TO:	Chelsea Zoning Board of Appeals	DATE:	March 30, 2020
FROM:	Elizabeth Peart Rick Latini, P.E.	HSH PROJECT NO.:	2019214.03
SUBJECT:	45 Market Street, Chelsea, MA Project Trip Generation		

Overview

As part of SDTJ's proposed development at 45 Market Street (Project) in Chelsea, Massachusetts, HSH has prepared this memorandum presenting existing traffic count data, vehicle trip estimates associated with the Project, and a qualitative assessment of intersection impacts associated with the Project.

The Project Site at 45 Market Street, which is currently vacant, is adjacent to the intersection of Market Street/Boston Terminal Market (BMT) driveway, approximately 500 feet south of 2nd Street and approximately 700 feet north of Beacham Street. The proposed Project includes construction of a one-story, 12,000 square foot (sf) wholesale produce distribution building containing warehouse, storage, and accessory office uses. Fifteen automobile parking spaces for employees/visitors and four truck loading spaces will be provided. All Project vehicles will access and egress the Project Site via the BMT Driveway at Market Street, by means of a recorded Reciprocal Easement Agreement between the owner of the Project Site (SDTJ LLC) and the owner of the adjacent 34 Market Street, Everett property (DIV BMT, LLC).

The BMT Driveway also serves two other businesses located in Everett, including the Boston Market Terminal at 34 Market Street and the Garden Fresh Salad Company at 304 2nd Street. Access and egress for the nearby Middlesex Gases and Technologies, at 292 2nd Street, occurs at a Market Street curb-cut, immediately southwest of the Market Street/2nd Street intersection.

Traffic Counts

Turning movement counts and vehicle classification counts were conducted hourly for a 24-hour period at three intersections along the Market Street corridor: Market Street/2nd Street, Market Street/BMT Driveway, and Market Street/Beacham Street. Each location was counted on Wednesday, February 12, 2020.

While the entrance driveway to Boston Market Terminal is on Market Street and the entrance driveway to the New England Produce Center (NEPC) is on Beacham Street, these two sites are

adjacent. An operable gate exists between the two properties. The gate is controlled by NEPC. The open gate allows access between the two properties by informal arrangement and provides trucks from NEPC and Boston Market Terminal with an alternative circulation option to/from both Market Street and Beacham Street. This NEPC gate was open during the February 12, 2020 counts.

Subsequent to completion of the February 12, 2020 counts, the study team learned that activity at the Boston Market Terminal varies significantly by day of week, with Mondays typically being the busiest day. To understand daily variability in Boston Market Terminal activity, a second count was conducted at the Market Street/BMT Driveway on Monday, March 10, 2020, with the NEPC gate closed. The count commenced at 5:00 p.m. on Sunday, March 9, 2020, and continued to midnight on Tuesday, March 11, 2020. Having the gate closed ensured that the traffic counts on the BMT Driveway only included vehicles coming into the Boston Market Terminal site and 45 Market Street lot exclusively via Market Street.

On Monday, March 11, 2020, during the 24-hour period between midnight and 11:59 p.m., about 1,300 vehicles entered the BMT Driveway and about 1,300 exited, for a total of 2,600 vehicles. The classification counts, which included cars and heavy vehicles, reveal that approximately 37% of vehicles accessing the BMT Driveway are heavy trucks. (Heavy trucks include the Federal Highway Administration's (FHWA) vehicle categories of Class 4 and above. Class 4 and above include buses, two-axle single-unit trucks w/six tires, and all trucks with 3+ axles.)

The existing hourly intersection volumes (vehicles entering intersection) are presented later in this memo in Figure 1 through Figure 3.

Trip Generation

While it is typical to adopt project trip generation rates as published in the Institute of Transportation Engineers' (ITE) Trip Generation Manual (10th edition supplement, 2020), site-specific data is preferable due to the countercyclical nature of the applicant's business operations. Based on discussions with SDTJ representatives knowledgeable about its proposed operations at the Project Site, Project vehicle trips by vehicle type and time of day were estimated. Due to the industrial nature of the Project site and surrounding area, all trips are expected to occur via vehicles, with no transit or walk trips.

Vehicle trips were disaggregated by large trucks, small trucks/vans, and automobiles (employees), as described below.

- Large Trucks - The new 12,000 s.f. warehouse is expected to receive up to 35 deliveries per week via large wide-body trucks, with more deliveries occurring on Mondays and Tuesdays and fewer on the remaining five days of the week. Based upon conversations with applicant representatives, the study team assumed that 25% of deliveries will occur on the peak days of Monday and Tuesday and 10% on other days, resulting in an estimate of between 4 and 10 large truck deliveries daily. These larger trucks typically travel during off-peak hours and are expected to arrive at the Project Site between 1:00 a.m. to 5 a.m. for off-loading.

- Small Trucks/Vans - Throughout the day, small trucks/vans will arrive to pick-up goods and distribute to retailers. An estimated 35-50 small truck/van trips are expected to the Project Site daily. These trips are expected to be distributed throughout the day between about 6:00 a.m. to 4:00 p.m., resulting in 4 to 5 small truck/van arrivals per hour.

- Automobiles/Employees - The Project will have between 5 to 6 office employees who typically start work at 7:00 a.m. and leave by 3:00 p.m. Warehouse employees are expected to work a late evening shift, starting at about 7:00 p.m. and leaving between 3:00 a.m. and 4:00 a.m. This analysis has assumed that all employees will drive to the Project Site, based upon conversations with the applicant.

Table 1 summarizes the Project's daily and peak hour vehicle trips.

Table 1. 45 Market Street - Project Vehicle Trip Generation

Methodology	Daily		a.m. peak hour (7:00 - 8:00 a.m.)		p.m. peak hour (4:00 - 5:00 p.m.)	
	Enter	Exit	Enter	Exit	Enter	Exit
Site-Specific Data						
Large trucks	4-10	4-10	0	0	0	0
Smaller trucks/vans	35-50	35-50	4-5	4-5	0	0
Automobiles (Employees)	11-14	11-14	0	0	0	0
Total all vehicles	50-74	50-74	4-5	4-5	0	0

The a.m. and p.m. peak hours were identified based on the hourly volume counts along Market Street.

Trip Distribution

Based on the traffic volumes observed at the three Market Street intersections, the geographic distribution of Project trips is expected to be as follows:

- Twenty-five percent (25%) of Project trips are expected to arrive/depart via the Market Street/Second Street intersection.
- One hundred percent (100%) of Project trips are expected to arrive/depart through the Market Street/BMT Driveway intersection.
- Seventy-five percent (75%) of Project trips are expected to arrive/depart via the Market Street/Beacham Street intersection.

Table 2 shows the existing weekday intersection volumes and estimated new Project trips at each of the three Market Street study intersections at 2nd Street, BMT Driveway, and Beacham Street. As shown, the percent change in intersection volumes at Market Street/2nd Street and Market Street/Beacham Street is expected to be 0.6% or less during each time period, which is a very small increase. At the Project Site access at the Market Street/BMT Driveway intersection, volume increases will still be relatively small at 1.7% or less during each time period.

Table 2. 45 Market Street - Project Vehicle Trips by Intersection

Intersection/ Time Period	Existing Volume	New Project Vehicle Trips	Percent Change
Market Street/2nd Street			
Daily	23,100	30	0.1%
a.m. Peak Hour *(7:00 - 8:00 a.m.)*	1,420	2	0.1%
p.m. Peak Hour *(4:00 - 5:00 p.m.)*	1,300	0	0.0%
Market Street/BMT Driveway			
Daily	7,700	148	1.7%
a.m. Peak Hour *(7:00 - 8:00 a.m.)*	630	10	1.4%
p.m. Peak Hour *(4:00 - 5:00 p.m.)*	470	0	0.0%
Market Street/Beacham Street			
Daily	18,670	118	0.6%
a.m. Peak Hour *(7:00 - 8:00 a.m.)*	1,280	8	0.6%
p.m. Peak Hour *(4:00 - 5:00 p.m.)*	1,400	0	0.0%

The a.m. and p.m. peak hours were identified based on the hourly volume counts along Market Street.

Graphs presented in Figure 1 through Figure 3 show the existing weekday intersection volumes and estimated new Project trips throughout the day at each of the three Market Street intersections.

34 Market Street Redevelopment

It is important to note that when the adjacent Boston Market Terminal at 34 Market Street is redeveloped, the BMT Driveway will continue to serve both 34 Market Street and the proposed Project at 45 Market Street. Currently, the Boston Market Terminal warehouse generates approximately 2,600 vehicle trips per day, with about 37% of trips made by large trucks. Any redevelopment of the Boston Market Terminal would result in an adjustment of these 2,600 trips to reflect the size and nature of the new redevelopment. The net impact of redevelopment may, in fact, be minimal depending on the nature of the new building constructed and the business operations of any new tenant(s). Upon completion of the 34 Market Street redevelopment, NEPC traffic will no longer access the Boston Market Terminal site.

Absent a definitive plan for redevelopment of the 34 Market Street property or proposed use program/tenant(s), the new trips associated with the redevelopment of the Boston Market Terminal cannot be estimated. For comparative purposes, however, several hypothetical program scenarios using different ITE land use codes have been developed. By targeting about 2,600 vehicle trips per day for each scenario (thus targeting a net zero increase in daily trips relative to the existing conditions), the resulting size of the hypothetical new facility was determined. Table 3 lists the program scenarios along with associated size and daily vehicle trips. Any of these scenarios would result in approximately no net change in daily vehicle trips at the 34 Market Street site.

Under any of the scenarios, ITE time-of-day distribution data indicates that trip activity is quite low before 7:00 a.m., with most activity occurring between about 7:00 a.m. and 4:00 p.m. The projected activity patterns at 45 Market Street discussed above, with all large truck deliveries occurring before 6:00 a.m. and small truck/van trips occurring throughout the day, would be compatible with a range of future potential warehousing programming at the Boston Market Terminal site.

The hourly trip activity patterns for both the proposed 45 Market Street project and the hypothetical Scenario 1 at 34 Market are shown in Figure 4 and Figure 5, respectively, for entering and exiting traffic on the Boston Market Terminal Driveway. These graphs emphasize the concept that little conflict will exist between large truck traffic generated at 45 Market Street and a hypothetical redevelopment at 34 Market Street.

Table 3. 34 Market Street - Daily Vehicle Trip Generation for Hypothetical Scenarios

Scenario/ ITE Land Use Code	Size	Vehicle Trips
Scenario 1 - Warehouse ITE LUC 150	1,500,000 sf	2,610
Scenario 2 - High-Cube[1] Transload & Short-Term Storage Warehouse ITE LUC 154	1,850,000 sf	2,590
Scenario 3 - High-Cube Fulfillment Center Warehouse ITE LUC 155	1,425,000 sf	2,580
Scenario 4 - High-Cube Parcel Hub Warehouse ITE LUC 156	560,000 sf	2,590
Scenario 5 - High-Cube Cold Storage ITE LUC 157	1,225,000 sf	2,600

[1] The term "High Cube" refers to a warehouse/distribution center used primarily for the storage and/or consolidation of manufactured goods prior to their distribution to retail locations or other warehouses. These facilities are typically constructed with ceiling heights of at least 24 feet.

Of note, the Boston Market Terminal Driveway and the NEPC gate currently serve the Garden Fresh Salad (GFS) Company building, located at 304 2nd Street, Everett. The future redevelopment of the 34 Market St. property will require GFS to only utilize their site access driveway located on 2nd Street in Everett, thus eliminating GFS trips currently travelling on the Boston Market Terminal Driveway and reducing the intersection volumes shown in Table 2 for the Market Street/Boston Market Terminal driveway.

Vehicle Maneuvers

Using AutoTurn, engineering software that models vehicle maneuvers, travel paths were evaluated for Project trucks entering and exiting the loading bays at 45 Market Street. Maneuvers were also examined for automobiles (employees and visitors) using the parking spaces.

Large Trucks

Large wide-body (WB) trucks with lengths of 67 feet and 50 feet are shown in Figure 6 through Figure 11. (Such trucks have 5+ axles, corresponding to FHWA's categories of Class 9 and Class 10 vehicles.) These large trucks will arrive at the Project Site between about 1:00 a.m. and 5:00 a.m., when traffic volumes on Market Street are low. With the low traffic volumes on Market Street during this period, the trucks will be able to back-in to the loading bays from Market Street. If a large truck does arrive after 7:00 a.m., which would be unusual, the truck could turn forward into

the Boston Market Terminal Driveway and maneuver within the Project Site or could be assisted by the dockmaster with the reverse maneuver from Market Street.

- Figure 6 - WB67 Entering the Project Site via reverse maneuver (back-in) from Market Street
- Figure 7 - WB67 Entering the Project Site via forward turn from Market Street
- Figure 8 - WB67 Exiting the Project Site
- Figure 9 - WB50 Entering the Project Site via reverse maneuver (back-in) from Market Street
- Figure 10 - WB50 Entering the Project Site via forward turn from Market Street
- Figure 11 - WB50 Exiting the Project Site

Small Trucks/Vans

Small trucks and vans represent the largest share of vehicle activity at the Project Site. These trips will generally occur between about 6:00 a.m. to 4:00 p.m. These vehicles will all turn (forward) into the BMT Driveway and maneuver to the loading bays as shown.

- Figure 12 - SU36 - Entering the Project Site via forward turn from Market Street
- Figure 13 - SU36 - Exiting the Project Site

Automobiles

The planned fifteen parking spaces on-site will be used by office employees and visitors, who will arrive by automobile. These vehicles will all turn (forward) into the BMT Driveway to access the parking spaces. Note that fifteen spaces will serve two shifts of workers throughout the day: office workers who are generally on-site from 7:00 a.m. to 3:00 p.m., and warehouse workers who are generally on-site between 7:00 p.m. and 3:00 to 4:00 a.m.

- Figure 14 - Large Passenger Car - Entering and Exiting the Site

Conclusion

The information provided in this memorandum shows that the estimated new vehicle trips generated by the proposed Project at 45 Market Street will not adversely affect traffic operations along Market Street.

The highest hourly volume of new Project vehicle trips will occur between 6:00 a.m. to 7:00 a.m. as office employees arrive at the Project Site. The second highest hourly volume of new trips will occur

between 3:00 p.m. to 4:00 p.m. as office employees leave the Project Site. During the intervening hours, between 3 and 10 vehicles per hour will be added to the Market Street intersections.

Most new Project trips will be small trucks, vans, or automobiles. The few large trucks generated by the Project will arrive at the Project Site between about 1:00 a.m. to 5:00 a.m. and, given the relatively low volumes on Market Street at these times, may back-in to loading bays from Market Street without disrupting traffic.

The increase in hourly intersection volumes generated by the proposed new warehouse at 45 Market Street will be relatively small during each hour of the day. The Project, therefore, is expected to cause no impact to area intersection operations.

When redevelopment of the Boston Market Terminal at 34 Market Street occurs in the future, most of the associated warehouse activity is expected to occur between 7:00 a.m. and 4:00 p.m. and can be expected to be compatible with the adjacent 45 Market Street, where large truck activity will typically occur before 7:00 a.m.

Figure 1. ***Intersection Volumes by Time of Day (Weekday)***
Market Street/2nd Street

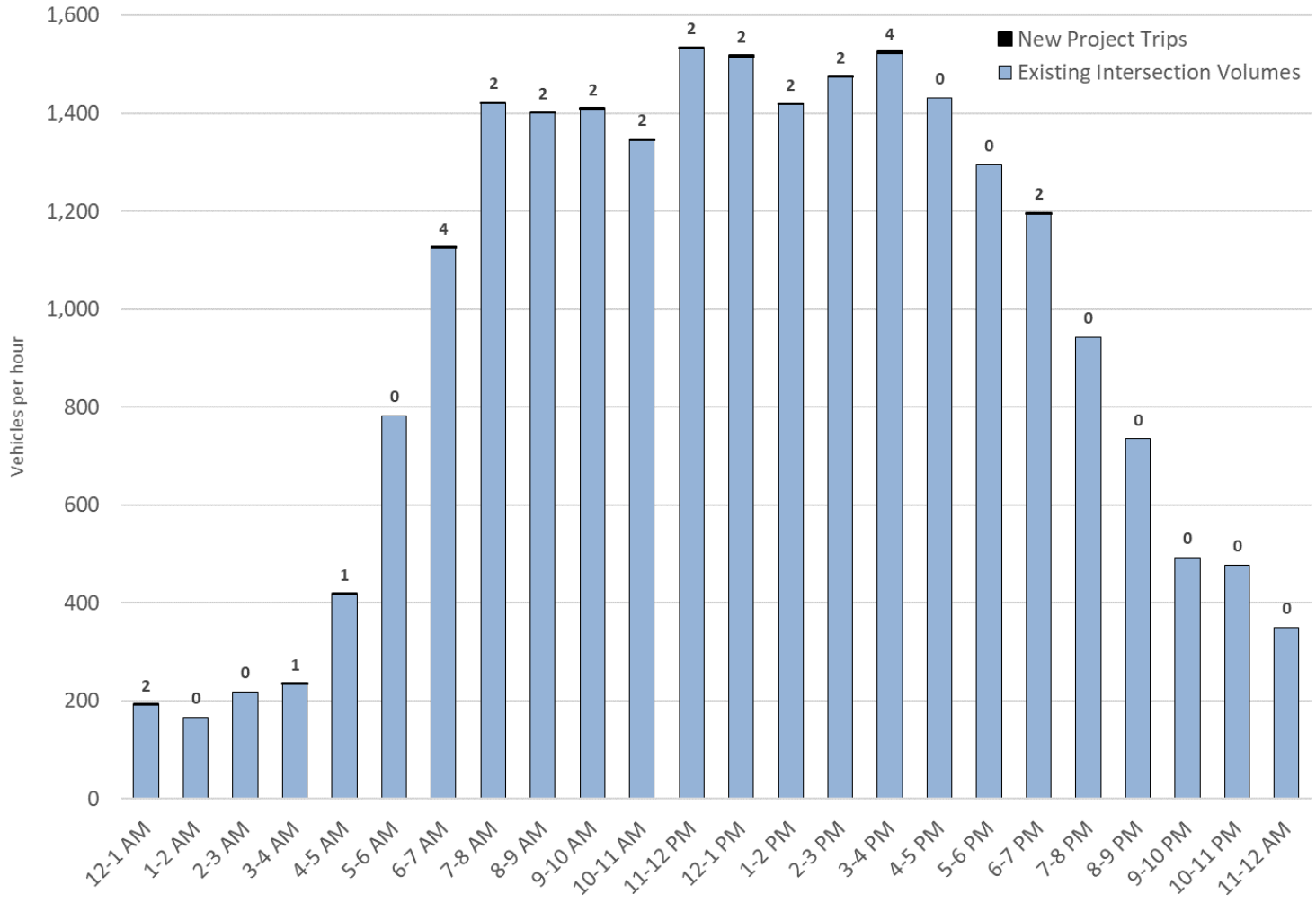


Figure 2. ***Intersection Volumes by Time of Day (Weekday)***
Market Street/Boston Market Terminal Driveway

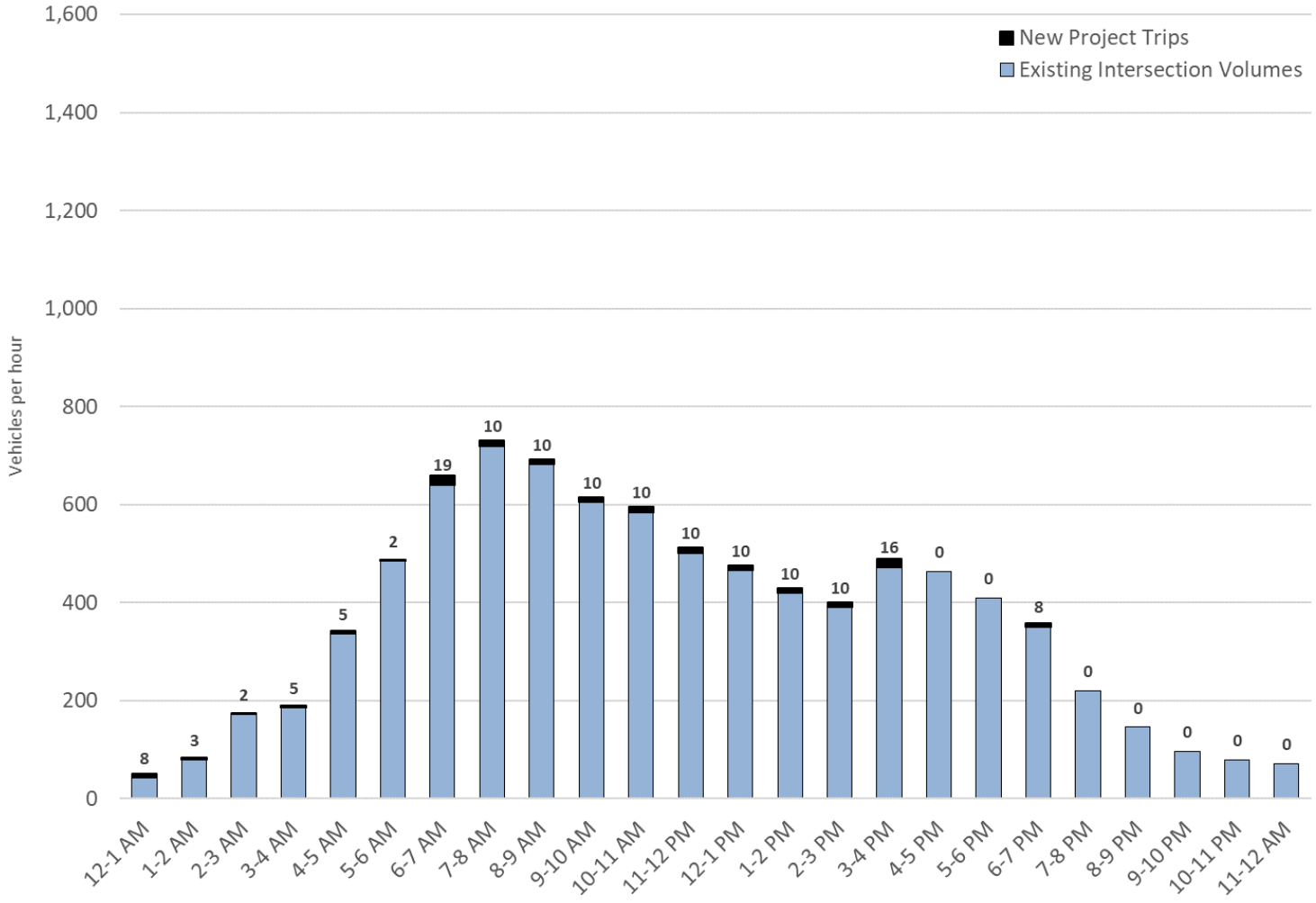


Figure 3. ***Intersection Volumes by Time of Day (Weekday)***
Market Street/Beacham Street

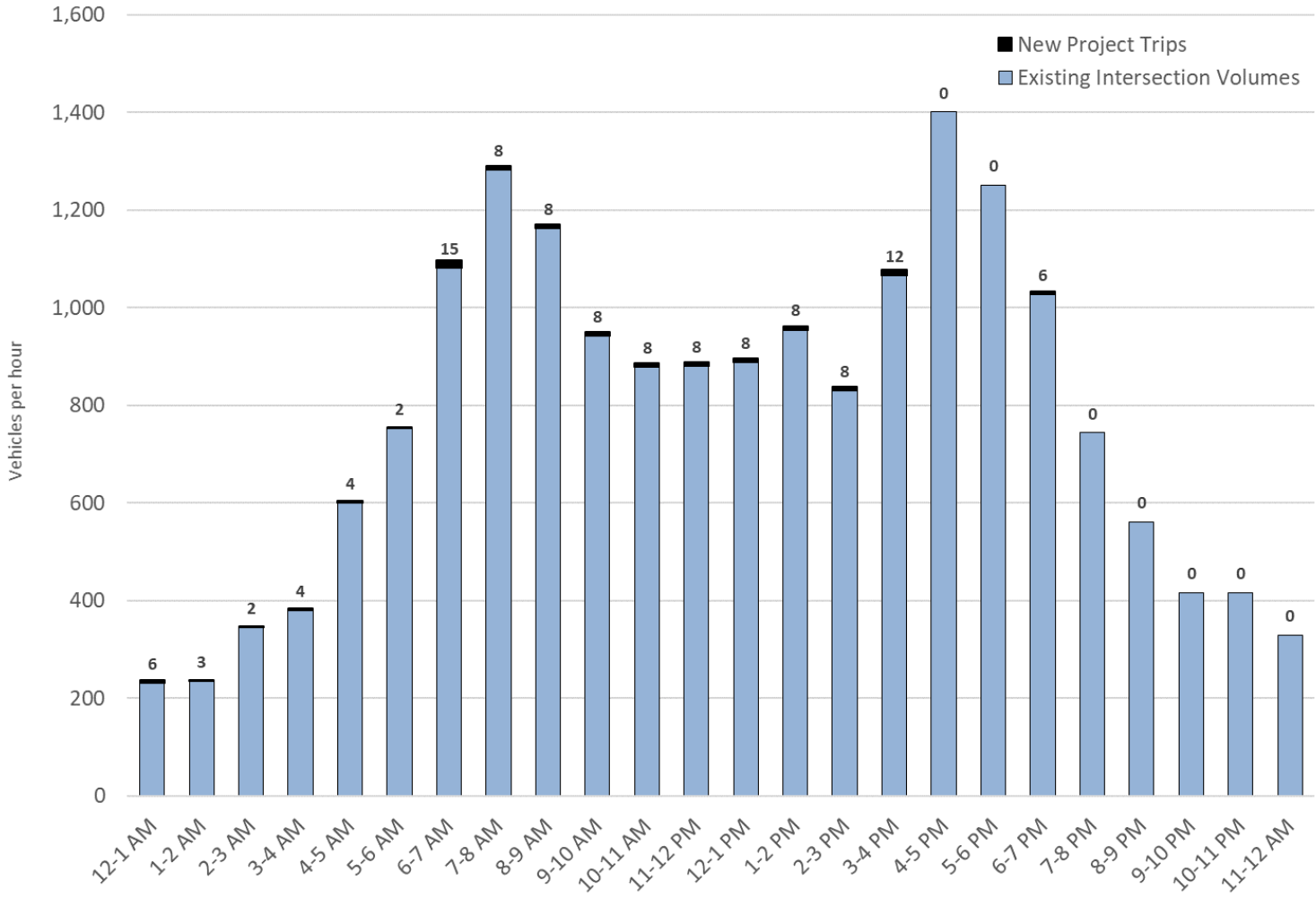


Figure 4. ***Future Trips on Boston Market Terminal Driveway Entering Vehicles***

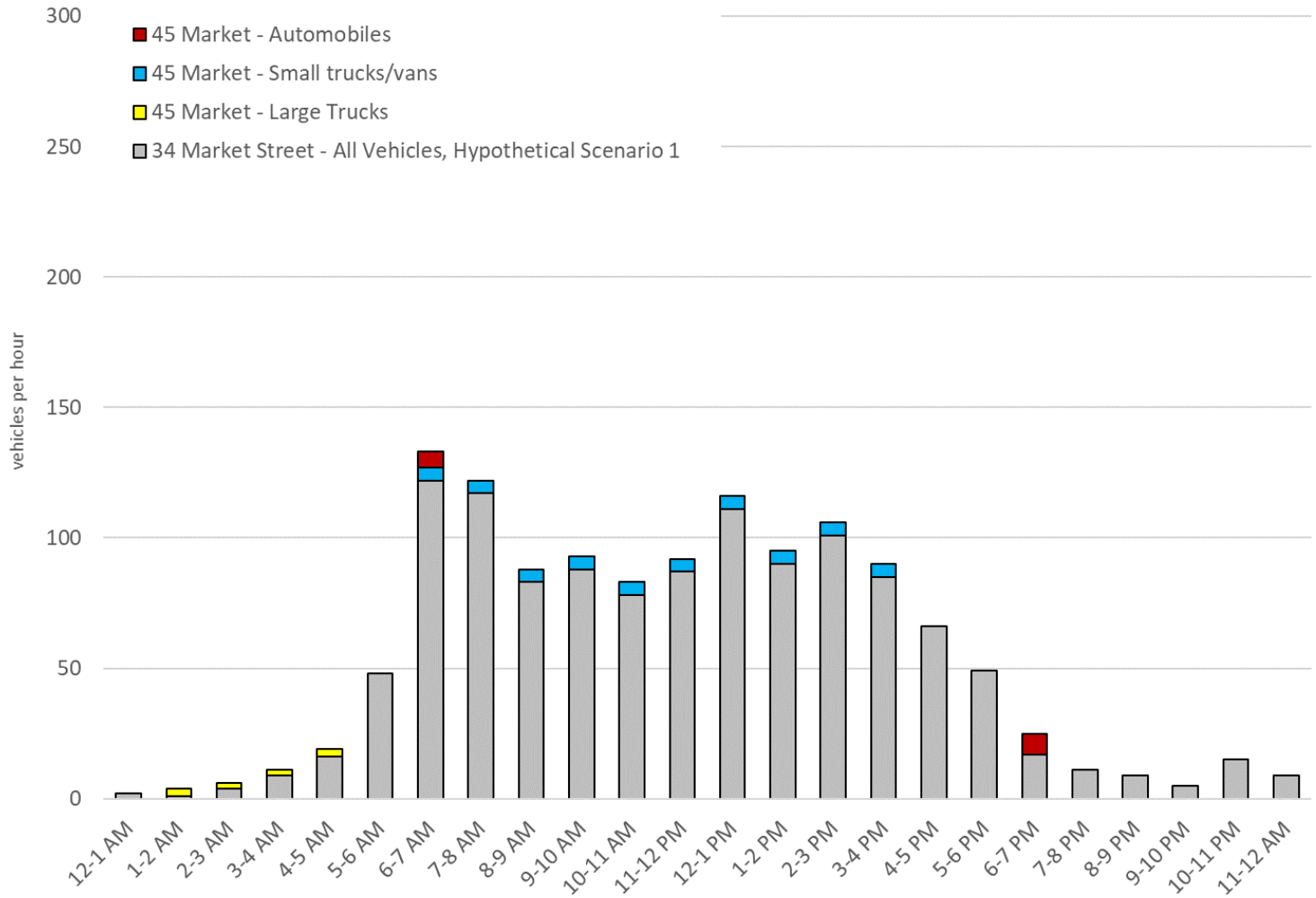


Figure 5. ***Future Trips on Boston Market Terminal Driveway Exiting Vehicles***

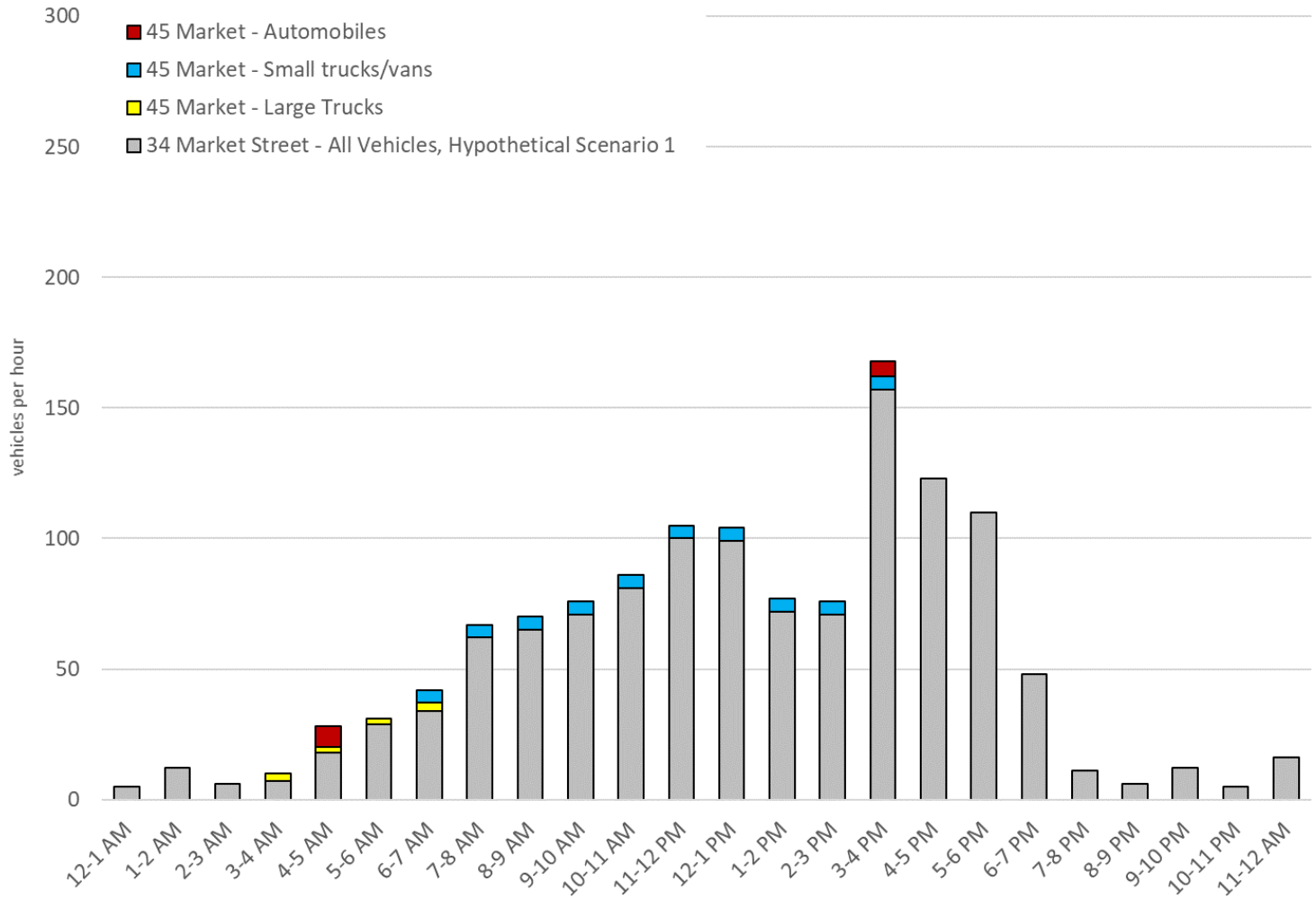
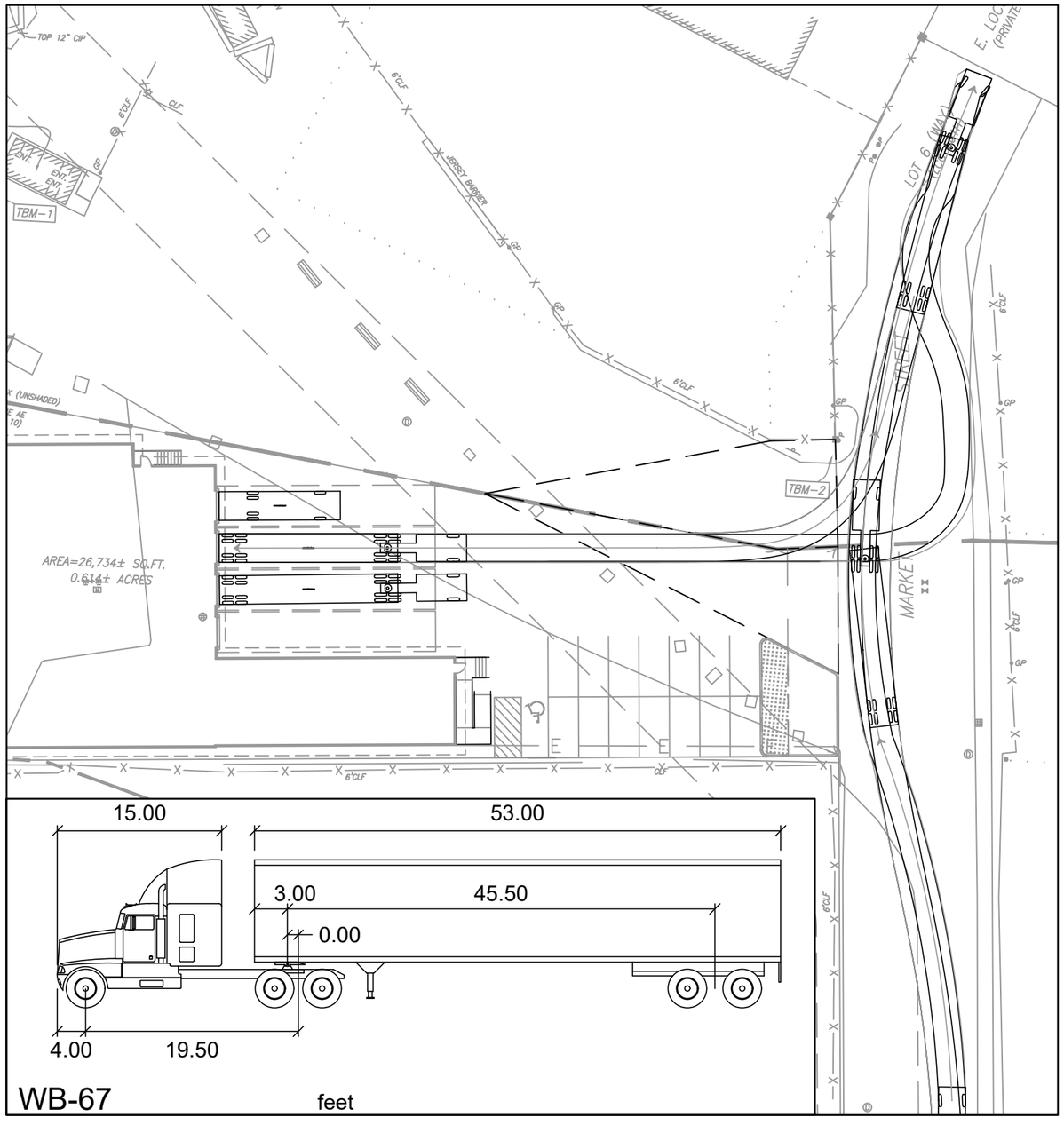
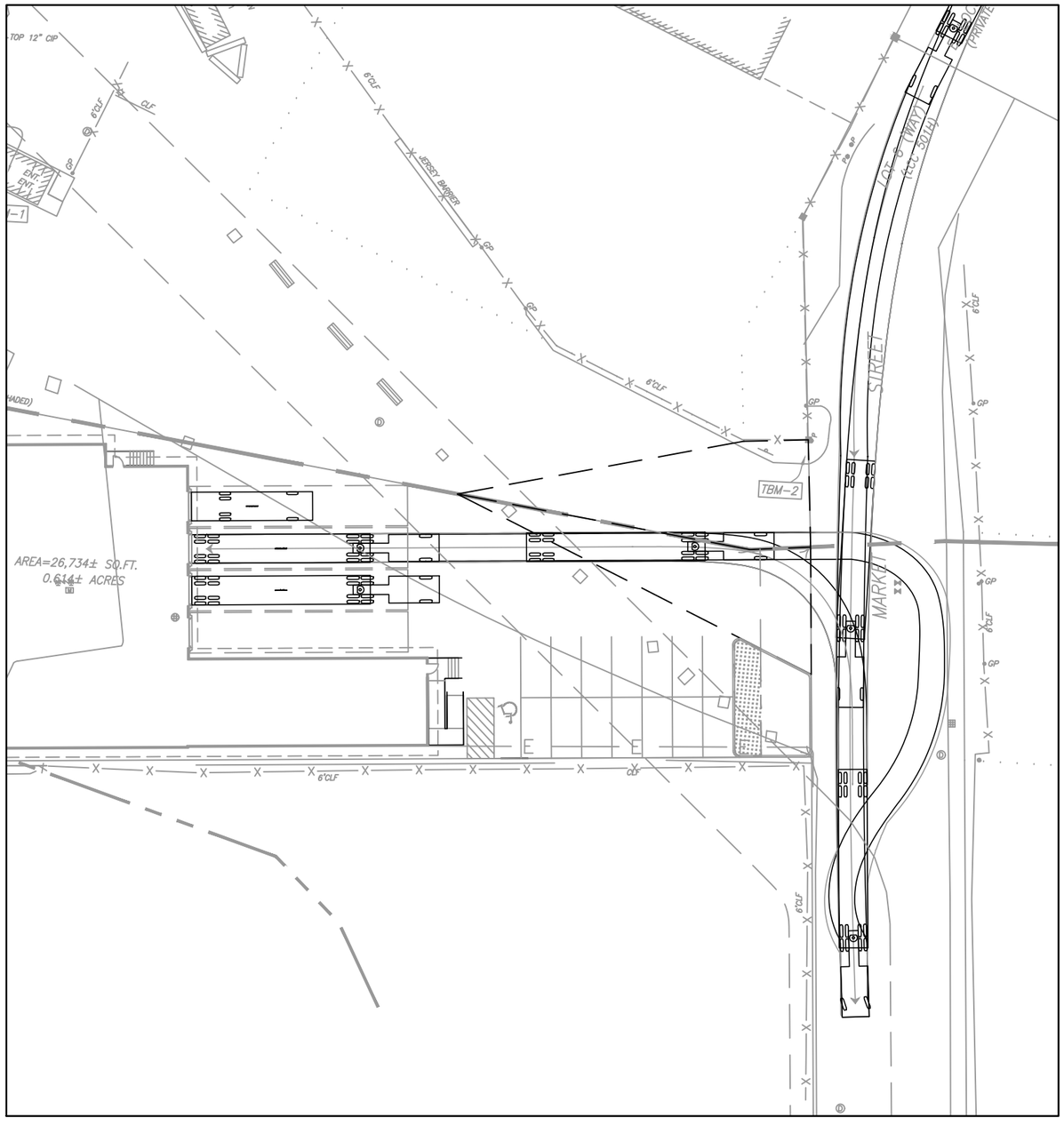


Figure 6. *LOADING MANEUVERS - WB67 ENTERING THE PROJECT SITE VIA REVERSE (BACK-IN) MANEUVER FROM MARKET STREET*

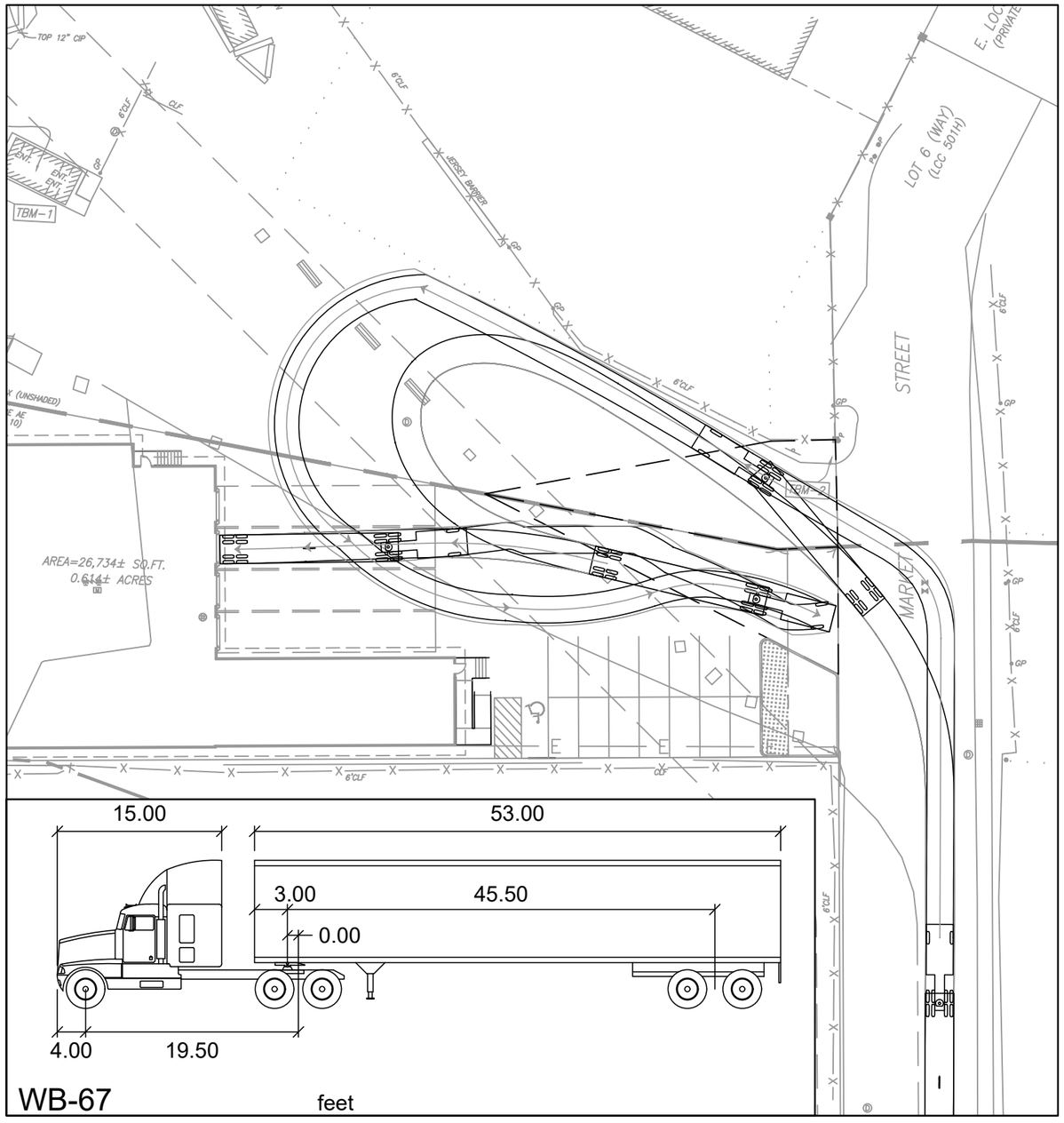


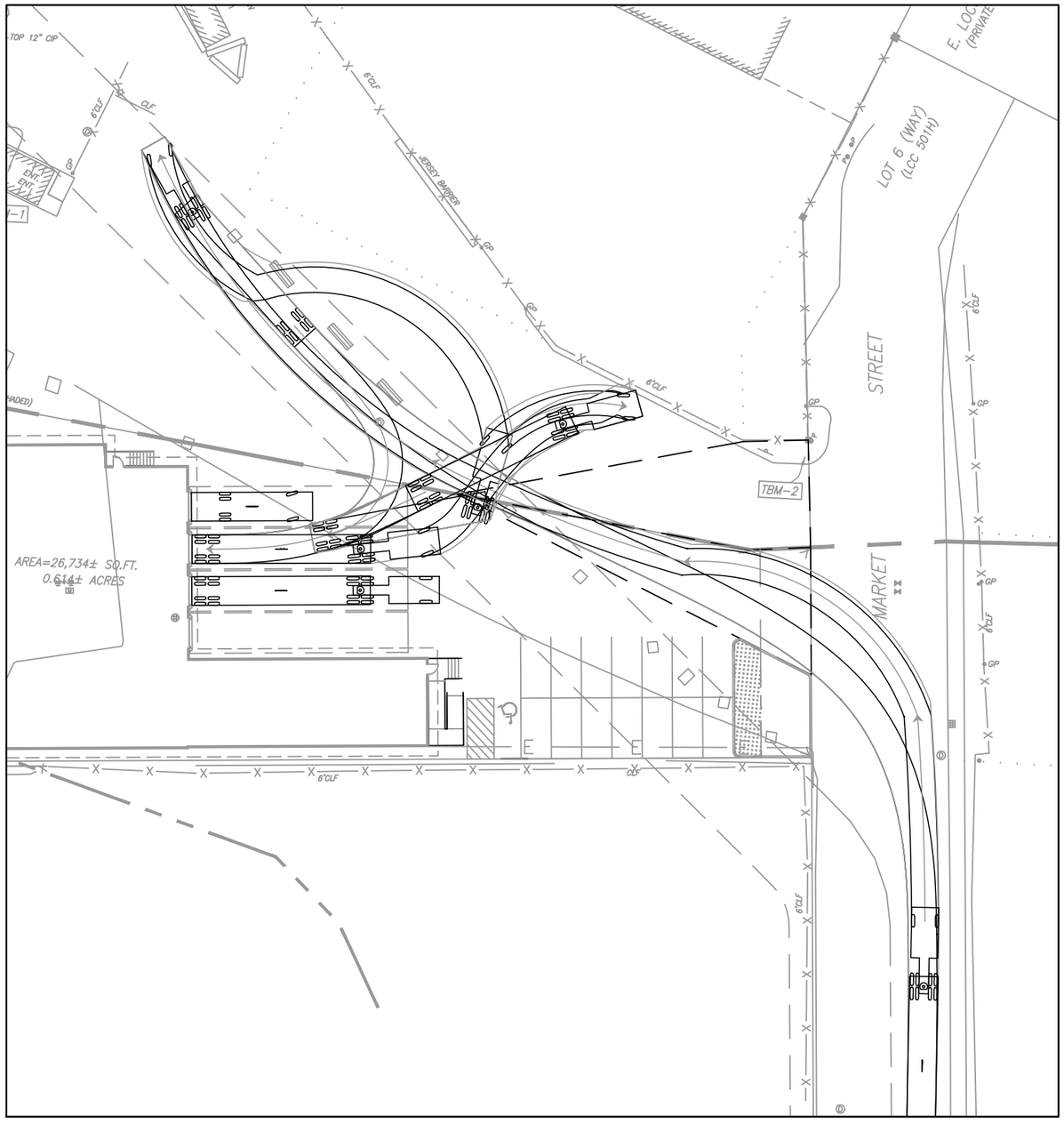


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 28.40
Tractor Track	: 8.00	Articulating Angle	: 75.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 7. *LOADING MANEUVERS - WB67 ENTERING THE PROJECT SITE VIA FORWARD TURN FROM MARKET STREET*

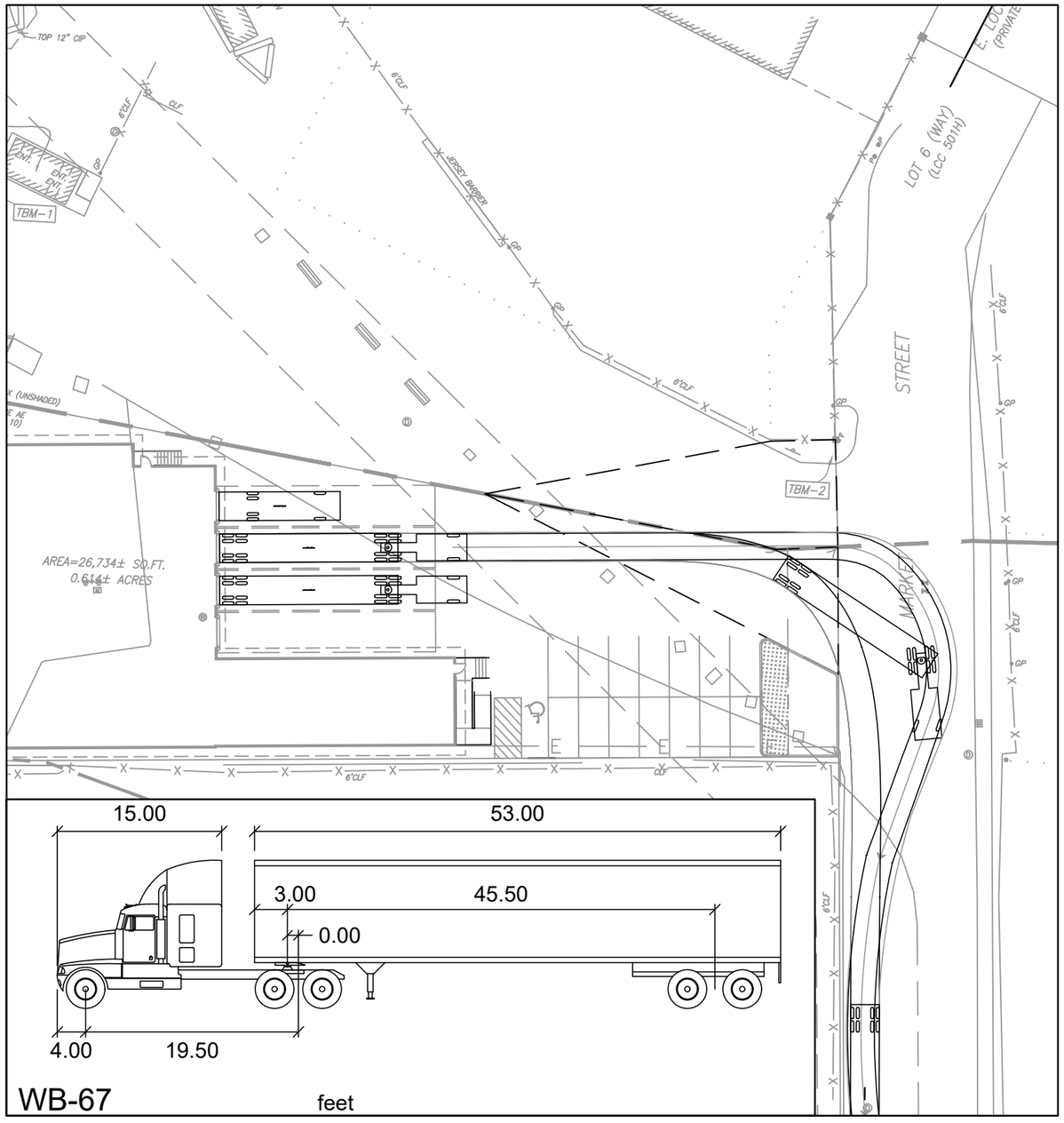


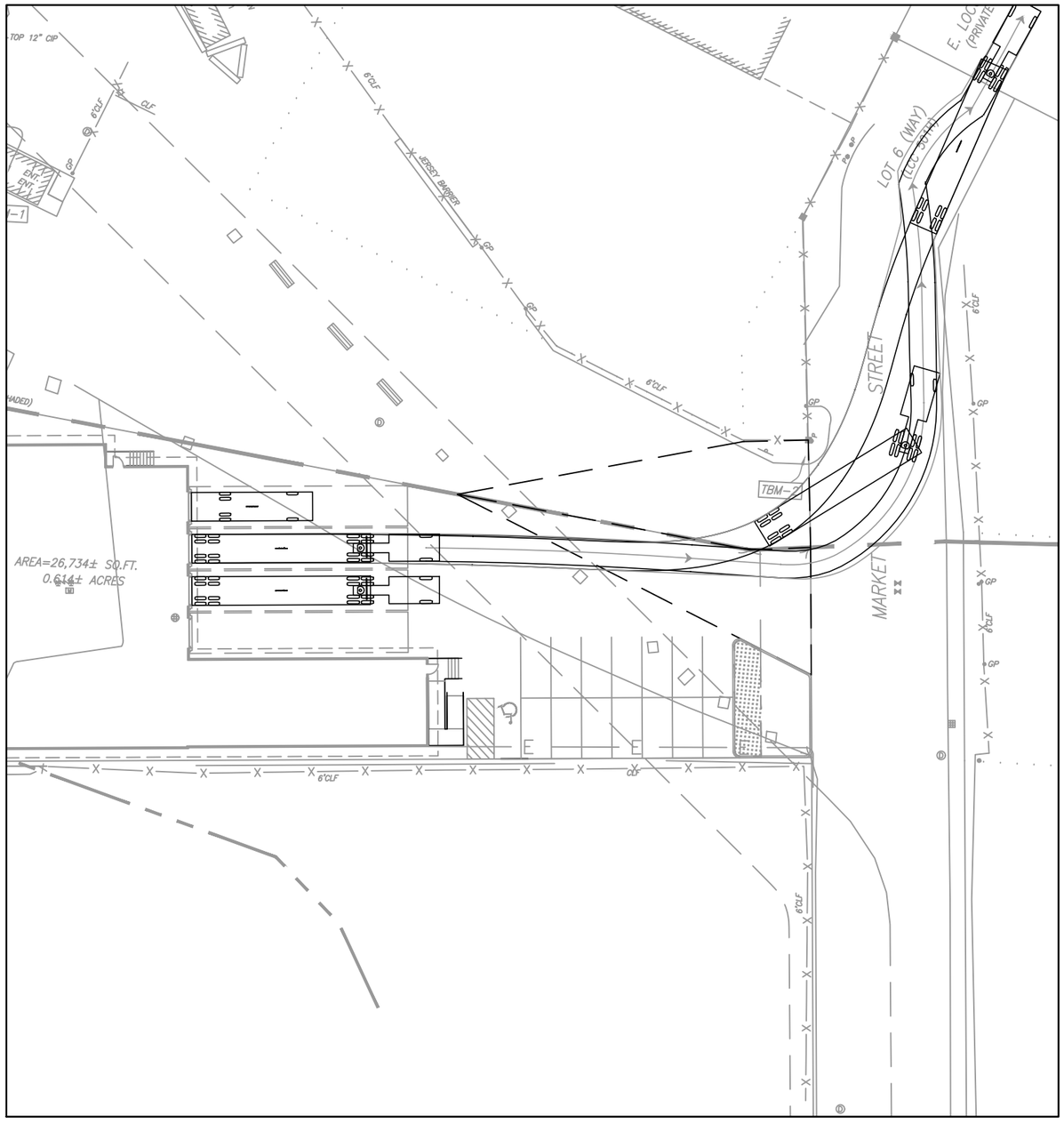


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 28.40
Tractor Track	: 8.00	Articulating Angle	: 75.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 8. ***LOADING MANEUVERS - WB67 EXITING THE PROJECT SITE***

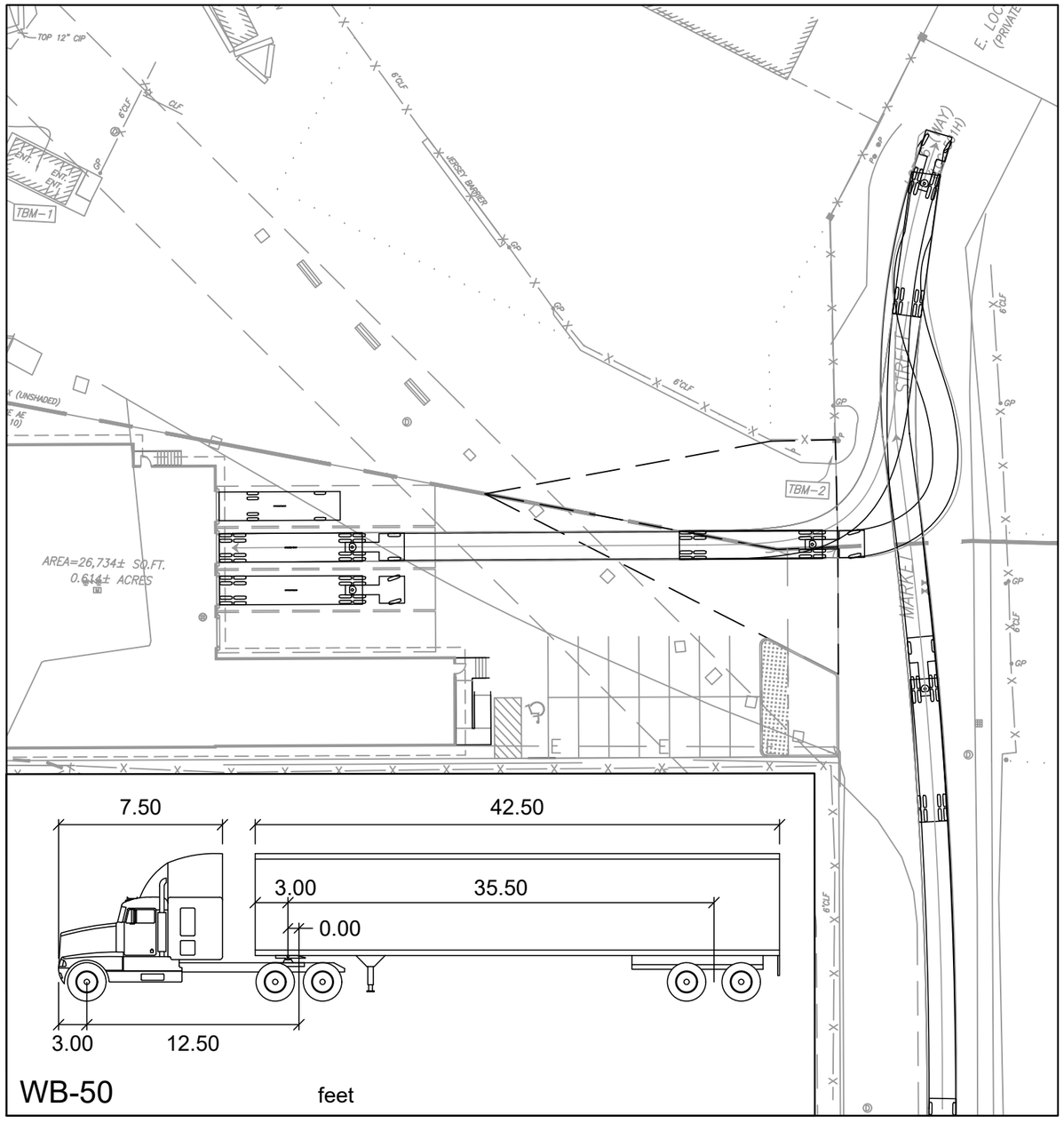


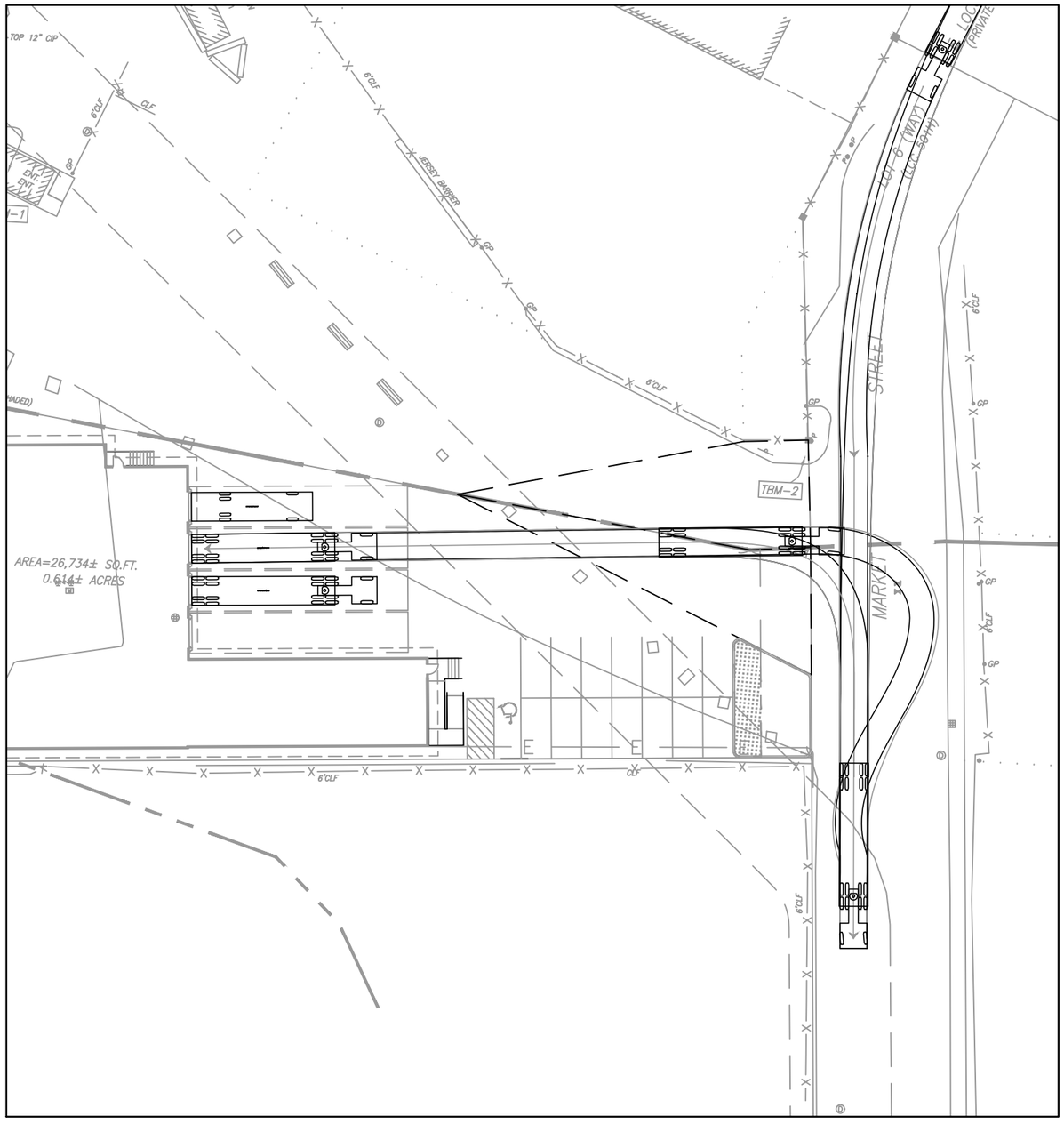


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 28.40
Tractor Track	: 8.00	Articulating Angle	: 75.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 9. *LOADING MANEUVERS - WB50 ENTERING THE PROJECT SITE VIA REVERSE (BACK-IN) MANEUVER FROM MARKET STREET*

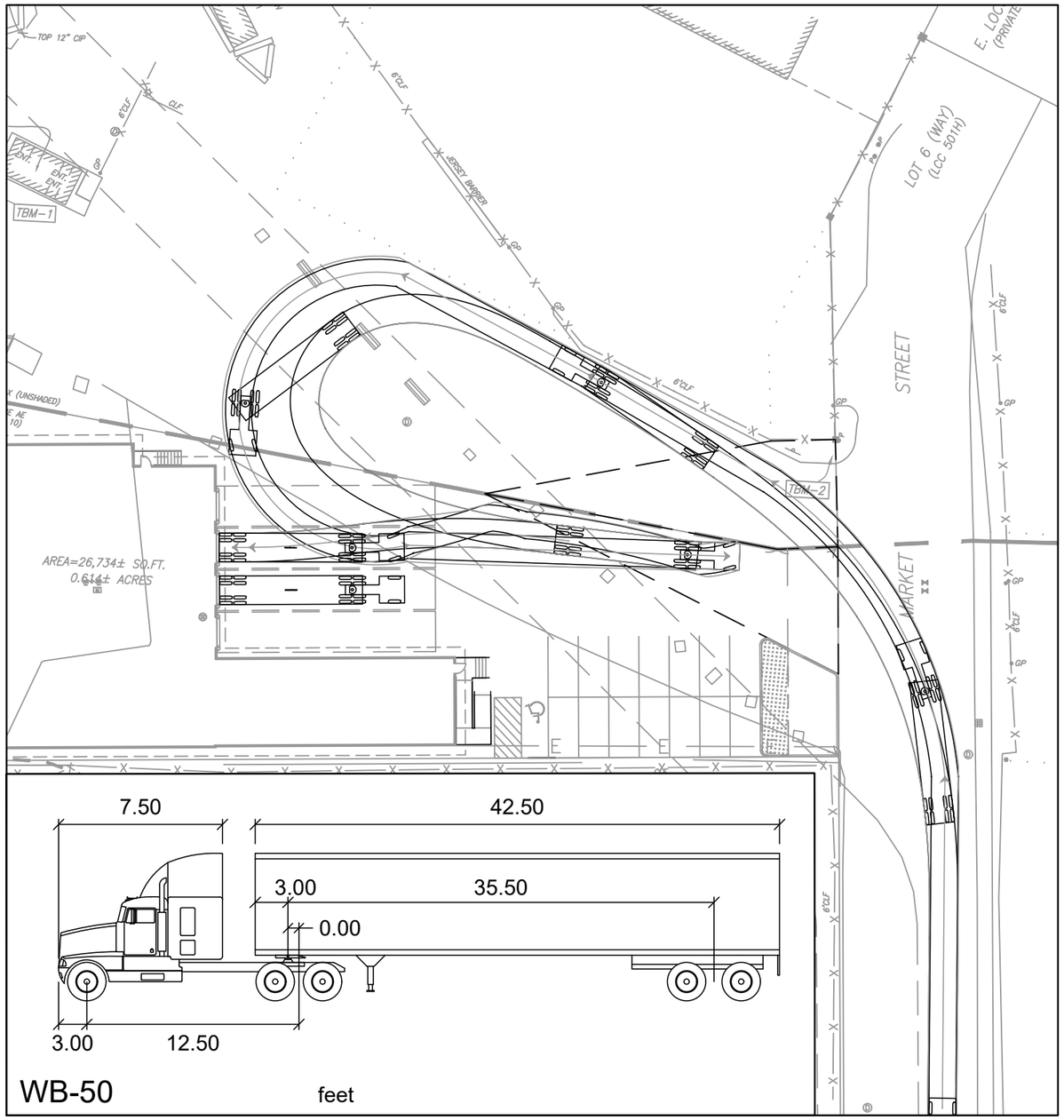


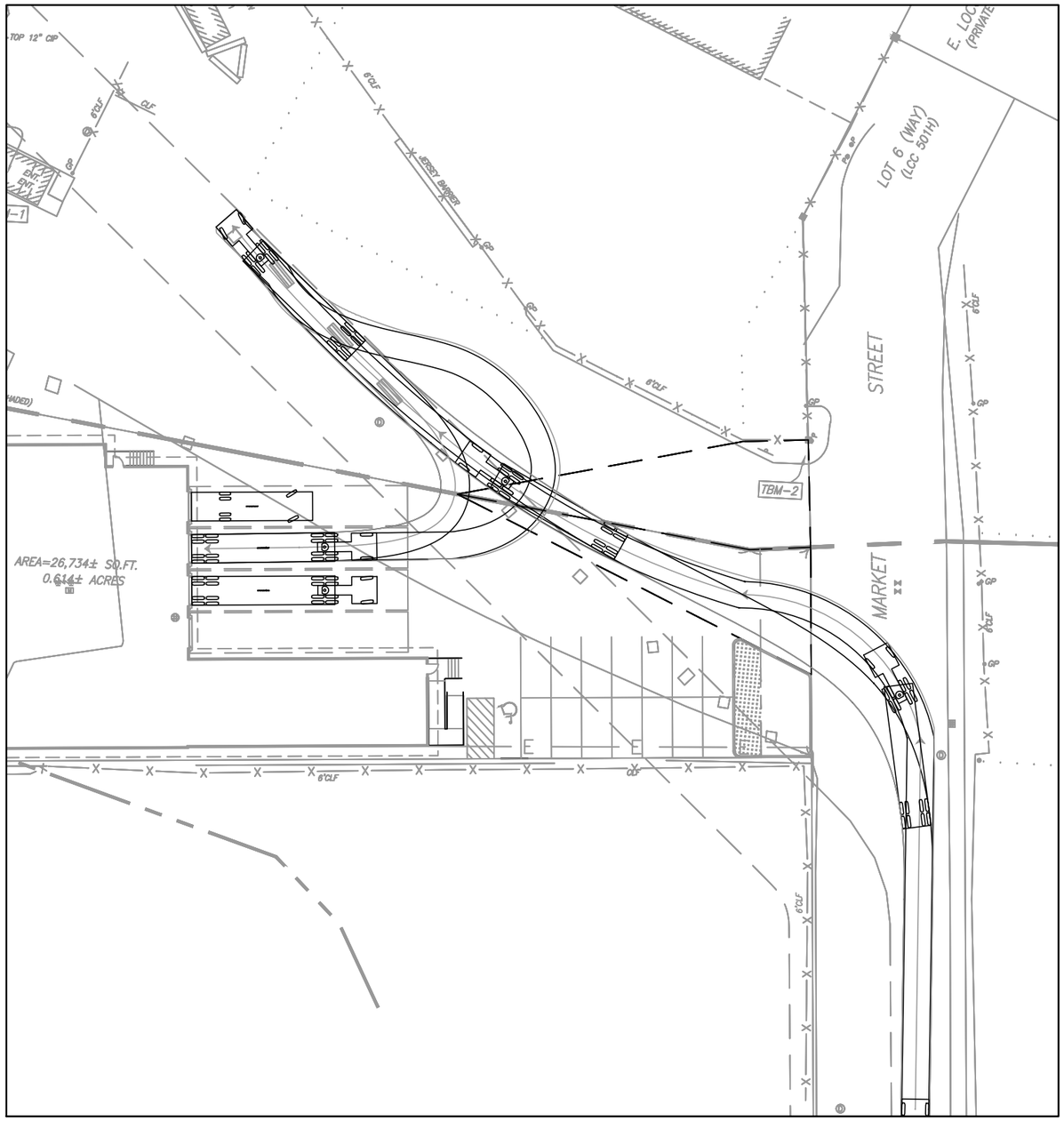


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 17.70
Tractor Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 10. *LOADING MANEUVERS - WB50 ENTERING THE PROJECT SITE VIA FORWARD TURN FROM MARKET STREET*

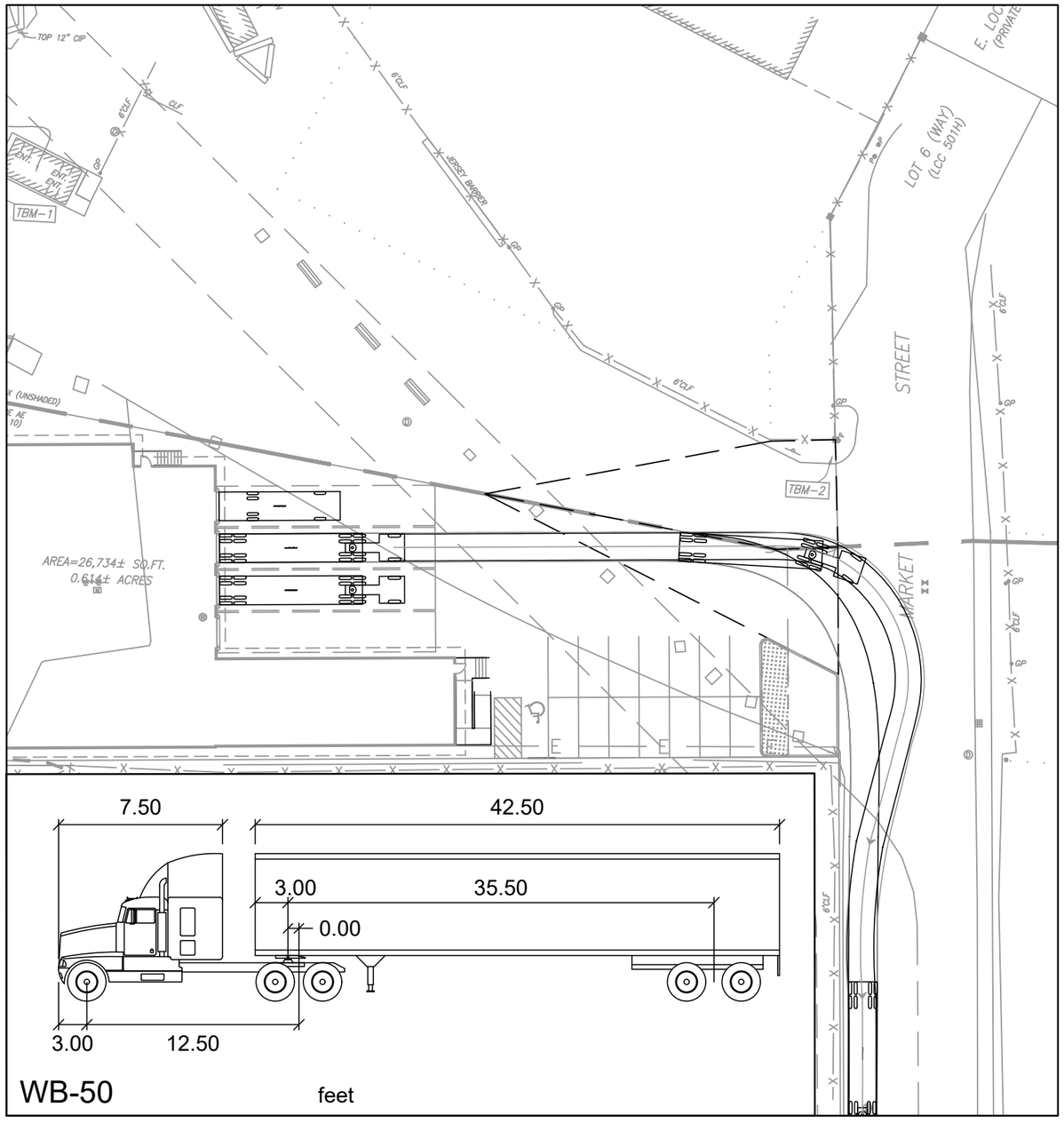


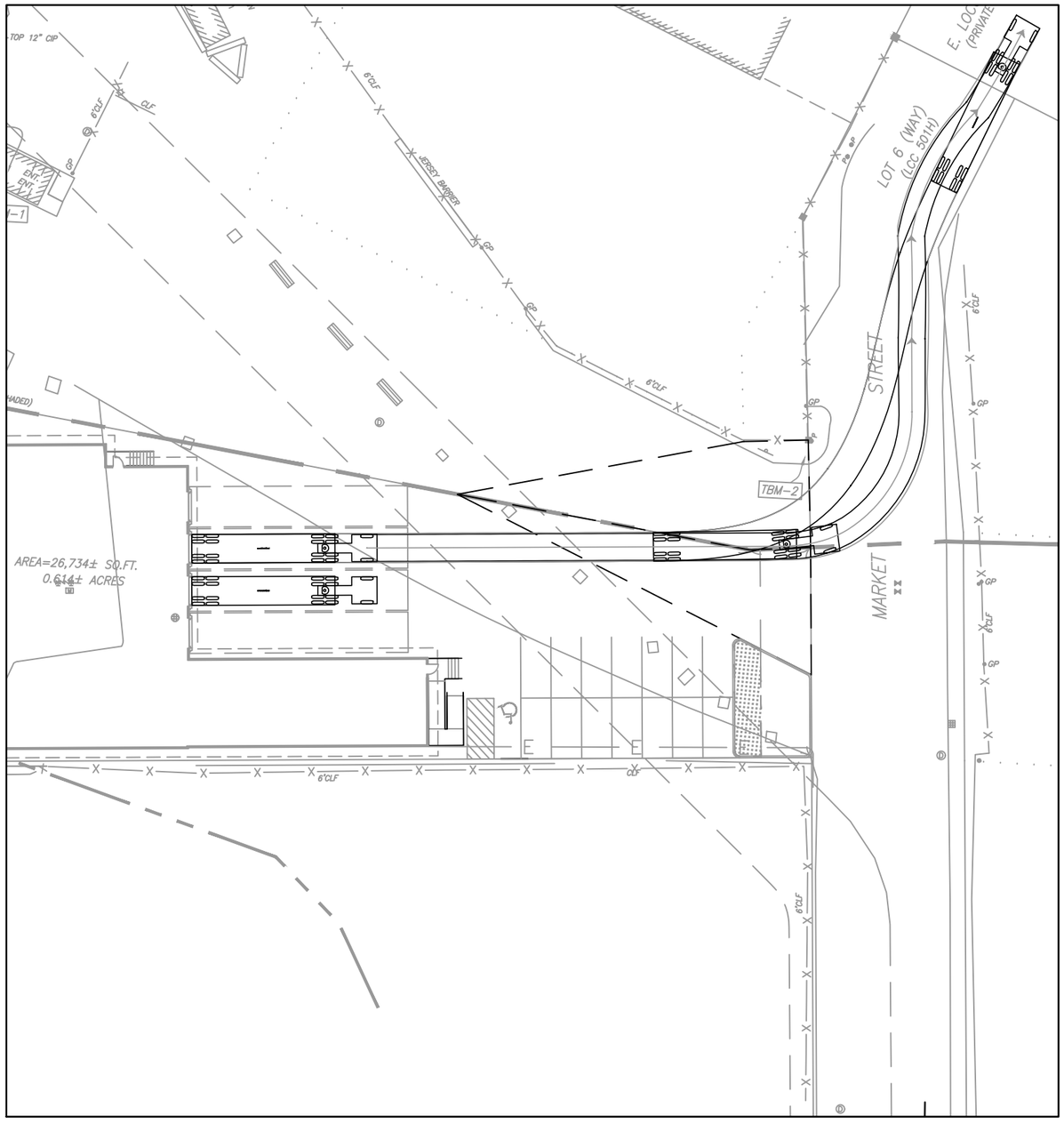


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 17.70
Tractor Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 11. *LOADING MANEUVERS - WB50 EXITING PROJECT SITE*

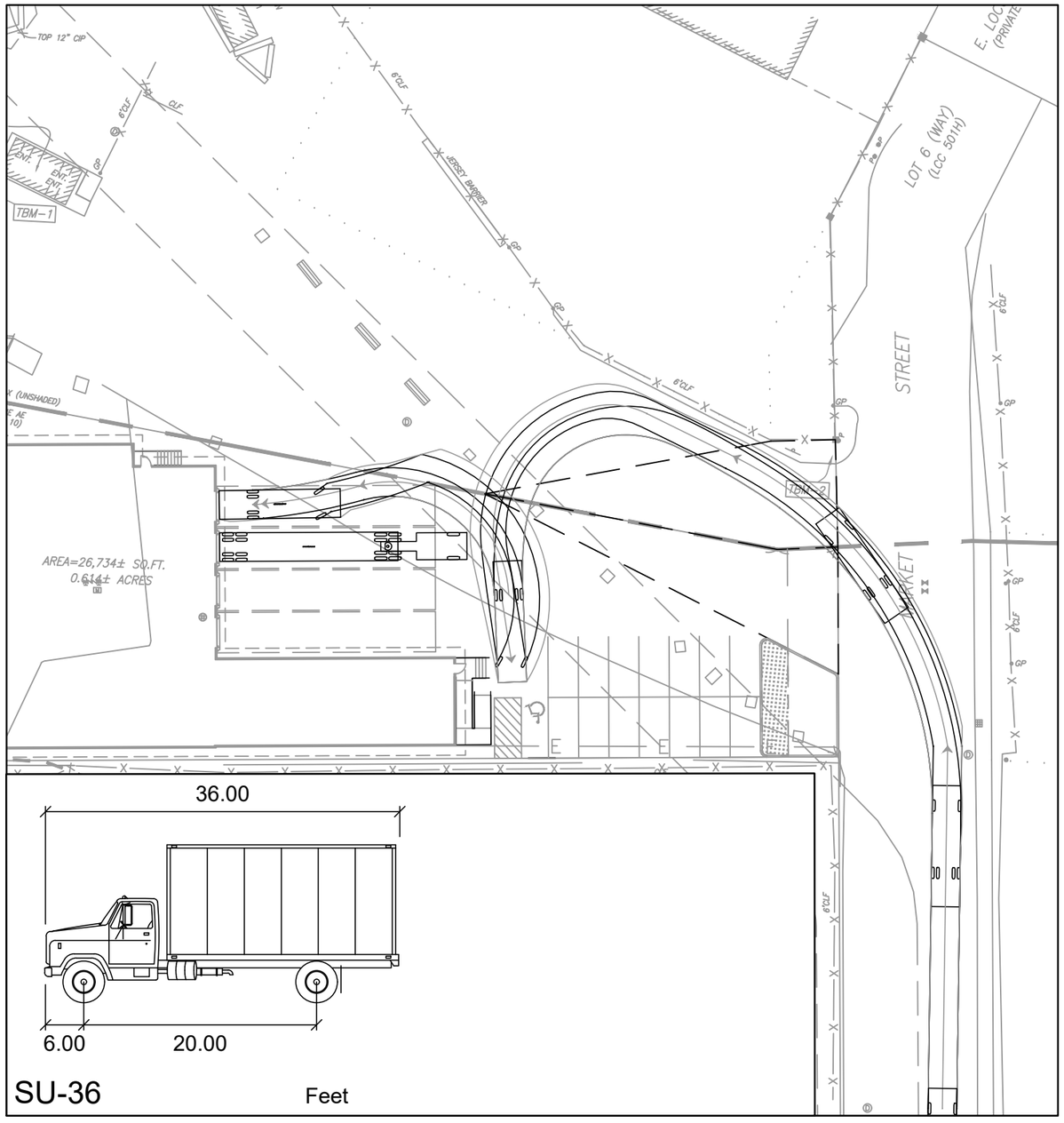


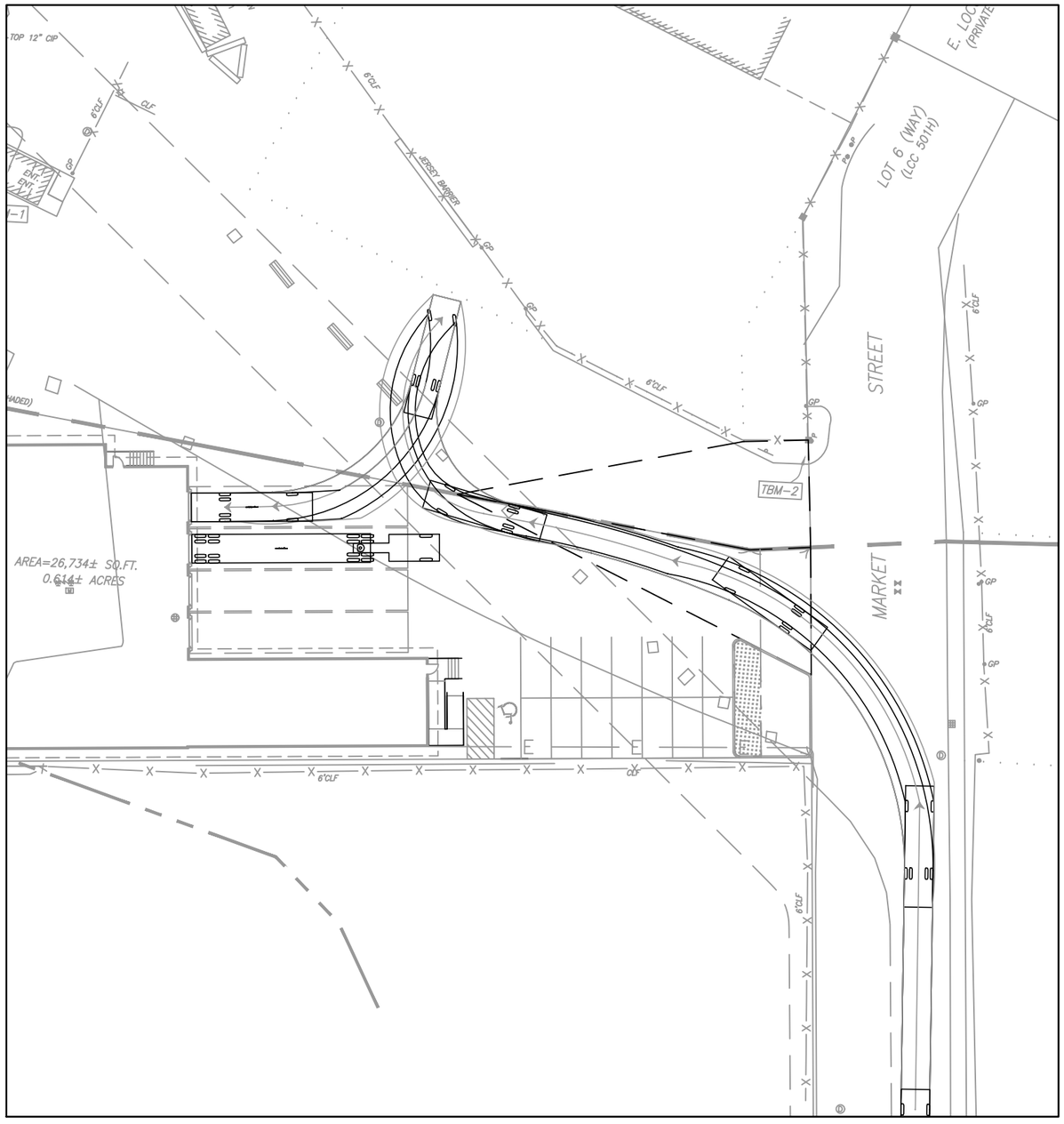


Tractor Width	: 8.00	Lock to Lock Time	: 6.00
Trailer Width	: 8.50	Steering Angle	: 17.70
Tractor Track	: 8.00	Articulating Angle	: 70.00
Trailer Track	: 8.50		

Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

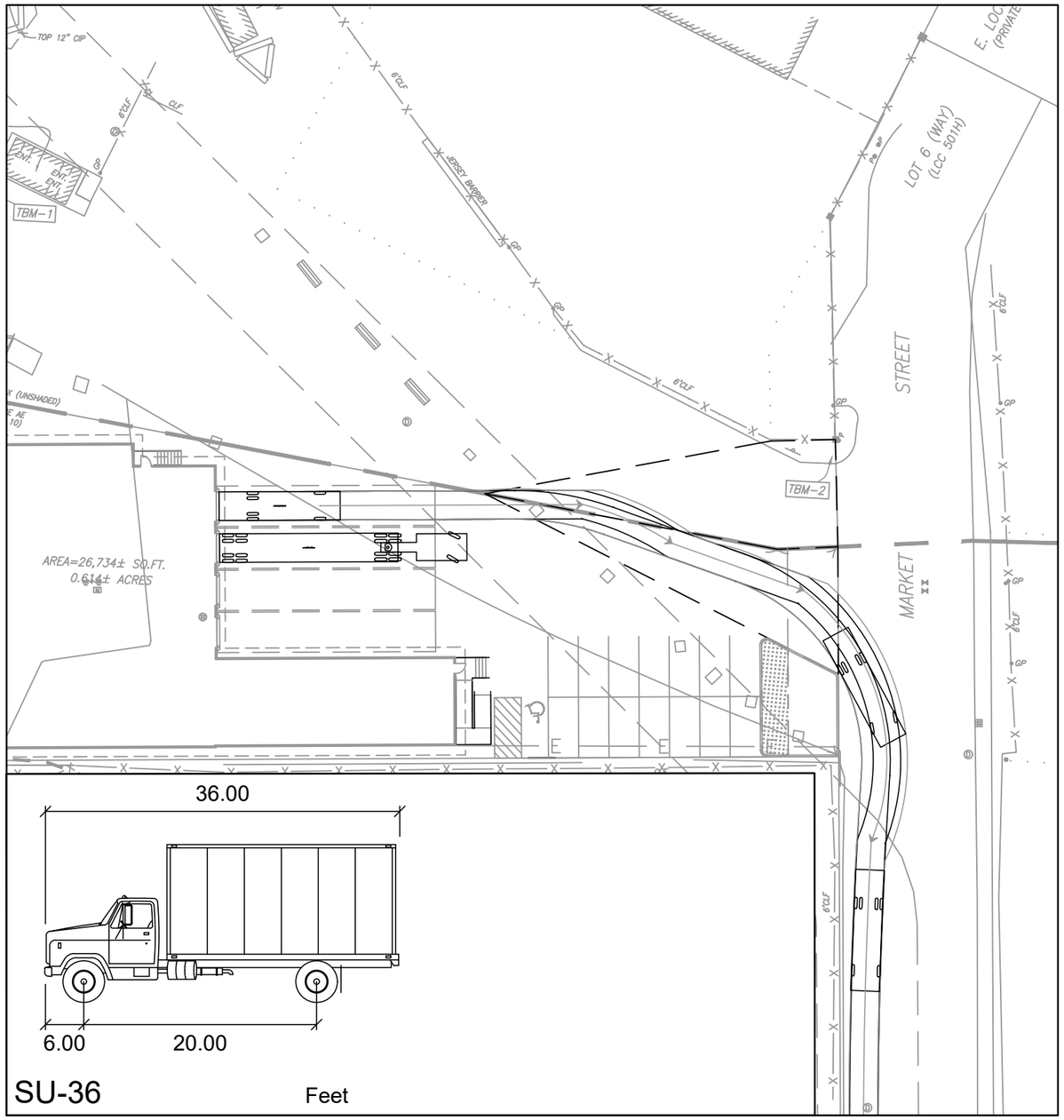
Figure 12. *LOADING MANEUVERS - SU36 ENTERING THE PROJECT SITE VIA FORWARD TURN FROM MARKET STREET*





Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 13 *LOADING MANEUVERS - SU36 EXITING THE PROJECT SITE*



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Track	:	8.50
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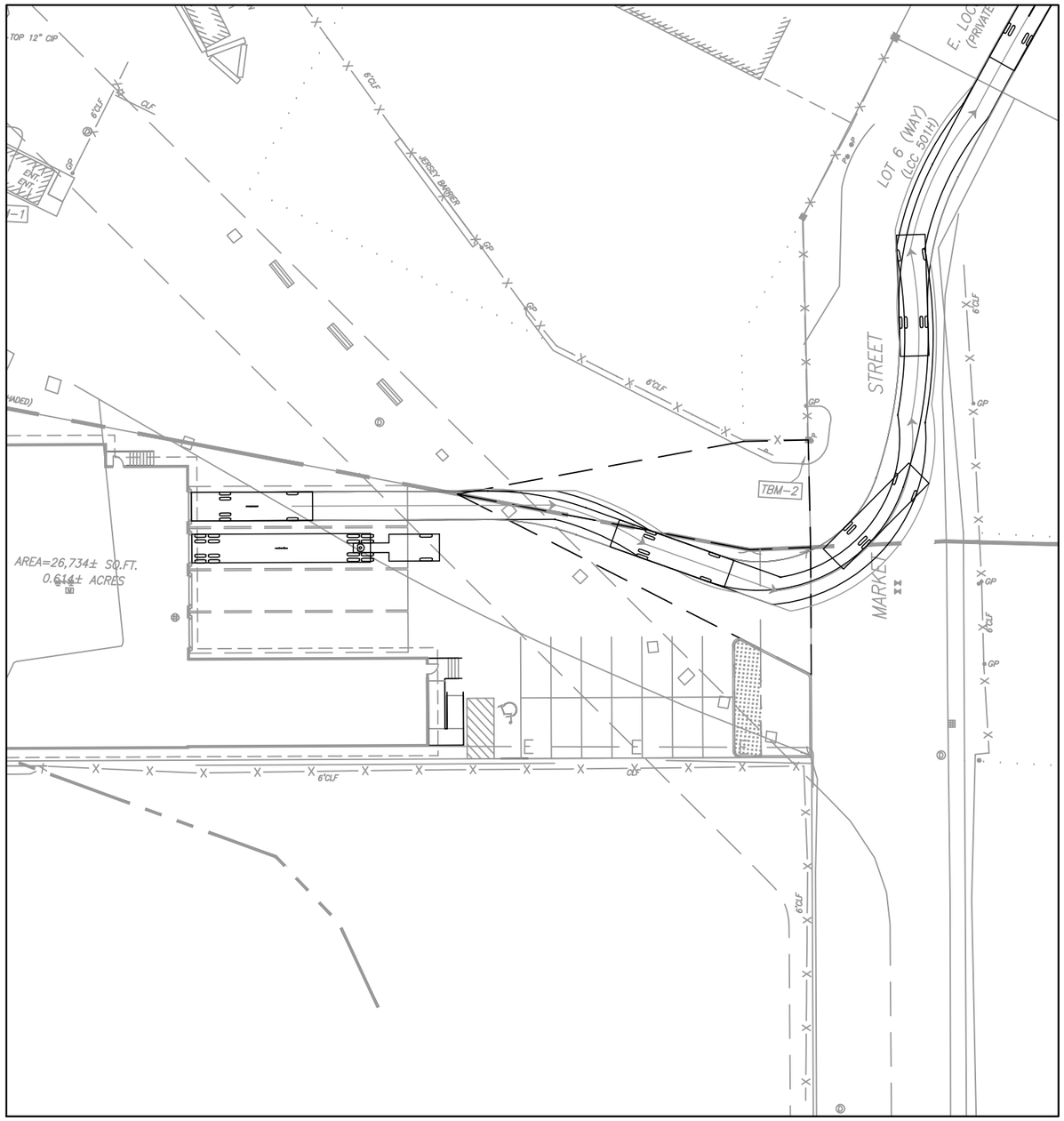
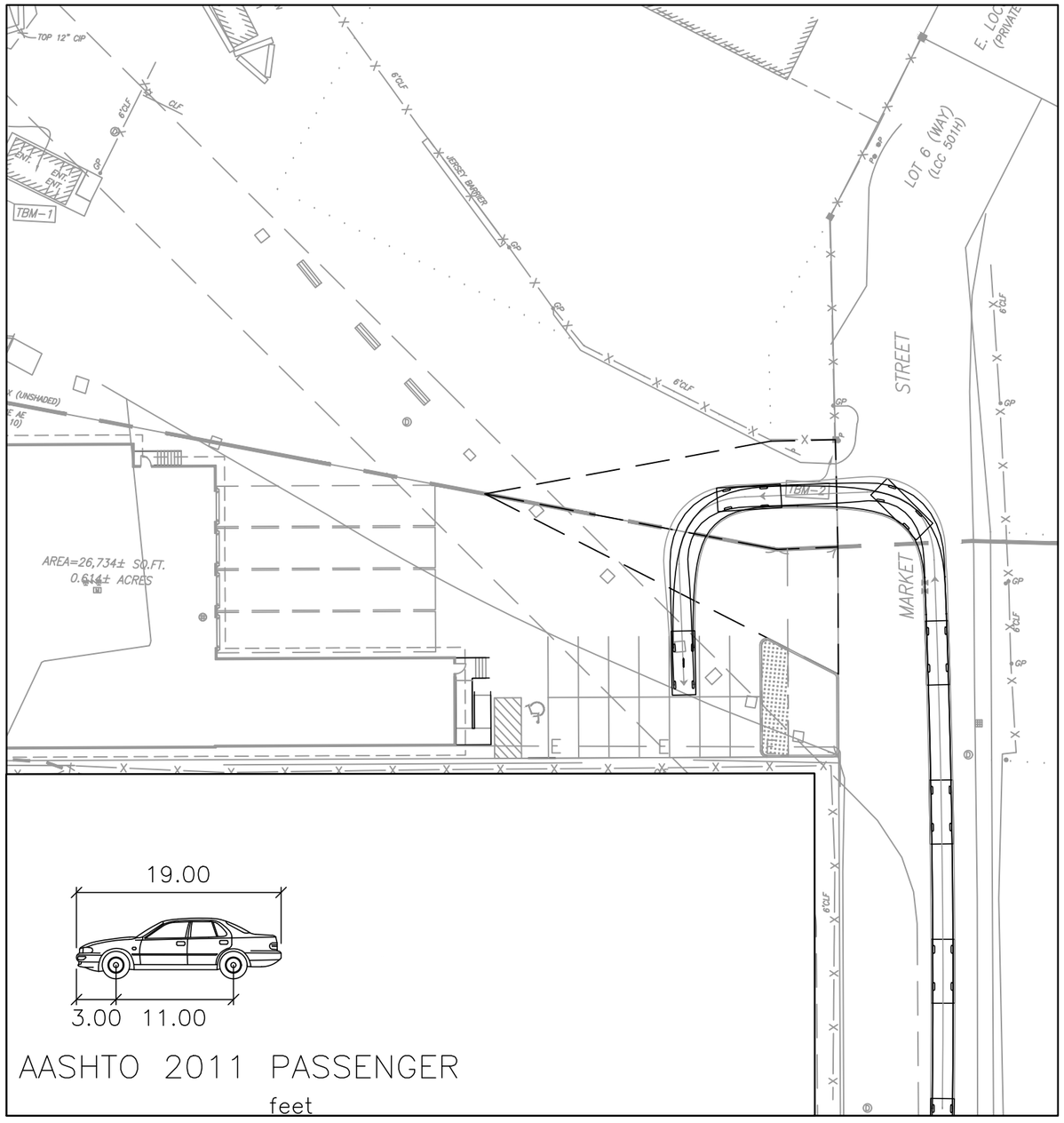
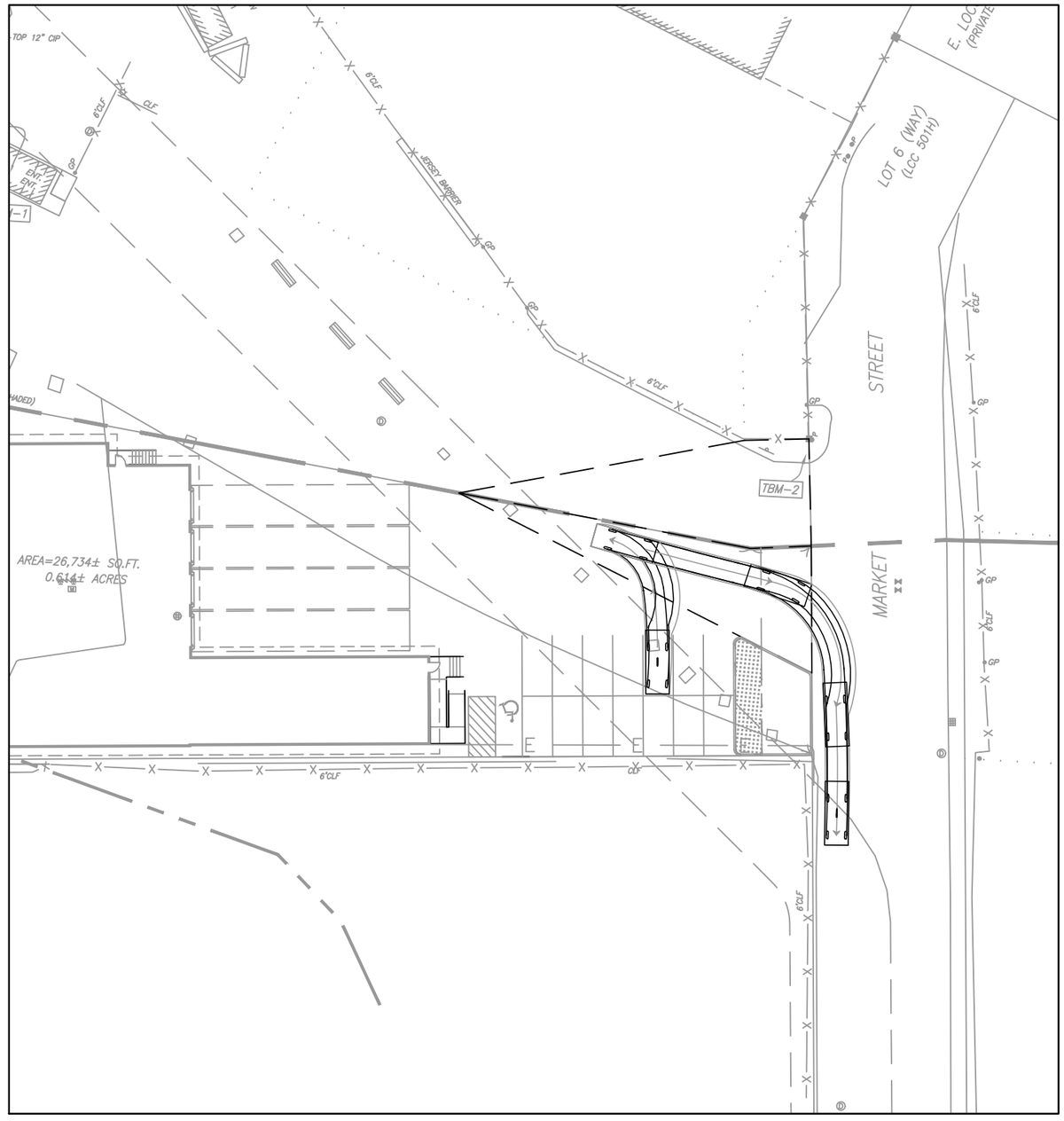
Steering Angle	:	31.60



Approximate Scale: 1" = 40'-0"
Date: 03-25-2020

Figure 14. ***LARGE PASSENGER VEHICLE CAR - ENTERING AND EXITING THE PROJECT SITE***





Approximate Scale: 1" = 40'-0"
Date: 03-25-2020