West	1458	2	2		2700	0.55	1458	2	2		2700	0.55
2030 - No Build	West	1642	2	2		2700	0.61	1642	2	2		2700	0.61
2030 - Build 1	West	575	1	2		2700	0.22	575	1	2		2700	0.22
	East	1067	1	2	5	3075	0.35	1067	0	0	10	1125	0.95
2030 - Build 2	West	821	1	2		2700	0.31	1642	2	2		2700	0.61
	New West	821	1	2	5	3075	0.27						

Note:

1. The 2030 Build 2 scenario uses the existing vertical elements for the passenger movement between the mezzanine and the platform.

# Denotes that flow is approaching capacity; volume to capacity ratio is greater than 0.75.

Table 23: Vertical Capacity Analysis - PM Peak Entries

Escalator Flow Rate	90	p/min
Stair (5' wide) Flow Rate	25	p/min
Stair (10' wide) Flow Rate	75	p/min
LOS C Stairway Capacity	10	p/ft/min
Peak Analysis Period	15	minutes
Peaking Factor	1	
Peak 1-Hour Factor	0.35	
Peak Hour Volume (2006)	3666	passengers
Peak Hour Volume (2030)	4207	passengers

Split Factor for Boarding Volumes (2030 Build 1)	
West	0.35
East	0.65

Split Factors for Boarding Volumes (2030 Build 2)	
West	0.5
New West	0.5

SCENARIO	ENTR.	STREET TO MEZZANINE						MEZZANINE TO PLATFORM					
		Peak 15 min. volume	Required Number of Escalators	Actual Number of Escalators	Required Width of Stairs	Vertical Capacity	V/C	Peak 15 min. volume	Required Number of Escalators	Actual Number of Escalators	Required Width of Stairs	Vertical Capacity	V/C
2006	West	1283	1	2		2700	0.48	1283	1	1		1350	0.95
2030 - No Build	West	1472	2	2		2700	0.55	1472	2	1		1350	**1.09**
2030 - Build 1	West	515	1	2		2700	0.20	515	1	1		1350	0.38
	East	957	1	2	5	3075	0.32	957	0	0	9	1125	0.85
2030 - Build 2	West	736	1	2		2700	0.28	1472	2	1		1350	**1.09**
	New West	736	1	2	5	3075	0.24						

Note:
1. The 2030 Build 2 scenario uses the existing vertical elements for the passenger movement between the mezzanine and the platform.

#	Denotes that flow is approaching capacity; volume to capacity ratio is greater than 0.75.
#	Denotes that flow is over capacity; volume to capacity ratio is greater than 1.0.

Elevator Analysis

Table 24: 2006 and 2030 No Build Elevator Capacity Analysis

Capacity of Existing Site Analysis - West Entrance		
	Street to Mezzanine	Mezzanine to Platform
Number of Elevators	1	1
Area of Elevator (ft^2)	30.0	30.0
Boarding / Alighting	10	10
Passenger unloading top (sec)	10.5	10.5
Passenger loading top (sec)	10.5	10.5
Doors closing (sec)	2.5	2.5
Travel time(sec)	8.8	13.6
Leveling time (sec)	2.0	2.0
Doors opening (sec)	2.5	2.5
Passenger unloading bottom (sec)	10.5	10.5
Passenger Loading bottom (sec)	10.5	10.5
Doors closing (sec)	2.5	2.5
Travel time(sec)	8.8	13.6
Leveling time (sec)	2.0	2.0
Doors opening (sec)	2.5	2.5
Cycle time (sec) =	73.6	83.2
Boarding / Alighting peak 15 load	122	108
Total 15 min peak load =	**216**	**People**

2006 Existing	**West**	**Capacity**	**V/C**
AM			
Peak 15 minute load	90	216	0.42
Boarding	17	108	0.16
Alighting	73	108	0.67
PM			
Peak 15 minute load	87	216	0.40
Boarding	64	108	0.59
Alighting	23	108	0.21

2030 No Build	**West**	**Capacity**	**V/C**
AM			
Peak 15 minute load	102	216	0.47
Boarding	20	108	0.18
Alighting	82	108	0.76
PM			
Peak 15 minute load	100	216	0.46
Boarding	74	108	0.68
Alighting	26	108	0.24

# Denotes that flow is approaching capacity; volume to capacity ratio is greater than 0.75.

Table 25: 2030 Build 1 Elevator Capacity Analysis

Capacity Future Site Analysis - East and West Entrances				
	West		East	
	Street to Mezzanine	Mezzanine to Platform	Street to Mezzanine	Mezzanine to Platform
Number of Elevators	1	1	1	1
Area of Elevator (ft^2)	30.0	30.0	30.0	25.5
Boarding / Alighting	10	10	10	8.5
Passenger unloading top (sec)	10.5	10.5	10.5	8.9
Passenger loading top (sec)	10.5	10.5	10.5	8.9
Doors closing (sec)	2.5	2.5	2.5	2.5
Travel time(sec)	8.8	13.6	1.9	2.9
Leveling time (sec)	2.0	2.0	2.0	2.0
Doors opening (sec)	2.5	2.5	2.5	2.5
Passenger unloading bottom (sec)	10.5	10.5	10.5	8.9
Passenger Loading bottom (sec)	10.5	10.5	10.5	8.9
Doors closing (sec)	2.5	2.5	2.5	2.5
Travel time(sec)	8.8	13.6	1.9	2.9
Leveling time (sec)	2.0	2.0	2.0	2.0
Doors opening (sec)	2.5	2.5	2.5	2.5
Cycle time (sec) =	73.6	83.2	59.8	55.5
Boarding / Alighting peak 15 load	122	108	151	138
Total 15 min peak load =	**216**	**People**	**276**	**People**

2030 - Build 1	West	Capacity	V/C	East	Capacity	V/C
AM						
Peak 15 minute load	36	216	0.16	66	276	0.24
Boarding	7	108	0.06	13	138	0.09
Alighting	29	108	0.27	53	138	0.39
PM						
Peak 15 minute load	35	216	0.16	65	276	0.24
Boarding	26	108	0.24	48	138	0.35
Alighting	9	108	0.08	17	138	0.12

Table 26: 2030 Build 2 Elevator Capacity Analysis

Capacity Future Site Analysis - Existing and New West Entrances				
	Existing West		New West	
	Street to Mezzanine	Mezzanine to Platform	Street to Mezzanine	Mezzanine to Platform
Number of Elevators	1	1	1	1
Area of Elevator (ft^2)	30.0	30.0	30.0	25.5
Boarding / Alighting	10	10	10	8.5
Passenger unloading top (sec)	10.5	10.5	10.5	8.9
Passenger loading top (sec)	10.5	10.5	10.5	8.9
Doors closing (sec)	2.5	2.5	2.5	2.5
Travel time(sec)	8.8	13.6	1.9	2.9
Leveling time (sec)	2.0	2.0	2.0	2.0
Doors opening (sec)	2.5	2.5	2.5	2.5
Passenger unloading bottom (sec)	10.5	10.5	10.5	8.9
Passenger Loading bottom (sec)	10.5	10.5	10.5	8.9
Doors closing (sec)	2.5	2.5	2.5	2.5
Travel time(sec)	8.8	13.6	1.9	2.9
Leveling time (sec)	2.0	2.0	2.0	2.0
Doors opening (sec)	2.5	2.5	2.5	2.5
Cycle time (sec) =	73.6	83.2	59.8	55.5
Boarding / Alighting peak 15 load	122	108	151	138
Total 15 min peak load =	**216**	**People**	**276**	**People**

2030 - Build 2	West	Capacity	V/C	New West	Capacity	V/C
AM						
Peak 15 minute load	51	216	0.24	51	276	0.19
Boarding	10	108	0.09	10	138	0.07
Alighting	41	108	0.38	41	138	0.30
PM						
Peak 15 minute load	50	216	0.23	50	276	0.18
Boarding	37	108	0.34	37	138	0.27
Alighting	13	108	0.12	13	138	0.10

Platform Analysis

Table 27: Platform Capacity Analysis

		2005		2030	
Analysis Period		**AM**	**PM**	**AM**	**PM**
	Boarding	173	642	199	736
	Alighting	729	151	547	175
Total passengers on platform at one time		902	792	746	911

LOS "C" required passenger waiting space	7	ft²/p
LOS "C" required passenger walking space	15	ft²/p
Total Area Available for Passengers	**15,415**	ft²

Analysis Period	2005		2030	
	AM	**PM**	**AM**	**PM**
Total area required to accommodate passenger waiting on platform at one time (ft²)	6,315	5,545	5,221	6,375

NFPA-130 Analysis

Table 28: NFPA-130 Preliminary Analysis – AM Peak

WITHOUT EAST ENTRANCE

Platform to mezzanine capacity	No.	width (in)	pim	p/min
Stairs	0	0	1.41	0
Escalators*	2	96	1.41	135.36
Total				135.36
% Escalators:		100%		
Faregate capacity				
West Entrance				
Faregates	16		50	800
Service gate	2	72	2.27	163.44
Total				963.44
Mezzanine to street capacity				
West Entrance				
Escalators*	2	96	1.41	135.36
Walking time for longest route				
West Entrance				
	ft	ft/min	minutes	
Platform	385	124	3.104839	
Escalator	12.3	48	0.25625	
Mezzanine	231	124	1.862903	
Escalator	32.5	48	0.677083	
Total			5.901075	

WITH EAST ENTRANCE

Platform to mezzanine capacity	No.	width (in)	pim	p/min
Stairs	1	120	1.41	169.2
Escalators*	2	96	1.41	135.36
Total				304.56
% Escalators:		67%		
Faregate capacity				
West Entrance				
Faregates	16		50	800
Service gate	2	72	2.27	163.44
Total				963.44
East Entrance				
Faregates	6		50	300
Service gate	1	36	2.27	81.72
Total				381.72
Mezzanine to street capacity				
West Entrance				
Escalators	3	144	1.41	203.04
East Entrance				
Escalators*	1	48	1.41	67.68
Stairs	1	60	1.41	84.6
Total				152.28
Walking time for longest route				
West Entrance				
	ft	ft/min	minutes	
Platform	215	124	1.733871	
Escalator	12.4	50	0.248	
Mezzanine	231	124	1.862903	
Escalator	32.5	50	0.65	
Total			4.494774	
East Entrance				
Platform	132	124	1.064516	
Stair	12.4	50	0.248	
Mezzanine	164	124	1.322581	
Stair	32.5	50	0.65	
Total			3.285097	

WITH NEW WEST ENTRANCE

Platform to mezzanine capacity	No.	width (in)	pim	p/min
Stairs				
Escalators*	2	96	1.41	135.36
				135.36
% Escalators:		67%		
Faregate capacity				
For Current and New West Entrances				
Faregates	15	15	50	750
ADA gate	1	1	75	75
Service gate	2	72	2.27	163.44
Total				988.44
Mezzanine to street capacity				
West Entrance				
Escalators	2	96	1.41	135.36
New West Entrance				
Escalators	2	96	1.41	135.36
Stairs	1	48	1.41	67.68
Total				203.04
Walking time for longest route				
West Entrance				
	ft	ft/min	minutes	
Platform	215	124	1.733871	
Escalator	12.4	48	0.2583333	
Mezzanine	231	124	1.8629032	
Escalator	32.5	48	0.6770833	
Total			4.5321909	
New West Entrance				
Platform	215	124	1.733871	
Escalator	12.4	48	0.2583333	
Mezzanine + Tunnel	431	124	3.4758065	
Escalator	32.5	48	0.6770833	
Total			6.1450941	

* One escalator is assumed to be out of service
Elevators are assumed to be out of service for evacuation purposes

Table 29: NFPA-130 Preliminary Analysis – PM Peak

WITHOUT EAST ENTRANCE					WITH EAST ENTRANCE					WITH NEW WEST ENTRANCE				
Platform to mezzanine capacity					***Platform to mezzanine capacity***					***Platform to mezzanine capacity***				
	No.	width (in)	pim	p/min		No.	width (in)	pim	p/min		No.	width (in)	pim	p/min
Stairs	0	0	1.41	0	Stairs	1	120	1.41	169.2	Stairs				
Escalators*	2	96	1.41	135.36	Escalators*	2	96	1.41	135.36	Escalators*	2	96	1.41	135.36
Total				135.36	Total				304.56					135.36
% Escalators:		100%			% Escalators:		67%			% Escalators:		67%		
Faregate capacity					***Faregate capacity***					***Faregate capacity***				
West Entrance					West Entrance					For Current and New West Entrances				
Faregates	15	15	50	750	Faregates	15	15	50	750	Faregates	15	15	50	750
ADA gate	1	1	75	75	ADA gate	1	1	75	75	ADA gate	1	1	75	75
Service gate	2	72	2.27	163.44	Service gate	2	72	2.27	163.44	Service gate	2	72	2.27	163.44
Total				988.44	Total				988.44	Total				988.44
					East Entrance									
					Faregates	5	5	50	250					
					ADA gate	1	1	75	75					
					Service gate	1	36	2.27	81.72					
					Total				406.72					
Mezzanine to street capacity					***Mezzanine to street capacity****					***Mezzanine to street capacity***				
West Entrance					West Entrance					West Entrance				
Escalators	2	96	1.41	135.36	Escalators	3	144	1.41	203.04	Escalators*	2	96	1.41	135.36
					East Entrance					New West Entrance				
					Escalators	1	48	1.41	67.68	Escalators	2	96	1.41	135.36
					Stairs**	1	48	1.41	67.68	Stairs	1	48	1.41	67.68
					Total				135.36	Total				203.04
Walking time for longest route					***Walking time for longest route***					***Walking time for longest route***				
West Entrance					West Entrance					West Entrance				
	ft	ft/min	minutes			ft	ft/min	minutes			ft	ft/min	minutes	
Platform	385	124	3.104839		Platform	215	124	1.733871		Platform	215	124	1.733871	
Escalator	12.3	48	0.25625		Escalator	12.4	48	0.258333		Escalator	12.4	48	0.2583333	
Mezzanine	231	124	1.862903		Mezzanine	231	124	1.862903		Mezzanine	231	124	1.8629032	
Escalator	32.5	48	0.677083		Escalator	32.5	48	0.677083		Escalator	32.5	48	0.6770833	
Total			5.901075		Total			4.532191		Total			4.5321909	
					East Entrance					New West Entrance				
					Platform	132	124	1.064516		Platform	215	124	1.733871	
					Stair	12.4	48	0.258333		Escalator	12.4	48	0.2583333	
					Mezzanine	164	124	1.322581		Mezzanine + Tunnel	431	124	3.4758065	
					Stair	32.5	48	0.677083		Escalator	32.5	48	0.6770833	
					Total			3.322513		Total			6.1450941	

* One escalator is assumed to be out of service
Elevators are assumed to be out of service for evacuation purposes

Table 30: NFPA-130 Complete Analysis - AM

Analysis period:	**AM**	**Options**			
		Existing 2005	No-build 2030	Build 1 2030	Build 2 2030
Entraining Load	Peak 1-hr period	910	1045	1045	1045
	Peak ½ hr period	475	538	538	538
B6*(0.38)	Peak 15-min period	346	397	397	397
	Headway (min)	2.5	2.5	2.5	2.5
	Entraining Load for analysis	115	132	132	132
	Cars per train[1]	6	8	8	8
	Car capacity	120	120	120	120
	Link load, peak direction	720	960	960	960
	Off-peak direction factor	0.4	0.4	0.4	0.4
	Link load, off-peak direction	288	384	384	384
	Total Occupant Load	**1123**	**1476**	**1476**	**1476**
	Time to Clear platform (min)	**8.3**	**10.9**	**4.8**	**10.9**
	Wait time at platform exit				
	West Entrance	5.2	7.8	3.1	9.2
	East Entrance			3.8	
	New West Entrance				9.2
Split	***Trips to Entrance***				
0.5	West Entrance	1123	1476	738	738
0.5	East Entrance			738	
	New West Entrance				738
	Faregate flow time				
	West Entrance	1.2	1.5	0.8	1.5
	East Entrance			1.9	
	New West Entrance[2]				1.5
	Wait time at faregates				
	West Entrance	0.0	0.0	0.0	0.0
	East Entrance			0.1	
	New West Entrance				0.0
	Street exit flow time				
	West Entrance	8.3	10.9	3.6	5.5
	East Entrance			4.8	
	New West Entrance				3.6
	Wait time at street exit				
	West Entrance	0.0	0.0	0.0	0.0
	East Entrance			0.0	
	New West Entrance				0.0
	Total exit time				
	West Entrance	14.7	20.2	7.5	16.1
	East Entrance			10.7	
	New West Entrance				14.3
	Evacuation Time (min)	**14.7**	**20.2**	**10.7**	**14.9**

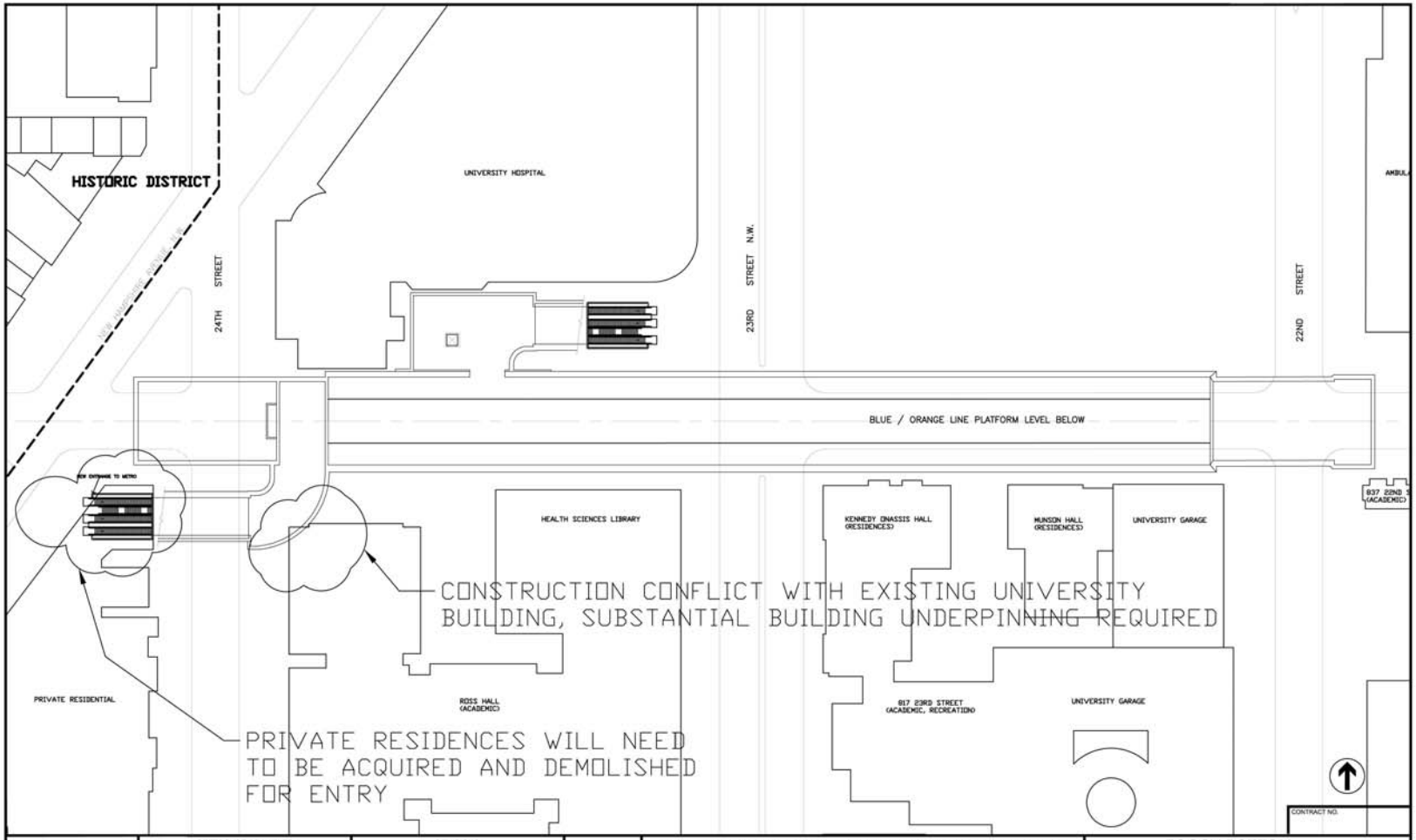
Note:
1. Future cars per train is assumed 8
2. Faregate flow time for new west entrance is the same as for the existing west entrance for 2030 - Build 2

Table 31: NFPA-130 Complete Analysis - PM

Analysis period:	PM	Options			
		Existing 2005	No-build 2030	Build 1 2030	Build 2 2030
Entraining Load	Peak 1-hr period	3666	4207	4207	4207
	Peak ½ -hr period	1943	2232	2232	2232
B5*0.35	Peak 15-min period	1283	1472	1472	1472
	Headway (min)	2.5	2.5	2.5	2.5
	Entraining Load for analysis	428	491	491	491
	Cars per train[1]	6	8	8	8
	Car capacity	120	120	120	120
	Link load, peak direction	720	960	960	960
	Off-peak direction factor	0.4	0.4	0.4	0.4
	Link load, off-peak direction	288	384	384	384
	Total Occupant Load	**1436**	**1835**	**1835**	**1835**
	Time to Clear platform (min)	**10.6**	**13.6**	**6.0**	**13.6**
	Wait time at platform exit				
	West Entrance	7.5	10.5	4.3	11.8
	East Entrance			5.0	
	New West Entrance				11.8
Split	***Trips to Entrance***				
0.5	West Entrance	1436	1835	917	917
0.5	East Entrance			917	
	New West Entrance				917
	Faregate flow time				
	West Entrance	1.5	1.9	0.9	1.9
	East Entrance			2.3	
	New West Entrance[2]				1.9
	Wait time at faregates				
	West Entrance	0.0	0.0	0.0	0.0
	East Entrance			0.0	
	New West Entrance				0.0
	Street exit flow time				
	West Entrance	10.6	13.6	4.5	6.8
	East Entrance			6.8	
	New West Entrance				4.5
	Wait time at street exit				
	West Entrance	0.0	0.0	0.0	0.0
	East Entrance			0.0	
	New West Entrance				0.0
	Total exit time				
	West Entrance	19.6	25.9	9.7	20.5
	East Entrance			14.0	
	New West Entrance				18.2
	Evacuation Time (min)	**19.6**	**25.9**	**14.0**	**18.8**

Note:
1. Future cars pert train is assumed 8
2. Faregate flow time for new west entrance is the same as for the existing west entrance for 2030 - Build 2

APPENDIX B: DRAWINGS OF INITIAL ALTERNATIVES



CONTRACT NO.

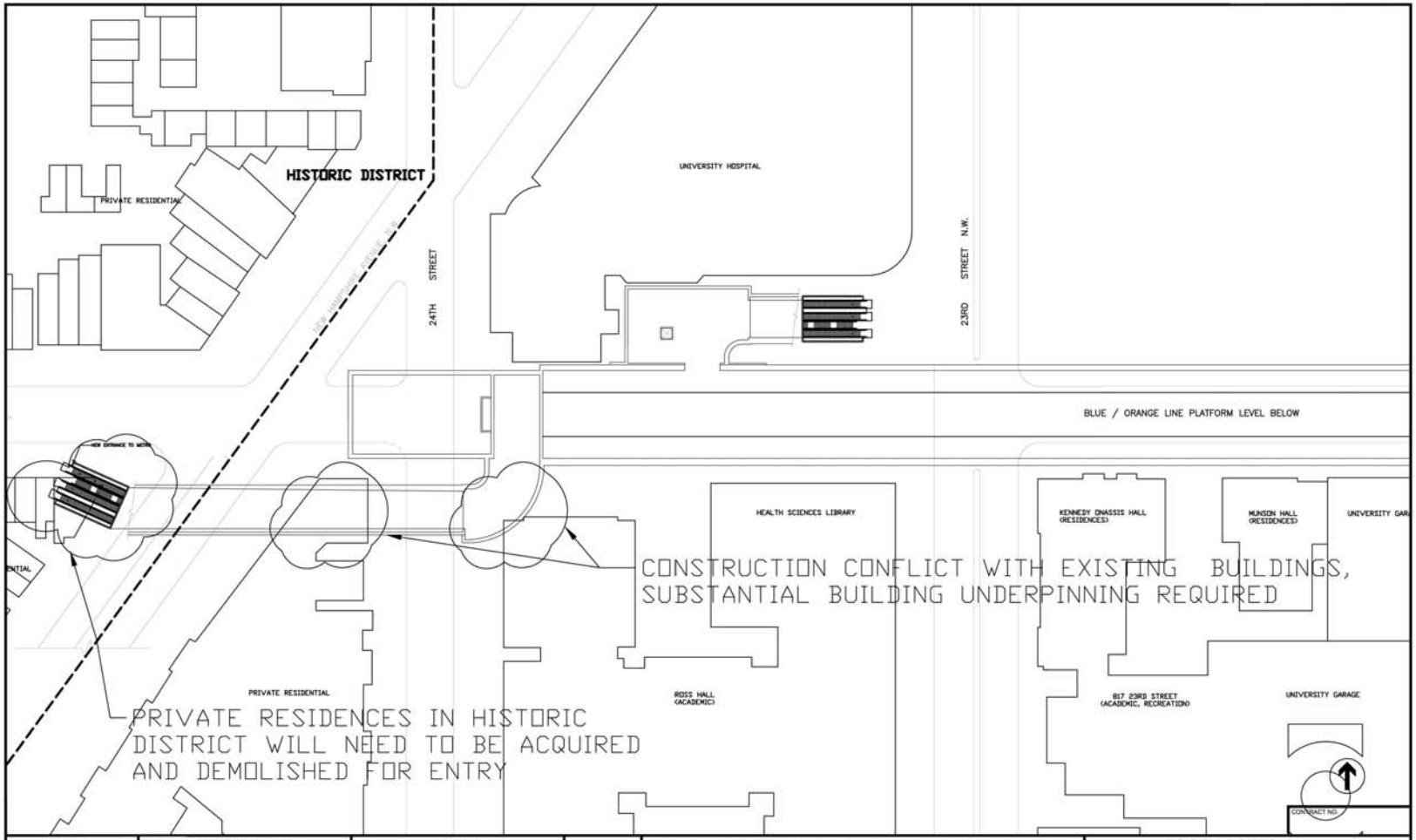
DESIGNED S. Garland 20June00 DATE	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DRAWN SG 20June00 DATE	NUMBER / DESCRIPTION	DATE / BY / DESCRIPTION	OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM
CHECKED DATE			APPROVED
APPROVED DATE			SUBMITTED — a joint venture of: •Parsons Transportation Group Inc. •Parson Brinckerhoff Quade & Douglas, Inc •Delon Hampton & Associates, Chartered — PROJECT MANAGER

FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 1A

SCALE 1"=60'-0"

DRAWING NO. A-03



DESIGNED S. Garland 20June00 DATE	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DRAWN SG 20June00 DATE	NUMBER / DESCRIPTION	DATE / BY / DESCRIPTION	OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM
CHECKED DATE			APPROVED
APPROVED DATE			SUBMITTED

a joint venture of:
•Parsons Transportation Group Inc.
•Parson Brinckerhoff Quade & Douglas, Inc
•Delon Hampton & Associates, Chartered

PROJECT MANAGER

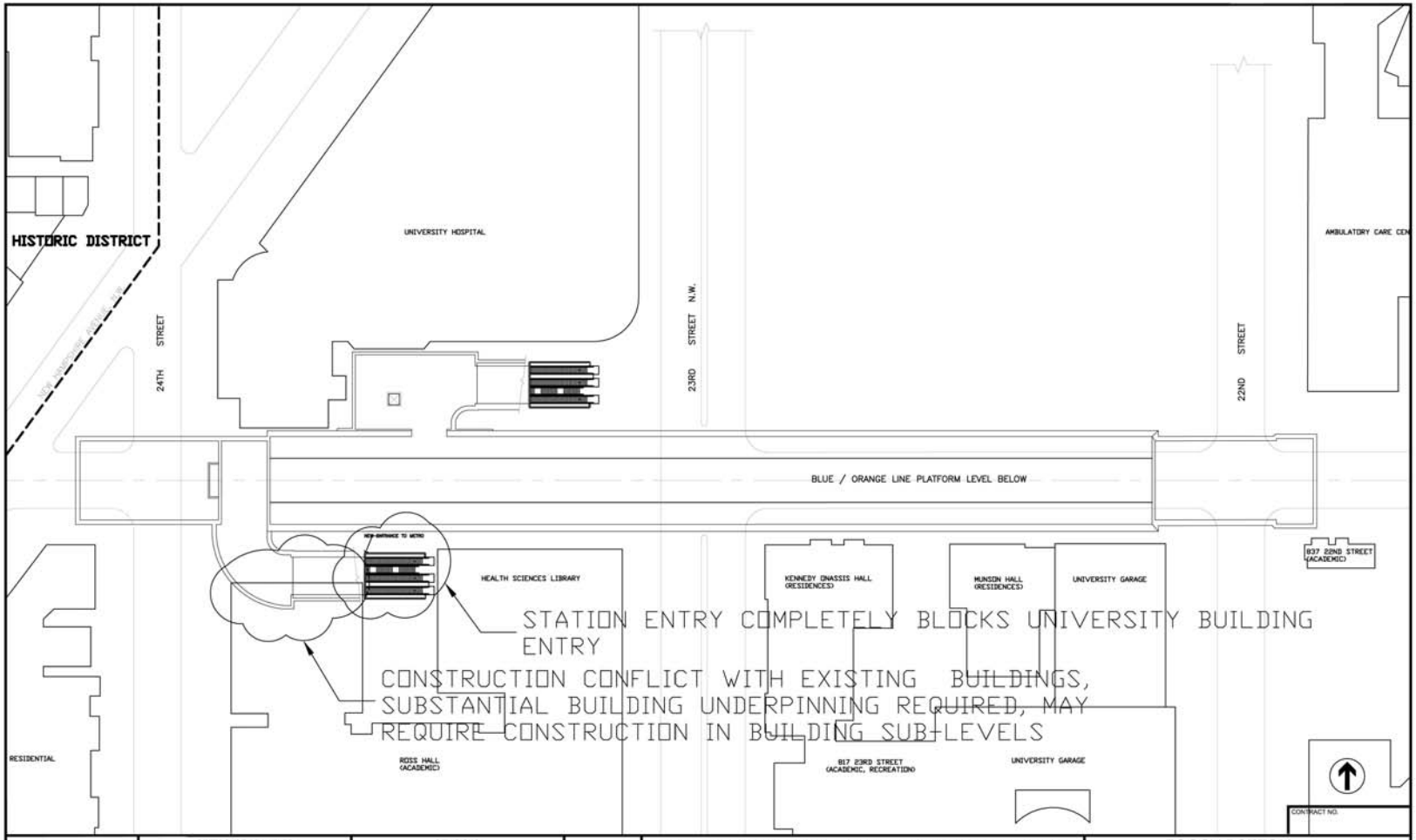
FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 1B

SCALE 1"=60'-0"

DRAWING NO. A-04

CONTRACT NO.



CONTRACT NO.

DESIGNED S. Garland 20June00 DATE
DRAWN SG 20June00 DATE
CHECKED DATE
APPROVED DATE

REFERENCE DRAWINGS	
NUMBER	DESCRIPTION

REVISIONS		
DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM

APPROVED

P2D SUBMITTED

a joint venture of:
•Parsons Transportation Group Inc.
•Parson Brinckerhoff Quade & Douglas, Inc
•Delon Hampton & Associates, Chartered

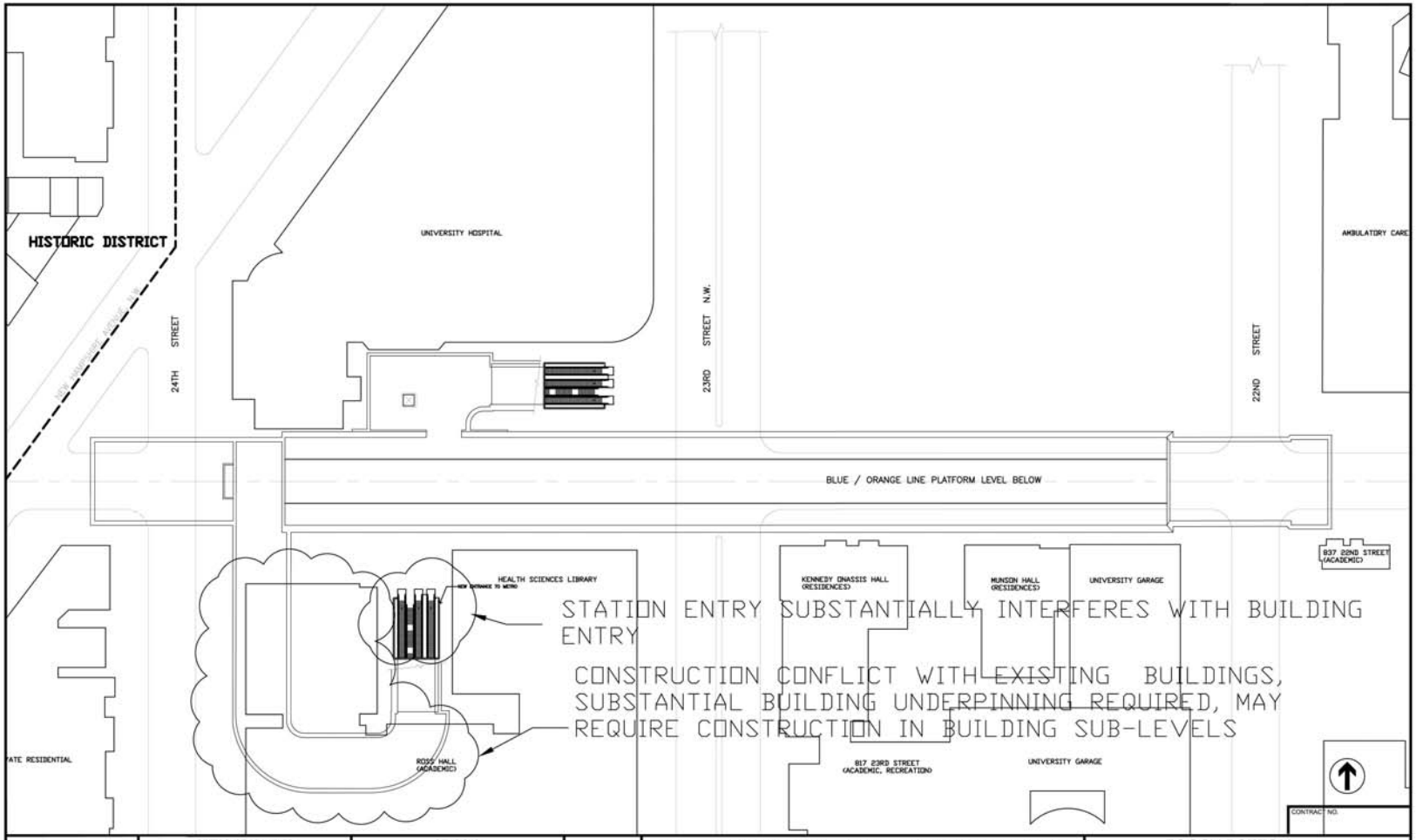
PROJECT MANAGER

FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 2A

SCALE 1"=60'-0"

DRAWING NO. A-05



DESIGNED S. Garland 20June00 DATE	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DRAWN SG 20June00 DATE	NUMBER / DESCRIPTION	DATE / BY / DESCRIPTION	OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM
CHECKED DATE			APPROVED
APPROVED DATE			SUBMITTED — PROJECT MANAGER

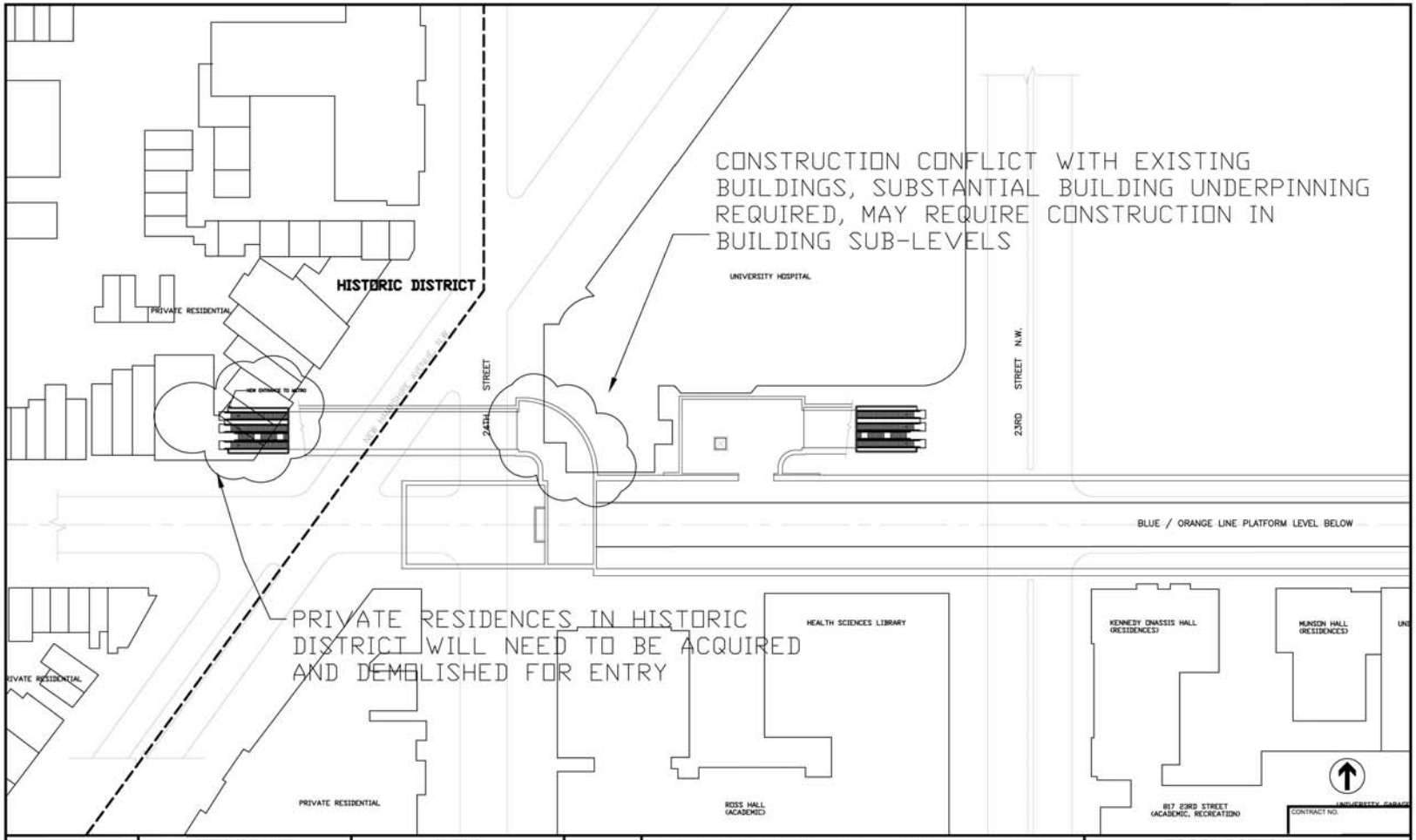
a joint venture of:
•Parsons Transportation Group Inc.
•Parson Brinckerhoff Quade & Douglas, Inc
•Delon Hampton & Associates, Chartered

FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 2B

SCALE 1"=60'-0"

DRAWING NO. A-06



DESIGNED S. Garland 20June00 DATE	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DRAWN SG 20June00 DATE	NUMBER / DESCRIPTION	DATE / BY / DESCRIPTION	OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM
CHECKED DATE			APPROVED
APPROVED DATE			SUBMITTED

a joint venture of:
•Parsons Transportation Group Inc.
•Parson Brinckerhoff Quade & Douglas, Inc
•Delon Hampton & Associates, Chartered

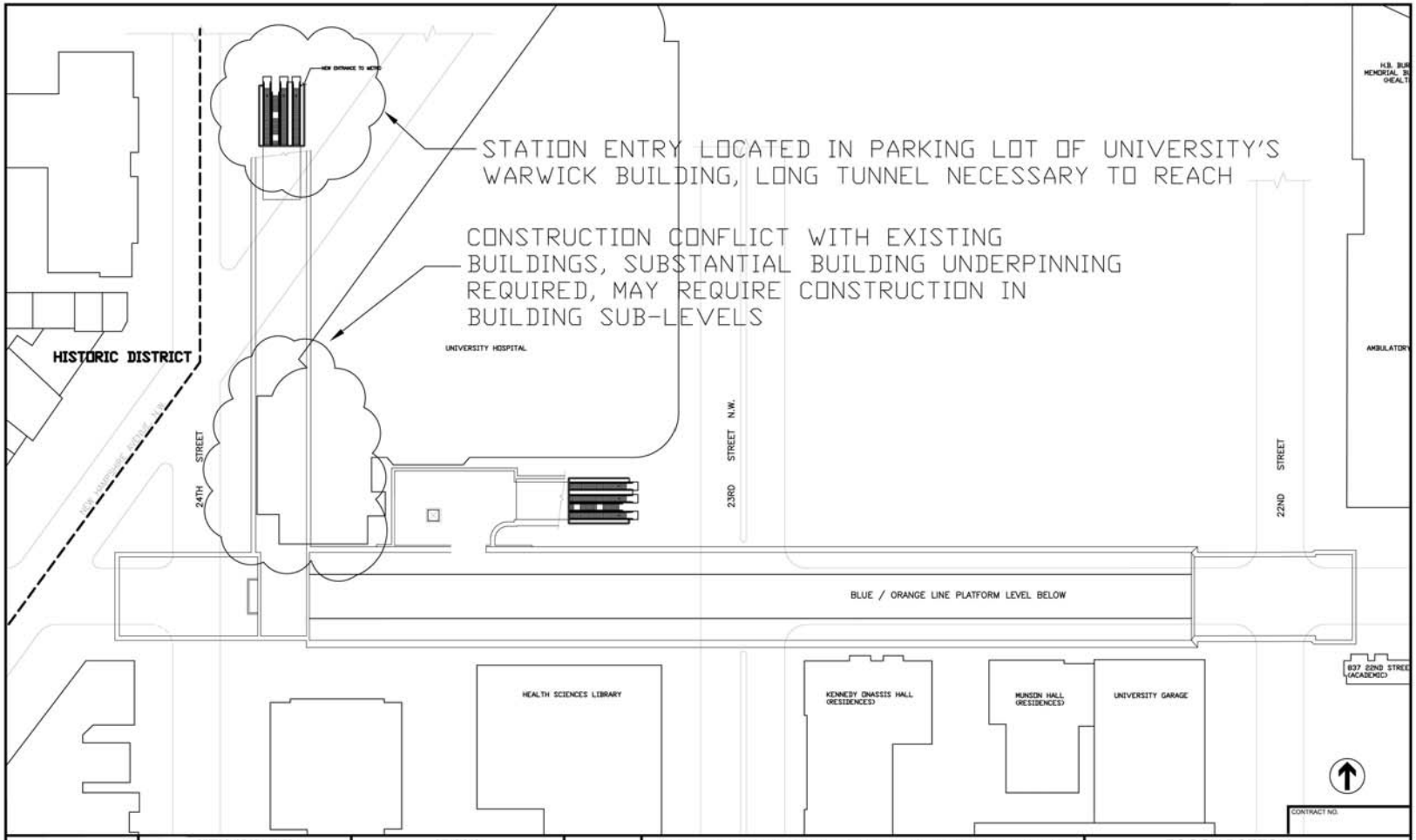
PROJECT MANAGER

FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 3A

SCALE 1"=60'-0"

DRAWING NO. A-07



DESIGNED S. Garland 20June00 DATE	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DRAWN SG 20June00 DATE	NUMBER / DESCRIPTION	DATE / BY / DESCRIPTION	OFFICE OF INFRASTRUCTURE AND RENEWAL PROGRAM
CHECKED DATE			APPROVED
APPROVED DATE			SUBMITTED

a joint venture of:
•Parsons Transportation Group Inc.
•Parson Brinckerhoff Quade & Douglas, Inc
•Delon Hampton & Associates, Chartered

PROJECT MANAGER

CONTRACT NO.

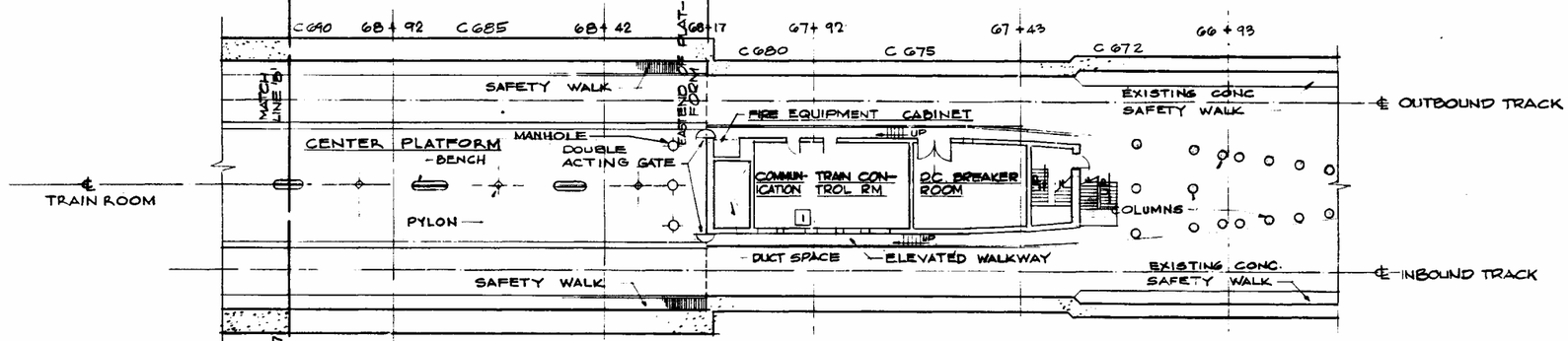
FOGGY BOTTOM

SITE PLAN – WEST ENTRY OPTION 3B

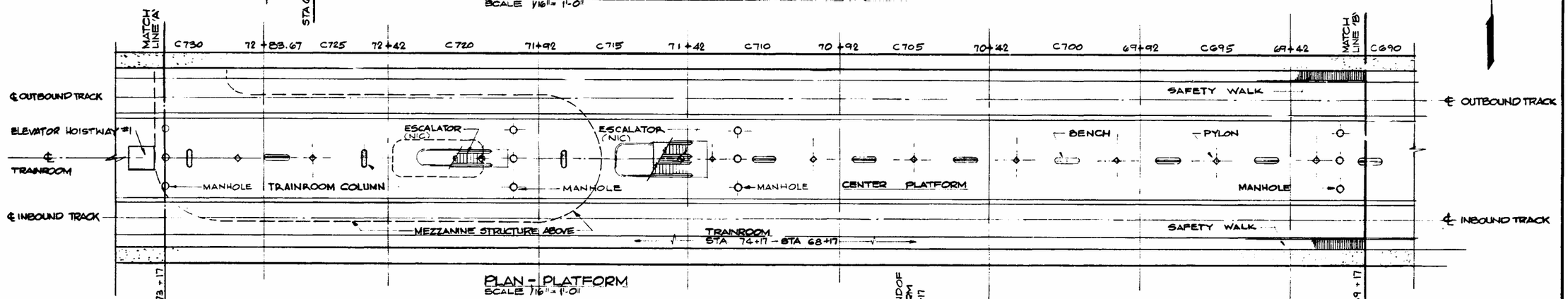
SCALE 1"=60'-0"

DRAWING NO. A-08

APPENDIX C: AS-BUILT DRAWINGS

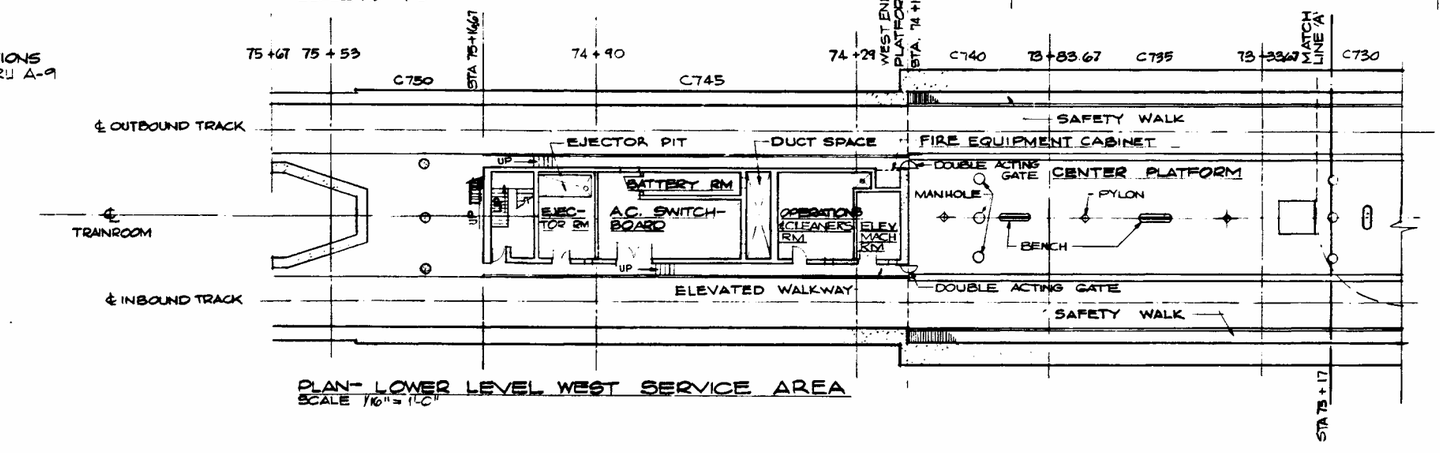


PLAN - LOWER LEVEL EAST SERVICE AREA
SCALE 1/16" = 1'-0"



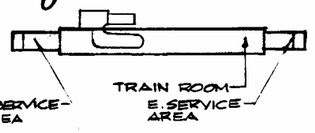
PLAN - PLATFORM
SCALE 1/16" = 1'-0"

NOTE:
FOR DETAILS AND DIMENSIONS
SEE PLAN SHEET A-4 THRU A-9



PLAN - LOWER LEVEL WEST SERVICE AREA
SCALE 1/16" = 1'-0"

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
BY: RESIDENT ENGINEER — DATE: MAY 27 1977



KEY PLAN

DESIGNED	[illegible]	5/21/70 DATE
DRAWN	WKT	10-19 DATE
CHECKED	DCH	5/21/71 DATE
APPROVED	[illegible]	7-28-71 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION

REVISIONS

DATE	BY		DESCRIPTION
3-8-77	SDN	1	WALL DELETED PER FCO-013. "AS-BUILT".

DISTRICT OF COLUMBIA — H. BOYD DICKERSON No 5062 — REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

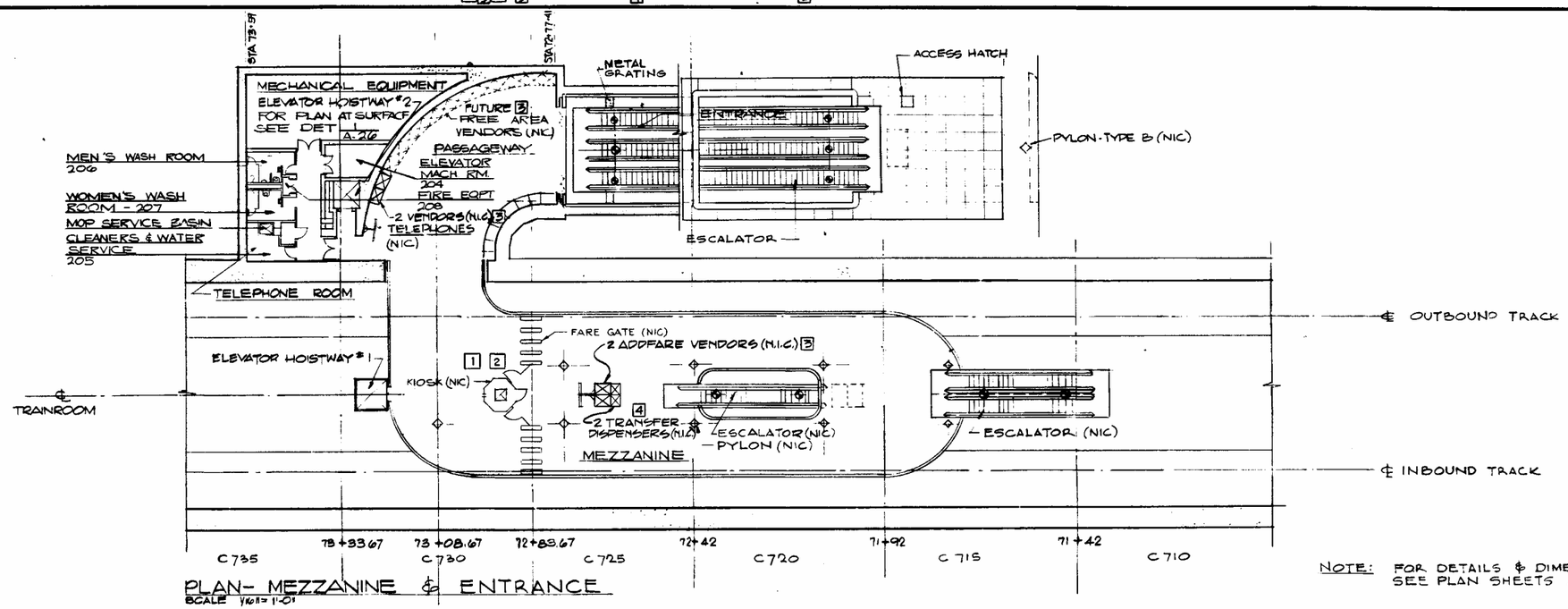
HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED H. Boyd Dickerson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. G. Cooperwood

HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLAN - LOWER LEVEL

SCALE 1/16" = 1'-0" 10 4 8 2 16 20
DRAWING NO. FC3-A-1
M42-9

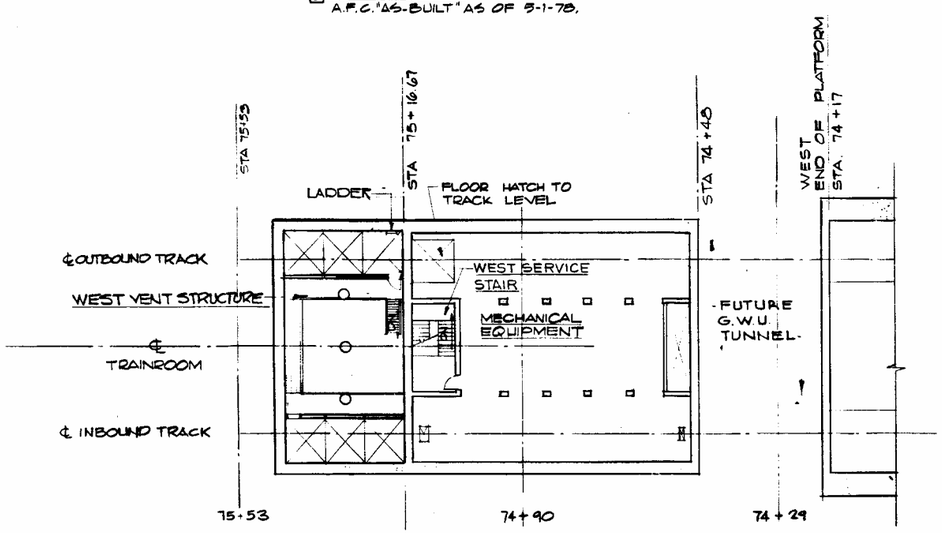
COMM. 3685
UD



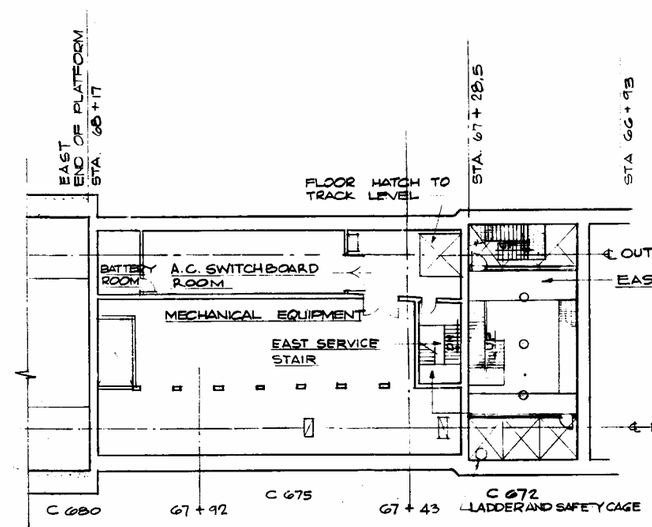
PLAN- MEZZANINE & ENTRANCE
SCALE 1/16" = 1'-0"

NOTE: FOR DETAILS & DIMENSIONS SEE PLAN SHEETS A4 THRU A-9

3 AS-BUILT NOTE:
A.F.C. "AS-BUILT" AS OF 5-1-78.

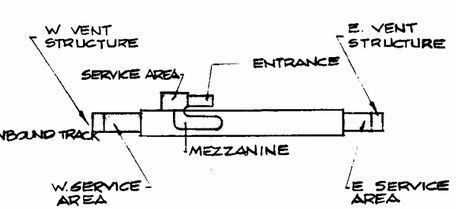


PLAN-UPPER LEVEL WEST SERVICE AREA
SCALE 1/16" = 1'-0"



PLAN-UPPER LEVEL EAST SERVICE AREA
SCALE 1/16" = 1'-0"

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
RESIDENT ENGINEER — DATE MAY 27 1977



KEY PLAN

DESIGNED	WMB	5/21/71 DATE
DRAWN	WKT	6-18 DATE
CHECKED	DGH	5/21/71 DATE
APPROVED	[illegible]	7-23-71 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION

REVISIONS

DATE	BY		DESCRIPTION
3-28-75	BFB	1	CHANGED EXIT GATE SWING PER PCO #3.
10-24-75	RFB	2	REVISE FARE GATES, PCO #18
7-11-78	PHU	3	REV. PER CONTRACT 2B0071A, AS-BUILT.
		4	TRANSFER DISPENSERS ADDED
		3	PER CONTRACT 1B0071, AS-BUILT

DISTRICT OF COLUMBIA — H. BOYD DICKERSON No 5062 — REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

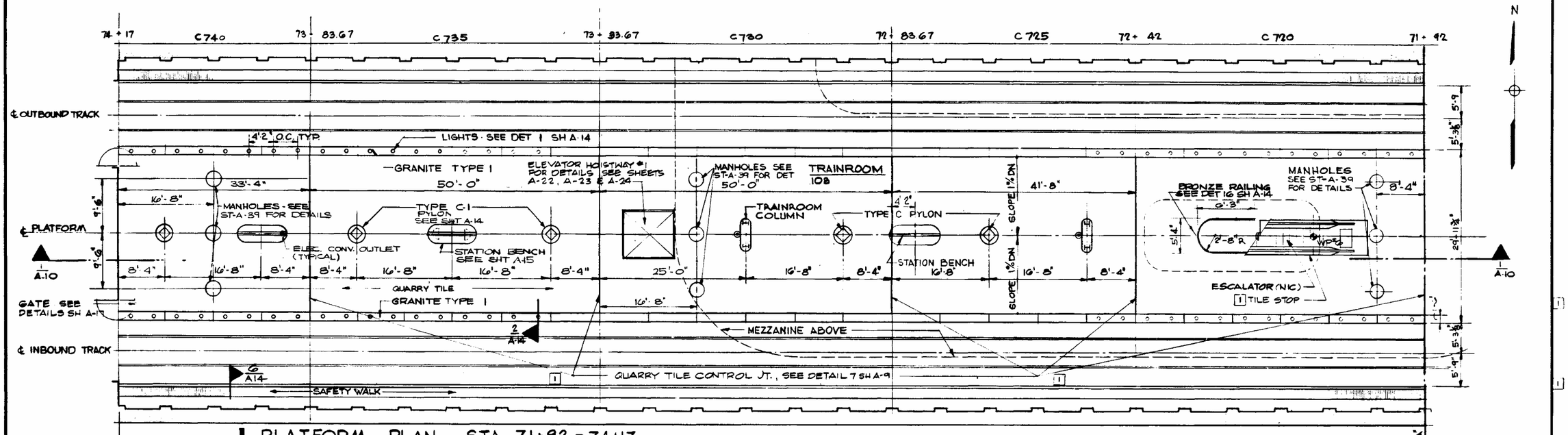
HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED H. Boyd Dickerson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. C. Cunningham

HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLAN- UPPER LEVEL

SCALE 1/16" = 1'-0" 1.0 4 8 12 16 20
DRAWING NO. FC3-A-2
M42-10

COMM. 3665
UD

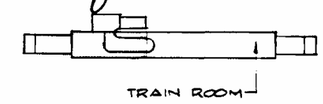


PLATFORM PLAN STA. 71+92 - 74+17

SCALE 1/8" = 1'-0"

1 NOTE:
QUARRY TILE JOINTS CUT STRAIGHT OVER STRUCTURAL SLAB EXPANSION JOINT

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
BY: RESIDENT ENGINEER — DATE: MAY 27 1977



KEY PLAN

DESIGNED	[illegible]	5/21/77 DATE
DRAWN	ADG JP	3/ DATE
CHECKED	DCH	5/21/77 DATE
APPROVED	[illegible]	7-23-77 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
A-10	SECTION
A-14	DETAILS & PLANS
A-15	BENCH DETAILS

REVISIONS

DATE	BY	DESCRIPTION
3-8-77	SJN	1 REVISED PER PCO-025, "AS-BUILT"

DISTRICT OF COLUMBIA — H. BOYD DICKERSON No 5062 — REGISTERED PROFESSIONAL ENGINEER

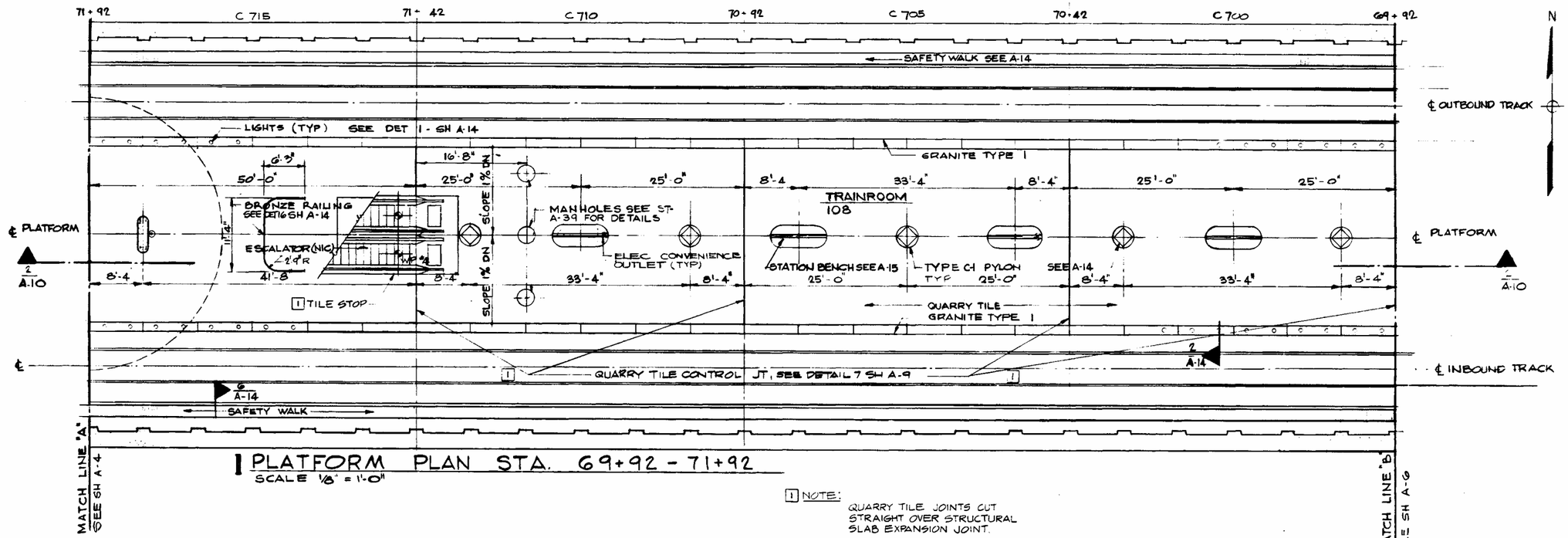
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED H. Boyd Dickerson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. A. Gingrowski

HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLATFORM PLAN
STA. 71+92 TO STA. 74+17

SCALE 1/8" = 1'-0" (1 0 2 4 6 8 10)
DRAWING NO. FC3-A-4
M42-12
COMM. 3665

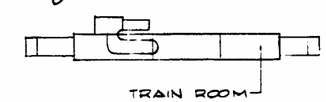


1 PLATFORM PLAN STA. 69+92 - 71+92

SCALE 1/8" = 1'-0"

1 NOTE:
QUARRY TILE JOINTS CUT STRAIGHT OVER STRUCTURAL SLAB EXPANSION JOINT.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
BY: Jane A. Foote RESIDENT ENGINEER
MAY 27 '97 DATE



KEY PLAN

DESIGNED	JJ Kor	5/21/71 DATE
DRAWN	A.D.S. JF	3-- DATE
CHECKED	DOH	5/21/71 DATE
APPROVED	[illegible]	7-23-71 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
A-10	SECTION
A-14	DETAILS & PLANS
A-15	BENCH DETAILS

REVISIONS

DATE	BY	DESCRIPTION
3-9-77	JCH	1 REVISED PER "CO-025", "AS-BUILT"

DISTRICT OF COLUMBIA H. BOYD DICKERSON No 5082 REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

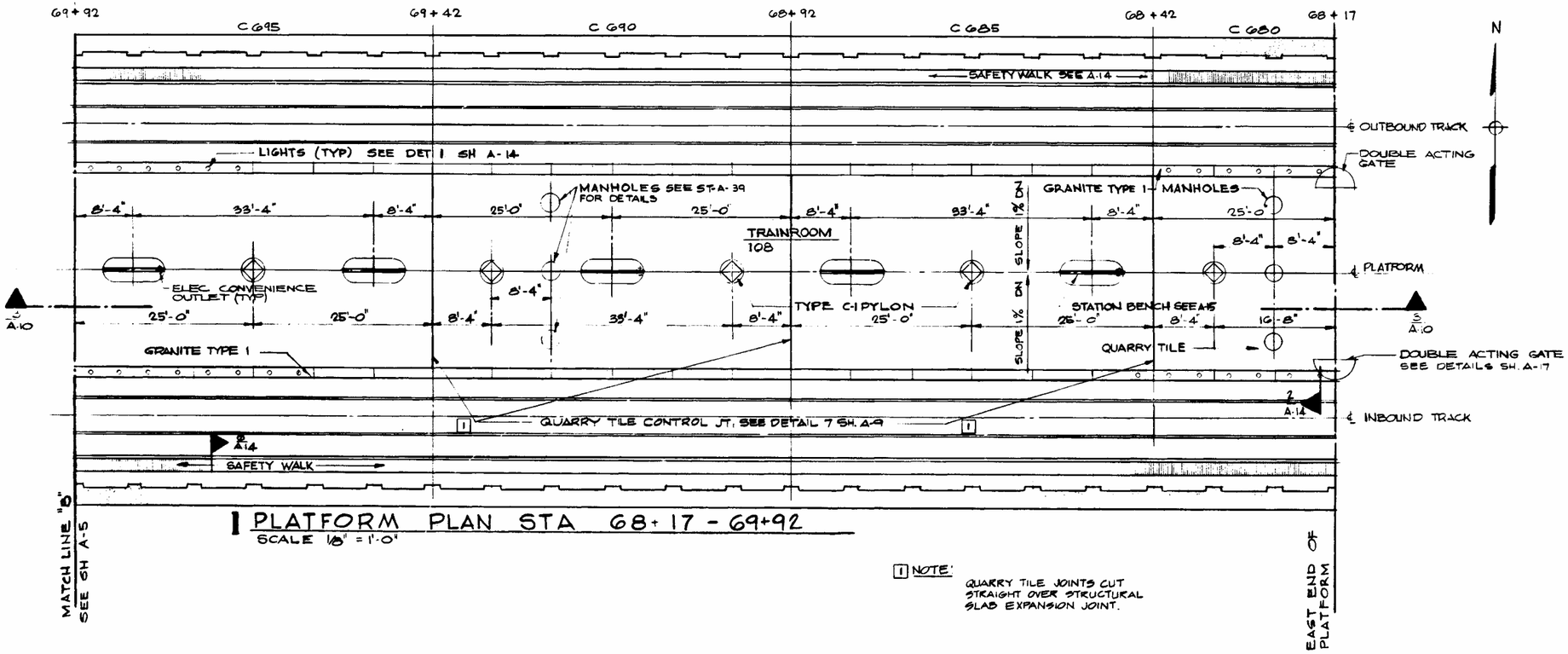
HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED H. Boyd Dickerson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. C. Carpenter

HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLATFORM PLAN
STA. 69+92 TO STA. 71+92

SCALE 1/8" = 1'-0" 0 2 4 6 8 10
DRAWING NO. FC3-A-5
M42-13

COMM. 3866

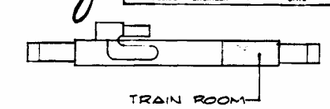


1 PLATFORM PLAN STA 68+17 - 69+92

SCALE 1/8" = 1'-0"

1 NOTE:
QUARRY TILE JOINTS CUT STRAIGHT OVER STRUCTURAL SLAB EXPANSION JOINT.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
RESIDENT ENGINEER — DATE MAY 27 1977



KEY PLAN

DESIGNED	WHB	5/21/71 DATE
DRAWN	ADG JP	3/1 DATE
CHECKED	DCH	5/21/71 DATE
APPROVED	[illegible]	7-22-71 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
A-10	SECTION
A-14	DETAILS & PLANS
A-15	BENCH DETAILS

REVISIONS

DATE	BY	DESCRIPTION
2-9-77	SON	1 REVISED PER PCO-023, "AS-BUILT"

DISTRICT OF COLUMBIA — ROYD DICKENSON — No 5062 — REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

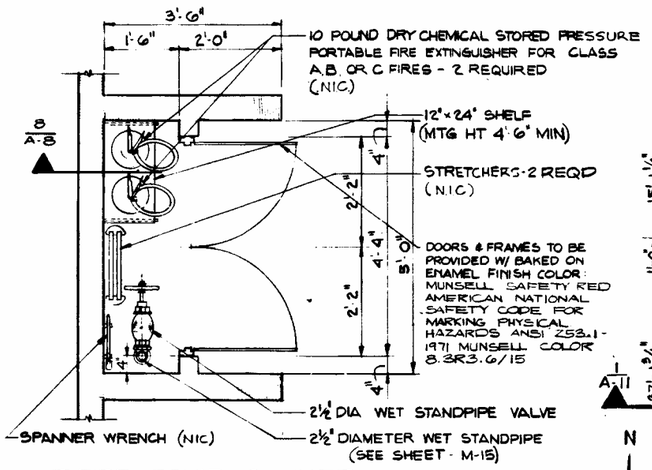
HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED H. Boyd Dickenson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. A. Cragwood

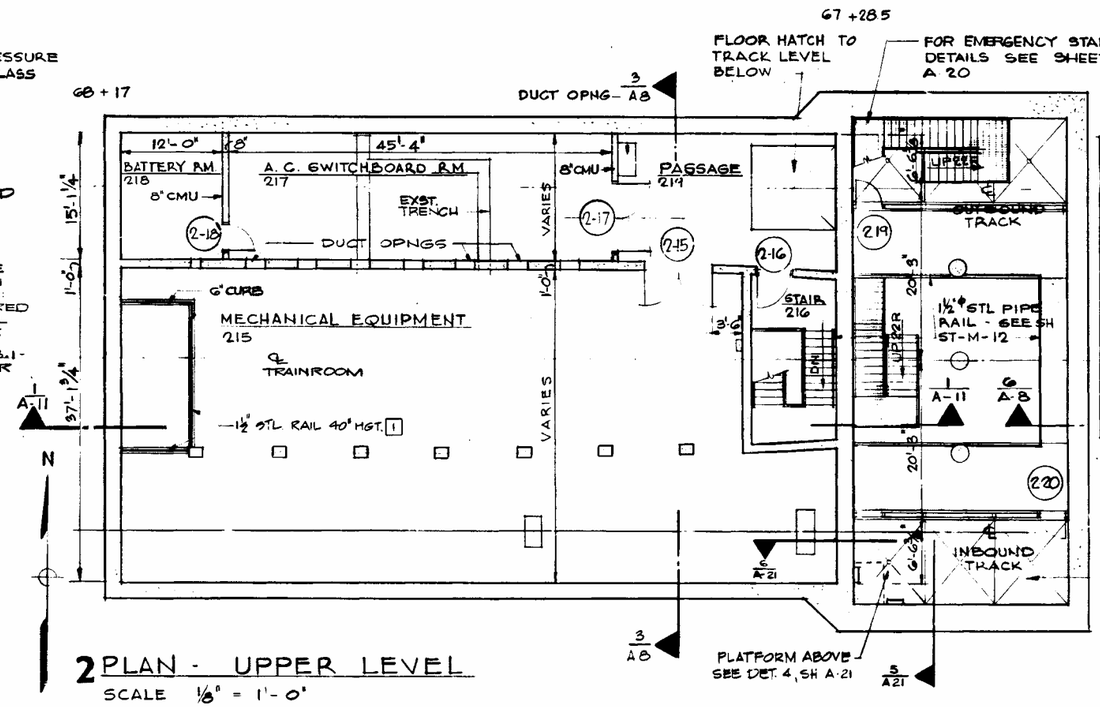
HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLATFORM PLAN
STA. 68+17 TO STA. 69+92

SCALE 1/8" = 1'-0" 1 0 2 4 6 8 10
DRAWING NO. FC3-A-6
M42-14

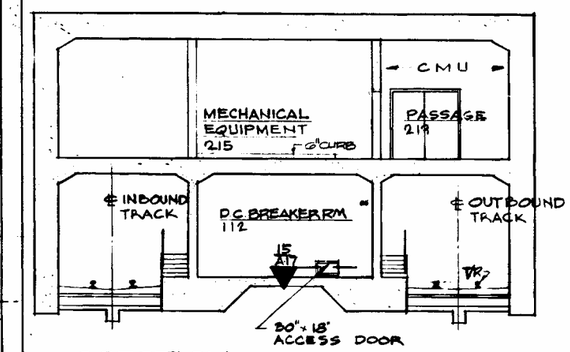
COMM. 3665



7 FIRE EQUIP CABINET 208
SCALE: ¾" = 1'-0" (MEZZANINE) A-9, A-17



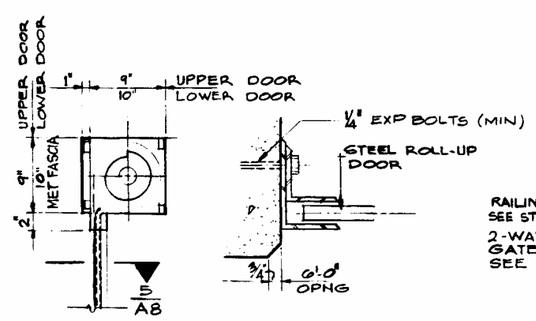
2 PLAN - UPPER LEVEL
SCALE 1/8" = 1'-0"



3 SECTION
SCALE 1/8" = 1'-0"

EAST VENT STRUCTURE

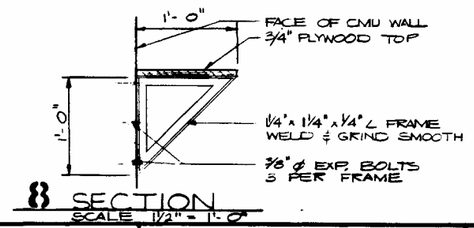
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
BY: RESIDENT ENGINEER DATE MAY 27 1977



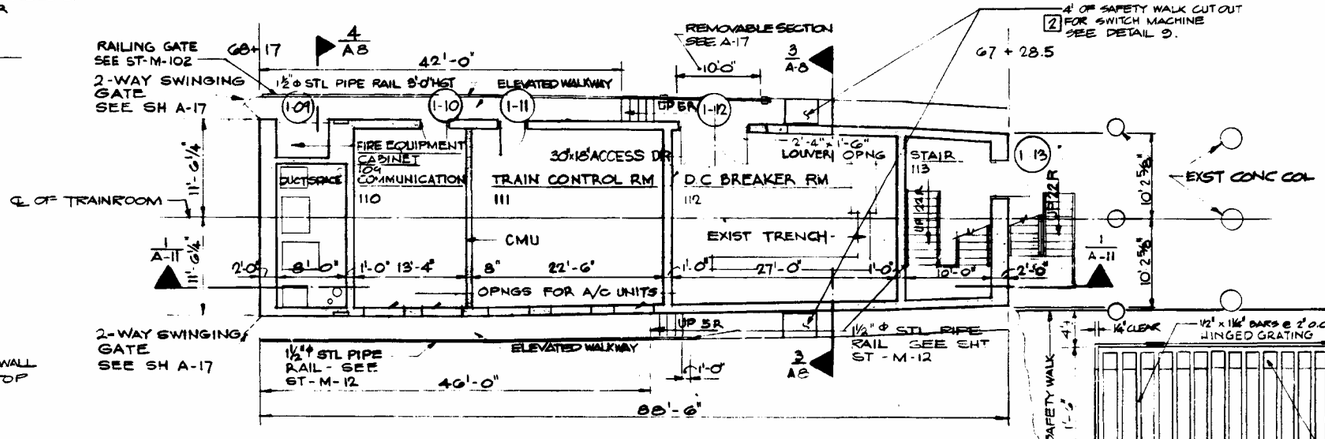
4 HEAD 1½" = 1'-0"
5 JAMB 3" = 1'-0"

DETAILS OF DOORS 1-07 & 1-09 A-14

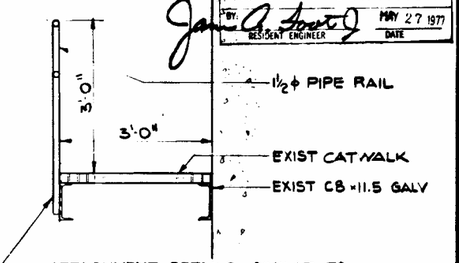
SEE SH A-14 FOR PLAN AND ELEVATION



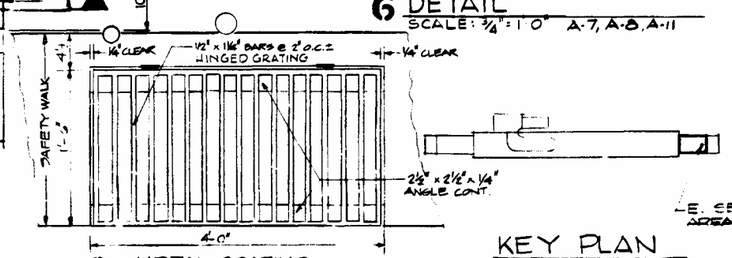
8 SECTION
SCALE 1½" = 1'-0"



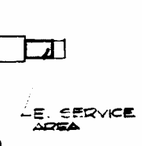
1 PLAN - LOWER LEVEL
SCALE 1/8" = 1'-0"



6 DETAIL
SCALE: ¾" = 1'-0" A-7, A-8, A-11



9 METAL GRATING
NOT TO SCALE



KEY PLAN

DESIGNED	UPP	5/21/77 DATE
DRAWN	ADG	3/19/77 DATE
CHECKED	DCH	5/21/77 DATE
APPROVED	[illegible]	7-25-77 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
A-11	SECTION
A-14, A-17, M-15	DETAILS
A-3	DOOR SCHEDULE
A-7	PLANS
A-20	STAIR DETAILS
ST-M-12	RAILING

REVISIONS

	DATE	BY	DESCRIPTION
1	3-9-77	SON	REVISED PER FCO-052, "AS-BUILT"
2	3-9-77	SON	REVISED PER FCO-044, "AS-BUILT"

DISTRICT OF COLUMBIA — W. BOYD DICKERSON — No 5982 — REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

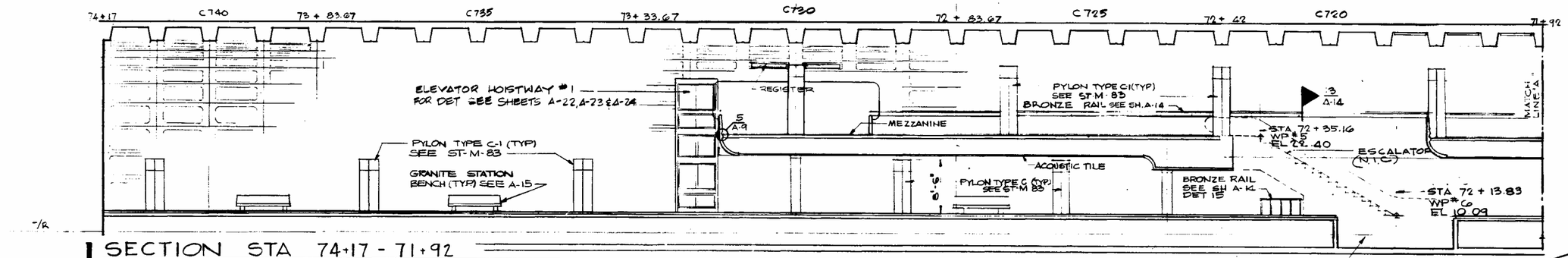
HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS
SECTION DESIGNER
SUBMITTED

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED

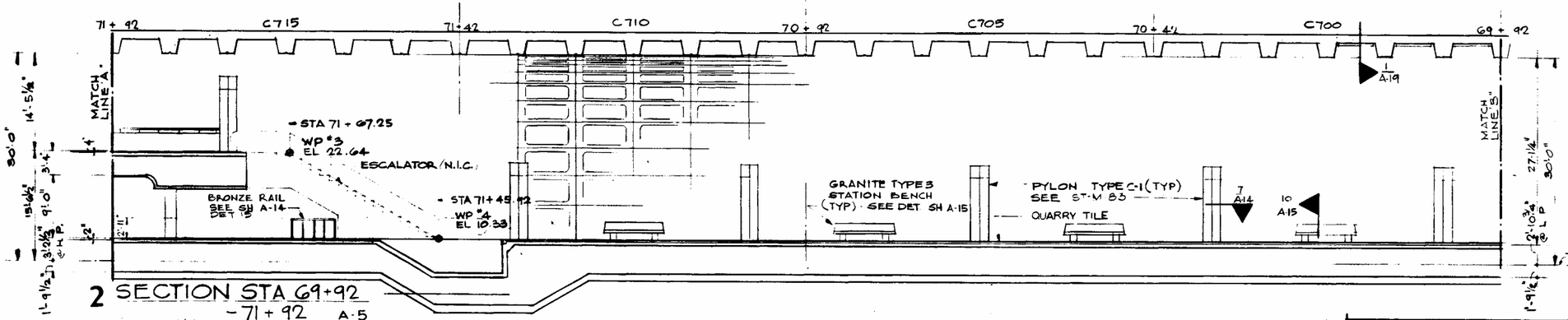
HUNTINGTON ROUTE
FOGGY BOTTOM STATION
PLAN-EAST SERVICE ROOMS

SCALE 1" = 1'-0" 10 2 4 6 8 10
DRAWING NO. FC3-A-8
M42-16

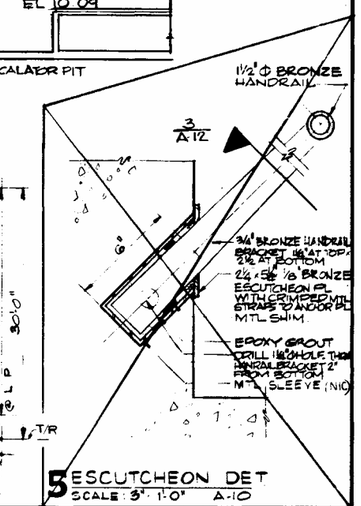
COMM. 3686



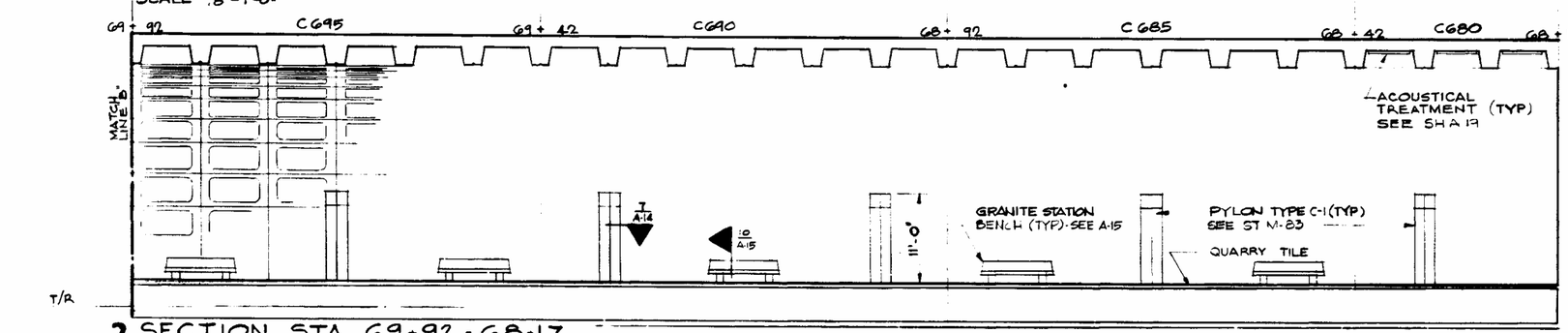
1 SECTION STA 74+17 - 71+92
SCALE 1/8" = 1'-0"
A-4



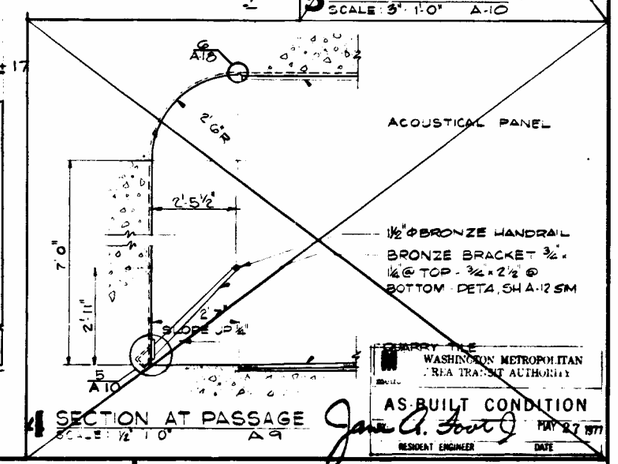
2 SECTION STA 69+92 - 71+92
SCALE 1/8" = 1'-0"
A-5



5 ESCUTCHEON DET
SCALE 3" = 1'-0"
A-10



3 SECTION STA 69+92 - 68+17
SCALE 1/8" = 1'-0"
A-6



4 SECTION AT PASSAGE
SCALE: 1/2" = 1'-0"
A-9

QUARRY TILE

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

AS-BUILT CONDITION

MAY 27 1971

RESIDENT ENGINEER — DATE

DESIGNED	LKT	5/21/70 DATE
DRAWN	ADG JP	4/1/70 DATE
CHECKED	DCH	5/21/70 DATE
APPROVED	[illegible]	7-23-70 DATE

REFERENCE DRAWINGS

NUMBER		DESCRIPTION
A-9, A-14	A-12	DETAILS
A-15		BENCH DETAILS
A-19, A-13		SECTIONS

REVISIONS

DATE	BY	DESCRIPTION

DISTRICT OF COLUMBIA — H. BOTO DICKERSON — No 5062 — REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS — ENGINEERS

SECTION DESIGNER

SUBMITTED H. Boyd Dickerson

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

APPROVED J. A. Cragwood

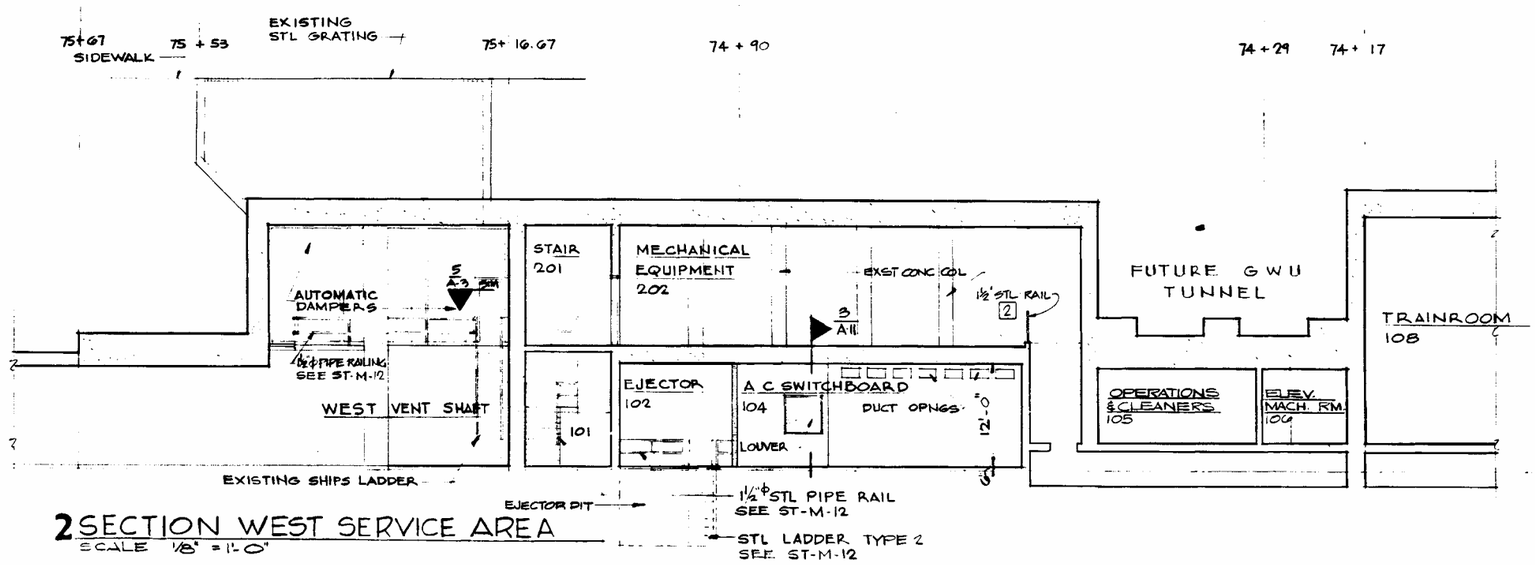
HUNTINGTON ROUTE
FOGGY BOTTOM STATION
LONGITUDINAL SECTIONS

SCALE 1/8" = 1'-0" 1 0 2 4 6 8 10

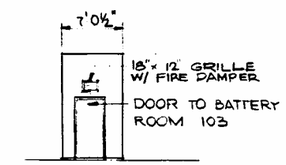
DRAWING NO. FC3-A-10

M42-18

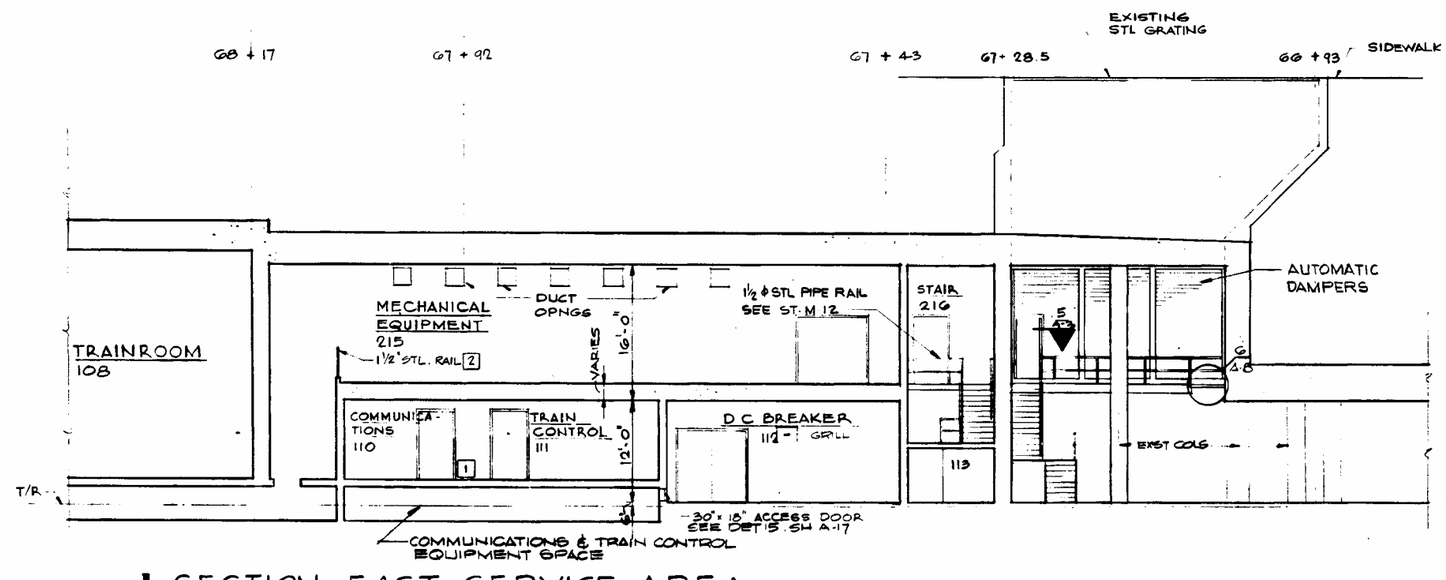
COMM. 3665



2 SECTION WEST SERVICE AREA
SCALE 1/8" = 1'-0"

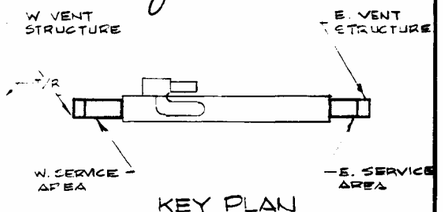


3 ELEVATION
SCALE 1/8" = 1'-0"



1 SECTION EAST SERVICE AREA
SCALE 1/8" = 1'-0"

WASHINGTON METROPOLITAN
AREA TRANSIT AUTHORITY
AS-BUILT CONDITION
BY: RESIDENT ENGINEER
MAY 27 1977
DATE



KEY PLAN

DESIGNED		5/21/71 DATE
DRAWN	ADGJP	4-14-70 DATE
CHECKED	DCH	5/21/71 DATE
APPROVED		7-29-71 DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
A-3	JAMB
A-17	DETAIL
ST-M-12	RAILING DETAILS

REVISIONS

DATE	BY		DESCRIPTION
3-10-77	SON	1	WALL DELETED PER PCO-015, "AS-BUILT"
3-10-77	SON	2	REVISED PER PCO-052, "AS-BUILT"

DISTRICT OF COLUMBIA
H. BOYD DICKERSON
No 5062
REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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GENERAL ARCHITECTURAL CONSULTANT
APPROVED J. C. Cunningham

HUNTINGTON ROUTE
FOGGY BOTTOM STATION
SERVICE AREAS SECTIONS

SCALE 1/8" = 1'-0" 10 2 4 6 8 10
DRAWING NO. FC3-A-11
M42-19

COMM. 3665
UD