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PL2016-120

Development Application
Mall of America Transit Station Renovations
Bloomington, MN

Project Narrative

June 29, 2016

Owner:

Metropolitan Council
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A. REQUESTED ACTION

The requested actions for the Metro Transit Mall of America (MOA) Transit Station Renovations are as follows:

- Major Revisions to the Final Development Plan for Mall of America
- Final Site Plan Approval

The Development Applications for the Metro Transit Mall of America Transit Station Renovations will adhere to the following proposed approval schedule:

Kick-Off Meeting (Planning Staff – Completed)	March 9, 2016
Informal Development Review Committee (DRC) Submittal	April 28, 2016
Informal DRC Meeting (Completed)	May 3, 2016
Informal DRC Follow-Up Meeting	May 26, 2016
Informal DRC Follow-up Meeting	June 3, 2016
Submit Development Applications to the City	June 29, 2016
Development Review Committee (DRC)	July 12, 2016
Planning Commission Meeting	August 4, 2016
City Council Meeting	August 15, 2016

Included in this submittal are the following:

- Development Application
- Compact Disk (CD, FTP, or Dropbox link) containing all hard copy items
- Project Narrative (1 copy)
- Final Development Plans:
  Four (4) full size sets (three folded and one rolled)
  Four (4) sets of 11x17
- Development Application Fees including the following:

-Major Revision to Preliminary Development Plan	$830
Total Application Fees:	$830

B. PROJECT LOCATION

The project site is located at the northwest quadrant of 24th Avenue South and Killebrew Drive and is on the Mall of America (MOA) property. The street address is 8100 24th Avenue South. The PID is 01-027-24-31-0017.

The site is located within the MOA, primarily on Level 0 (Ground level) of the East Parking Ramp south of Gate 5 (82nd Street). Metro Transit operates the MOA Transit Station, which includes service by the METRO Blue Line, METRO Red Line, local bus routes, and various other transit services. Metropolitan Council has an easement on which it owns and maintains the imbedded LRT track and OCS, LRT signals and controls, Transit Station, and all signage and

systems to operate the MOA Transit Station. The easement allows for revisions to the property with written approval of the Mall of America.

C. PROPERTY

The Legal Description of the Property is Lot 1, Block 1, Mall of America 3rd Addition. The project site is currently zoned as CX-2 Mixed Use Planned Development (PD), and the Airport Runway AR-17 Overlay. The overall MOA site is 2,765,475 SF or 63.49 acres.

The MOAC Mall Holdings LLC (MOAC) owns the property. The Port Authority of the City of Bloomington (Port) and the MOAC have a Ground Lease and Management Agreement for Construction and Operation of Public Parking Facilities on the Property (terminated) in which the Transit Station is located. The MOAC granted the Metropolitan Council a license to use a portion of the property, described in the Easement Agreement, to operate the Transit Station, bus operations, and LRT facilities on the property. There is a separate agreement OMP Agreement which addresses the operation and maintenance police services (Metro Transit Police and Bloomington Police Department) on the property.

D. EASEMENT AGREEMENT REVISION

The existing property Easement Agreement, dated December 31, 2004, will be revised based on the limits of the proposed Transit Station and associated bus and LRT facilities. The MOAC Mall Holdings LLC, Port Authority of the City of Bloomington and the Metropolitan Council have begun discussions on the revision of this agreement. The Easement Agreement Revision will address the following easements:

- Joint Access Easement
- Transit Easement
- MOA Transit Center Easement

The separate OMP Agreement will be adjusted as required.

The existing public sidewalk and bikeway easement will be modified along 24th Avenue South and Killebrew Drive to reflect the new access locations and changes to the public walks.

E. PROPOSED PROJECT

Summary

The Metropolitan Council, and its project partners, intend to improve the existing Mall of America Transit Station. The MOA Transit Station is the highest used facility in the Metro Transit system, serving more than 2 million riders annually. The intent of the project is to renovate the existing Mall of America Transit Station to provide for the following project goals:

- Improve Transit Bus Efficiency
- Reduce Entry Times for Transit Buses

- Improve Pedestrian Access and Exterior Visibility
- Improve Station Amenities and Aesthetics
- Improve Support Facilities associated with the Police Substation

The proposed project includes reconfiguration of the site, including a new busway and parking, new accesses from the public right-of-way, and renovated Transit Station building to meet the goals stated above.

The proposed site improvements include separation of MOA site access for employees and commercial vehicles from the Metro Transit bus operations. The proposed new entrance only driveway for the MOA employee traffic and commercial loading dock access is proposed just west of the LRT guideway on Killebrew Drive. A new security gate within the site and under the single level of the parking ramp which will reduce traffic impacts to Killebrew Drive. MOA employee traffic would enter the site at this location, circulate within the site, and exit from a modified dedicated exit at Gate 6. MOA employee and commercial loading dock traffic will have to turn right onto southbound 24th Avenue South. Metro Transit and other bus service providers would enter the site at a new entrance only driveway from southbound 24th Avenue South (CSAH 1), circulate through a new bus operations and gate area east of the LRT platform, and exit via a modified Gate 6 dedicated exit. Transit and other bus service providers will be able turn to both to southbound and northbound 24th Avenue South. See the attached plans.

The proposed building improvements include the partial demolition of the existing Transit Station and the construction of a new Transit Station that is oriented east-west with a direct connection to 24th Avenue public right-of-way and the Mall of America Level 1. The partial demolition will include all of the existing Transit Station except the existing elevators that access all the East Garage parking levels and an existing elevator equipment room and electrical room at the north end of the existing building.

The proposed building gross area is approximately 24,000 SF and will include 11,000 SF of public Transit Station spaces, 3,800 SF of police substation space for Bloomington Police Department and Metro Transit Police Department, 1,600 SF of Metro Transit driver break and layover facilities, 1000 SF of retail, and 700 SF of public restrooms. A new direct connection to the Mall of America will be made with escalators and an elevator to Level 1 at the east entrance to the mall. This entrance will connect beneath the current Level 1 ring road and access directly within the existing Level 1 East Entrance.

Existing Operations

Access to the site is provided at a security check point at Gate 6, located on 24th Avenue South, just south of East 82nd Street. This security check point includes a manned guard shack, gate arms, and crash-rated pop-up barriers. This entrance provides access to Mall of America contractors and employees, delivery trucks, buses that serve the Transit Station, Bloomington Police Department, Metro Transit Police Department, and other Transit Station maintenance and support staff.

The METRO Blue Line Light Rail Transit (METRO Blue Line) enters the site from the south side of the East Parking Ramp near the intersection of 24th Avenue S and Killebrew Drive. The METRO Blue Line platform is oriented north-south on Level 0, and is encompassed with the drive lane for bus operations. As there is not sufficient space for dedicated bus gates, buses drop

off and pick up passengers at the curb near the Transit Station, but are required to circle across the light rail tracks to layover before beginning their routes. This creates inefficiencies that cause delay for buses waiting for trains.

This renovation project is aimed at improving efficiency of transit operations by providing a separate, dedicated entry point from 24th Avenue S for buses and other transit support staff. Bus gates will be provided east of the LRT platform, which eliminates the need for buses to cross the internal LRT at-grade crossing. Access for all other vehicles will be provided at a new entrance from Killebrew Drive west of the light rail tracks. The security check point will be located internal to the site, with a new manned guard shack, gate arms, and K4 crash-rated barriers. The existing Transit Station building is being demolished, and a new Transit Station will be extended east to provide a direct connection to the public domain on 24th Avenue South.

Removals

The project will include the removal of concrete curb and gutter and bituminous pavements on Level 0 of the east parking ramp in the area of reconstruction. Some concrete curb and gutter and bituminous pavement on 24th Avenue South and Killebrew Drive will also be removed to accommodate reconfigured access points to the site and the removal of the southbound dedicated right turn lane at Killebrew Drive. Portions of concrete sidewalk are also being removed and relocated as part of the project.

Portions of the retaining wall with railing along 24th Avenue and the Gate 5 free-right turn lane will be removed to allow the construction of the new bus entrance and Transit Station.

The existing security booth at Gate 6 on 24th Avenue will be removed, along with the associated security gate arms and in pavement pop-up crash barriers.

With the reconfigured Transit building, the existing loading dock at the northwest corner of the project area will not be accessible by larger commercial vehicles. A new loading dock is provided on the new Transit Station Building allowing one overhead door and space for the relocated trash compactor.

The project will include demolition of the existing Transit Station transit shelter on both levels (approx. 14,672 square feet), with the exception of two existing elevators, an associated equipment room and the existing electrical room. The existing escalators will be removed and the Level 1 floor infilled. A semi-enclosed mechanical space (and mechanical unit) on Level 1 will also be removed and returned to parking.

An existing traffic signal pole and mast arm located at 82nd Street (Gate 5) will be relocated to accommodate changed curb geometry and the elimination of the free-right turn lane. A traffic signal pole and mast arm at Gate 6 will also require relocation. Other signal modifications will be required at Gate 6 due to the revised exit configuration.

Some trees along 24th Avenue and Killebrew Drive will be removed as part of this project. A total of twenty (20) trees will be removed, and a total of twenty-eight (28) trees will be planted. There does not appear to be an existing irrigation system on the site that will be impacted by the project.

Site Work

The project will include concrete pavements which match the existing pavement section on site for the busways, new entry from Killebrew Drive, loading dock drive, and relocated Level 0 ring road. The bus entrance from 24th Avenue will include integrally colored concrete pavement to provide visual guidance to the public that the entry is restricted to authorized vehicles only. Parking areas that are not subjected to bus or heavy truck traffic will be comprised of bituminous pavement.

The new bus entry and truck/employee entrance will also include overhead signage to indicate that they are to be used by authorized vehicles only. Signage will require City of Bloomington approval.

The truck/employee entrance will include (3) drive lanes, with K4 vertical crash barriers. A new guard shack will be located at the security check point. A security screen wall, to be designed by structures, is located near the security gate. Near the Y-intersection of the Level 0 ring road, (2) K4 steel plate barriers will be located to provide a secure rejection lane from the security checkpoint. Cast-in-place concrete barriers will also be constructed to provide a separated rejection lane. At the reconfigured Gate 6 exit, (2) K4 vertical crash barriers will be installed to prevent unauthorized access. The new bus entrance will also include a K4 vertical crash barrier gate. The new police substation entrance from Gate 5 will also include K4 security gate arms.

A new retaining wall, designed by structures, with architectural screening will encompass the MOA laydown area north of the new transit station near Gate 5.

The new depressed loading dock will include one overhead door and the relocated trash compactor.

Transit Technology

A number of transit technology components will be deployed at the Mall of America Transit Station to facilitate transit operations and to provide real-time customer information to transit users. This includes the following transit technology systems: automated gates at the entrance and exit of the transit station to allow buses and other transit vehicles to securely and efficiently access the transit station; dynamic signs to provide real-time route and departure information to transit users; and locator system to provide real-time bus location information to transit users.

Buses will enter the transit station from 24th Avenue, just south of 82nd Street, at the northeast corner of the Transit Station. A gate will be installed at this entrance to ensure that only approved vehicles (primarily buses) can enter the transit station at this location. To facilitate operations, this entrance gate will be automated and will automatically open for approved vehicles. Metro Transit buses equipped with the EMTRAC system will open the entrance gate via GPS and wireless communication. Other approved vehicles such as Metro Mobility, MVTA buses, maintenance vehicles, etc. are not equipped with the EMTRAC system and will require a different solution to open the entrance gate. Primary bypass solutions may include placing an active or passive RFID tag on approved vehicles to open the entrance gate or providing a card or keypad access to facilitate entry to the transit area.

Buses will exit the transit station onto 24th Avenue. The exit gate will be opened by a loop detector placed in front of the gate. This will allow vehicles that do not belong in the transit station to be easily escorted out. Both the entry and exit gates will have a manual override,

should the automated functions fail or access needs by emergency vehicles. Security staff are anticipated to have security camera surveillance and can assist with gate malfunctions until the necessary personnel arrive to repair the issue.

Real-time signs will be placed throughout the transit station to provide transit users with bus information such as the routes and departure time at each gate. All real-time signs will interface with Metro Transit's existing head-end system and will be 50-inch displays. Push-buttons, braille placards, and annunciators will be placed near the real-time signs to provide transit information for the visually impaired.

An LCD real-time display (or displays) will be placed near the bottom of the elevators as transit users leave the Mall of America and enter the transit station. Another LCD display (or displays) will be placed near the doors between the waiting area and the bus boarding area. This real-time display will likely contain the same information as the real-time sign by the elevators, but will be placed to allow transit users to view the information while they are waiting inside for their bus to arrive.

At each of the eight gates, a four-line, double-sided LED real-time (NexTrip) sign will be placed as close as possible to where the door of the bus will stop. The information on these LED real-time signs will be gate specific.

Metro Transit has recently deployed a bus locator system at their garages to be able to pin-point the location of a bus within a garage. This system is provided by UbiSense and uses active RFID technologies. Active RFID has high accuracy and does not require a clear view of the sky, a limitation of GPS-based systems. This system will require a number of active RFID antennas to be installed at each of the Transit gates. This system will be deployed at the Transit Station to track the location of buses at each transit gate, particularly the gate at which the bus is parked. Transit users will be able to look at the display to see the exact location of their bus.

Landscaping and Urban Design

The number of benches has been reduced and benches are now included at the busiest bus gates, totaling six (6) benches. Trash receptacles have also been reduced to a total of four (4) and will be located so they are visible from all proposed benches.

Decorative saw cut score lines and integrally colored 'special concrete' areas will be applied to paved areas within bus loading/waiting areas and paved areas adjacent to the new transit station building.

Perennials including daylilies and catmint, along with sodded areas, will be planted on the northeast portion of the site in a pattern that corresponds with the scoring pattern of the concrete. Steel edger will be used to separate the sod from the perennial massings. Sod will also be planted in all other areas disturbed due to construction.

Autumn Brilliance Serviceberry trees will be planted on the north side of the site. Three Serviceberry trees have been added on the west side of the 24th Avenue entrance walk. A few overstory trees will be planted to fill in areas where site work and grading will impact existing landscaping.

Traffic

The design team, led by SRF Consulting Group, has analyzed the existing traffic patterns around the project site to determine impacts to traffic operations with the proposed project. A comprehensive technical memorandum detailing the traffic analysis is provided in a separate document. This document evaluated four concept alternatives for evaluation, concluding that Alternative C – new commercial vehicles and employees access from westbound Killebrew west of 24th Avenue South - was the preferred alternative. This document is called the Metro Transit – MOA Transit Station Renovations Traffic Study, dated May 24, 2016.

The proposed security check point is located interior of the Mall of America site on Level 0, accessed from the new entry from Killebrew Drive located just west of 24th Avenue. The internal storage needs were analyzed based on data collected at the existing security check point on 24th Avenue. Based on this analysis, the proposed (3) entry lanes provide adequate storage interior of the site to reduce the risk of traffic queueing back into Killebrew Drive. Security check point procedures and operations will also need to be analyzed by the Mall of America to determine if modifications will be needed.

The existing dedicated right turn lane on 24th Avenue with a free-right turn lane was analyzed due to a concern with queues from the security check point backing up into Killebrew Drive. The METRO Blue Line at-grade crossing within the free-right turn lane was also a consideration for this location. The dedicated right turn lane is being removed on 24th Avenue to slow traffic prior to the turn at Killebrew Drive. Removing existing trees near the right turn lane were discussed to improve sight lines for the turn, but are not anticipated to be required to be removed, based on further analysis. The location of the LRT at-grade crossing is being maintained, to eliminate the need for track crossing modifications.

The opportunity to provide a pullout for temporary METRO Blue Line bus bridge operations on 24th Avenue was identified through the design process. It is understood that bus bridge operations occur very infrequently (2-3 times per year) for scheduled maintenance or due to service disruptions. This pullout allows for motorists to stay outside of MOA property to make safe drop-offs without stopping in the travel lane, which has been observed at busy times when MOA closes access at peak periods. The pullout will be signed "Drop-Off Only" to avoid lingering vehicles intending on pick-ups.

The existing traffic signal at the Gate 6 exit will be modified to accommodate the proposed geometry, as it is being converted to an exit only. The NB pole will be shifted north and video detection will be provided. The SB pole will be shifted to the median, and existing loop detection be used but Hennepin County may want to change to video detection. The EB pole will be shifted north, in line with the exit median, and a pedestal will be added for the MOA commercial vehicles and employee exit. All new wiring will be provided back to the existing cabinet. The vehicle detection will be loops for the MOA commercial vehicles and employees. The MOA commercial vehicles and employees right turn exit will be signaled separately from the busway right turn exit. This will avoid conflicts with larger commercial vehicles turning movements. Replacing the signal cabinet would be a Hennepin County task. The current signal is coordinated to the signal to the north (Gate 5), which will be separated with the project to give more time in the signal phasing.

The existing signal at Gate 5 will be modified. Advanced EVP will provided for exiting police at the police/maintenance on the EB approach to this signal.

The new and existing poles at the Gate 5 and Gate 6 will be painted the South Loop standard color – Graphite Black RAL #9011.

Street Lighting

The project will replace a number of street light poles on the west side of 24th Avenue South, from East 82nd Street to East Old Shakopee Road. The project will salvage the existing poles and relocate to new foundations. The new foundations will be the same as the current foundations and will be located 3 feet from face of curb. This work will include new conduit and hand holes. The City may update poles with the LED South Loop standard light poles and fixtures.

Emergency Access

Police and Fire Department access to the renovated Transit Station has been discussed with the City of Bloomington Fire Department. The primary access for the Transit Station and transit busway will be the right-in from southbound 24th Avenue South. The 24th Avenue South median access at the proposed Gate 6 exit needs be maintained for reverse entry to the transit busway exit and the adjacent commercial vehicle and employee exit. The primary access for the areas west of the LRT tracks will be the new commercial vehicle and MOA employee entrance off of Killebrew Drive. The queues in these three lanes will need to be cleared in an emergency. The design team will investigate whether access to the busway can accommodated from this new entrance.

Building Egress Through Transit Area

The MOA has two emergency exit doors on the westerly side of the transit area. Each of the exit doors has a width of 28'-6". This provide emergency egress from the lower level, near the MOA Management Offices. The current egress is around the existing Transit Station, across the LRT tracks, across the parking lot to the public right-of-way of 24th Avenue South. This current route is not currently signed. The removal of the existing Transit Station will provide a clearer visual queue to the public right-of-way. The egress route will be north of LRT tracks and the pedestrian/vehicle crossing south of the LRT platform. Emergency egress signage will be added to the project.

Architecture

The new Mall of America Transit Station provides enhanced and enlarged space for all programs existing at the current facility, as well as new space provided for an outreach office. In addition to the improved operations provided by the site work, the building itself will improve functionality by providing a conditioned corridor from the 24th Avenue South entrance on the east, through the existing parking garage with vertical circulation directly into the east entry of the mall at Level 1. The project includes reconstruction of the mall guest services area to provide space for the required circulation, as well as some adjustment to the existing tenant warehouse space on Level 0, to provide a private corridor for mall employees to reach the Police Substation. New mechanical units will be located on the roof of the existing stairway tower, with ducts running in existing and new chaseways. A new loading dock area will be provided to replace the existing loading dock made inaccessible by the project.

The project aesthetic will be light, bright and clean, with white, custom perforated metal panels forming a ceiling plane and black, perforated and solid metal panels forming the north wall of the facility. The floor will be white and light grey terrazzo, white and light grey tile will be used for other surfaces including the public restrooms, with clean, durable painted block with rubber flooring for the interior of break rooms and the police substation.

Colors from both Mall of America branding and Metro Transit branding will provide linear accents integrated with the custom perforated pattern in the white metal panels. While the existing light fixtures will be reused for general illumination in the exterior transit spaces, supplemental lighting and ceiling treatment will be provided above the LRT platform and the bus loading areas to enhance the quality of spaces starting from the moment one disembarks from transit. The white ceiling will fold up the façade to form a canopy and signage element on the 24th Avenue façade. The black wall element will fold across the face of the building, forming a screen for the MOA dry storage area, and a façade along the transit area.

Occupancies will include A (Assembly) for the majority of the structure. The police substation will be classified as B (business). The design team has conducted two code review meetings with the Building and Inspection Division that have resulted in the various fire ratings of the building walls.

The existing parking garage consists of precast columns, shear walls and double-tees. The existing ring road is post-tensioned concrete. The structure will span beneath, adapting the roof assembly and providing for movement between these conditions. The construction type will be IIB, to match the existing mall construction, and occupancy separations will be provided between the transit facility and other uses on the south and north sides.

The design team has considered creative placemaking and public art, and incorporated opportunities within the design. A meeting is scheduled for early July to discuss with City staff.

The design team has considered the concept of pedestrian crossing of 24th Avenue South, resulting from master planning of the Adjoining Lands, in the design of the Transit Station project. A more detailed MOA Pedestrian Bridge Feasibility Study is resulting from that concept work and is being headed by MOA. The intent of the feasibility study is to ensure that Transit Station renovation does not preclude vertical circulation of the west side of 24th Avenue South at the Transit Station.

Structural

The majority of the structural demolition to accommodate the new construction is not structural in nature except for the following four areas:

- The existing CIP concrete stairs and stair tower wall extend from grade level to the roof level. The stairs and landings from grade to Level 1 will be demolished and removed and the southeast, south and southwest walls at the grade level will modified to open this area up. The remaining walls at the south east and southwest corners will be reinforced and enlarged to provide structural requirements.

- The existing steel framed composite concrete slab at Level 1 inside the mall will be demolished to create the floor opening for the escalator/stair construction and the elevator shaft. Some existing steel beams will be reinforced and steel beams will be added to support the modified beams and slabs.

- The existing escalators and stair in the existing station will be demolished and the floor opening at Level 1 of the parking structure will be infilled with reinforced concrete.

- The steel columns for the canopy frame at the busway entrance will be located on the outboard side of the existing parking ramp column.

The foundation walls adjacent to unheated areas will extend to 5' below grade for frost protection. The interior masonry walls will bear on shallow 2' x 1' strip footings. The footing supporting the elevator shaft will extend approximately 10' below grade to match the adjacent column footing for the mall. The escalator foundation will be a 2' x 3' grade beam straddling one of the exiting mall footings. The maximum allowable net bearing pressure is 3,000 PSF.

The wall footings and the thickened stair walls will be reinforced 4,000 psi concrete. The grade slab in the station will be a 5" thick 3,000 psi concrete slab with thickened edges. All doors opening into an unconditioned space will have a concrete threshold with frost footings 5' deep.

The Transit Station walls will be a combination of 8" and 12" reinforced concrete masonry walls braced by and cantilevered above the grade slab and isolated from the parking ramp and ring road structure above the top of walls.

The glass store front along the south wall will bear on an 8" reinforced concrete masonry wall with 16" x 24" CMU pilasters (below grade) at structural column locations. The elevator shaft will be 8" reinforced masonry walls with bearing pockets for the modified steel floor framing at Level 1. Openings in masonry walls will have reinforced jambs and reinforced masonry headers.

The glass store front on the south wall of the station will be braced laterally by steel HSS 10" x 6" header beams supported at 15' o.c. by steel HSS 5" x 3" columns bearing on the masonry pilasters. The steel columns are braced laterally at the top by W6 steel beams spanning the lobby above the ceiling to the masonry walls. The steel columns extend to the top of wall to support a steel angle bracing the metal stud wall over the HSS 10" x 6" header beams.

A steel sub-roof structure will be constructed over the station area where it passes under the concrete ring road. The existing ring road will support metal decking sloping to a gutter.

The existing steel beam which will now support the top of the stair and escalators in the mall lobby will be reinforced and additional steel beams added to support the modified framing creating the new floor opening.

The canopy above the busway on the 24th Avenue South side of the existing parking structure will be supported by steel HSS frames bearing on W12 steel columns braced laterally by the parking structure.

Electrical

The project will consist of selective demolition of electrical in a portion of the existing Transit Station, Barnes and Noble tenant space, Street Corners News tenant space, Guest Services space, Level 0 MOA loading dock, and Level 0 MOA Storage space. Additional selective demolition includes site electrical including ramp lighting, infra-red heaters, guard house, security gates, security barriers, and CCTV.

The existing Transit Station shall remain in operation during construction. After the new transit station is complete, demolish entire building, including all services. All connections will be removed back to source in Mall of America building.

The new Transit Station will be sub-fed from an existing Mall of America electric service. A new 277/480V, 3-phase, 4-wire feeder from existing Mall of America "Riser II" will provide electric service to the building. The electric service will feed a new circuit breaker main switchboard sized at approximately 1200A.

Normal power distribution will serve the 277/480V mechanical equipment loads, 277/480V panelboards, and 480V primary:120/208V secondary transformers throughout the building. Loads will also include the following: existing LRT platform pad mounted panel; existing LRT signal/communication bungalow; elevator, escalators, guard house at security gate, gates, to all power door openers; Metro Transit ticket kiosk, reader boards at bus platform and in transit station; all vending machines, refrigerators, microwaves, and other miscellaneous equipment located in driver's break area or police areas; infra-red heaters along bus platform with motion sensors for control; and to all loading dock equipment with service fed from existing MOA distribution equipment. Other require power requirements include fire protection equipment, access control systems, and other low voltage equipment.

The Mall of America has an existing generator system which will be used for emergency lighting and other emergency loads. Emergency circuits will be provided from the existing Mall building. Approximately 20% of light fixtures will connect to emergency circuits for egress lighting. Emergency circuits will be provided for fire alarm system equipment, fire/smoke dampers, and all power door operators in the path of egress.

Interior illumination shall be by dimming LED fixtures with electronic drivers. In addition, color changing LED node lighting strands will be provided behind the perforated metal panel ceilings in the Transit waiting/walk through areas, Transit waiting vestibules, Transit waiting canopy (exterior).

Exterior illumination shall be by LED fixtures with electronic drivers. General lighting in lower level of parking structure shall be MOA standard pendant mounted LED fixtures to match the existing light fixtures. Light fixtures are Lithonia #TLROC series. Supplement general lighting with 2" LED downlights mounted in the metal panel canopies located at the transportation platform locations to provide increased light levels on the transportation platforms. Illumination levels shall be consistent with existing parking structure and City of Bloomington Lighting Standards.

Building façade lighting will be provided to building façade metal panel layout and construction located on the east side of the parking ramp and entrance to the new Transit Station building. The front face of the façade will be illuminated by providing a continuous wall wash linear LED

fixture along the entire north vertical edge of the façade. The south edge of the façade will be backlit to provide a consistent illuminated region containing the Metro Transit and Mall of America signage. Color changing LED node lighting strands will be provided behind the perforated metal panel façade.

The exterior lighting for the project shall comply with the current edition of the City Code, Section 21.301.07 for Bloomington, MN. All exterior lighting shall be approved by the City of Bloomington Planning Division prior to installation. The interior lighting for both the Transit Station building, bus gates, and LRT platform shall comply with Metropolitan Council requirements and input from the City of Bloomington. City submittal shall include all items required by the City Code including initial and maintained lighting photometric plans, light fixture cut sheets, lighting control information, energy code calculations, and shall be signed by a Lighting Certified (LC) or Professional Engineer (PE). The following are the goals of the project:

Transit Station Interior	30-40 fc
Transit Station Entrances	15-20 fc – below canopy at front of Transit Station.
Transit Gates	15-20 fc
LRT Platform	Existing to remain.
Parking Areas	Match existing fc levels - 5fc.
Defined walkways through parking	10 fc
New south drive entrance	15-20 fc
Above new security gates	15-20fc

Mechanical

The existing plumbing fixtures and all associated plumbing piping for existing Transit Station shall be demolished. The existing RTU unit, controls, and all associated ductwork for existing Transit Station shall be demolished.

A new sanitary sewer system shall be installed and extended to the outside sanitary service for the public restrooms and driver break area. The police substation shall connect to existing sanitary system in the existing Transit Station.

Relocate existing above ground storm drain pipe drops along columns as required for new building. Civil will relocate or replace underground piping as required to meet code.

Extend domestic water from existing Transit Station. Civil will relocate existing underground piping to within 5 feet of the transit station and mechanical will extend from there into the building. Provide domestic cold water, hot water, recirculating hot water, sanitary waste and vent piping to new plumbing fixtures for police substation, public restrooms, and driver's breakroom restrooms. Provide one cold water, freeze proof hose bibb on each side of the building.

The HVAC system shall be a self-contained air conditioning system to serve the various zones

in the building. The air handling unit shall be variable volume with waterside economizer and electric heat. The approximate capacity is 15,000 CFM and 50 tons of cooling. The intake location for the outside air shall come from the second level of the parking ramp. The unit shall reject heat using a dry cooler with horizontal discharge located on the second level of the parking ramp. The main mechanical room shall have two base mounted pumps (primary and standby) to circulate condenser water between air handling unit and dry cooler. The condenser water shall contain 40% propylene glycol. Provide hydronic specialties associated with pumps and a glycol fill station for condenser loop.

The electric cabinet unit heaters will be provided in the vestibules and mechanical room. In floor hydronic heating will be provided in the through walk zone approximately 10,300 square feet.

Inline centrifugal exhaust fans serving each of the following areas: police substation restrooms, drivers break restrooms, and public restrooms and janitor's closet. Discharge through a sidewall louver on the North wall. The exhaust system to new bathroom near Guest Services into existing system in adjacent restroom.

All new equipment shall tie into a master controller in the Transit Station mechanical room. This controller shall tie into the MOA building automation system.

Fire Protection and Fire Alarm Systems

The existing fire protection piping, sprinklers and associated equipment for existing Transit Station shall be demolished and prepare areas of the Mall to be remodeled.

One new wet fire protection system on a dedicated zone control shall be installed and provided throughout the new Transit Station. The new wet system will also include closely space sprinklers around the escalator opening per NFPA 13, Minnesota State Building and Fire Code, and Mall of America Code Analysis requirements. Existing dry system(s) within parking ramp shall be modified and extended as required for new Transit Station.

To supplement the required fire rating of the glass wall and door assemblies within the separation between the new transit station and the parking ramp to the South, the following additional sprinkler protection is required. Provide closely-spaced sprinklers spaced at 6'-0" on center on both sides of the new glass assemblies at the south wall of the new transit station, adjacent to the parking ramp. Closely-spaced sprinklers on the interior of the transit station to be supplied from the new wet system sprinkler zone. Closely-spaced sprinklers on the exterior of the transit station will be supplied from the existing/extended dry system(s) serving the parking ramp.

Additionally, new ceiling areas are proposed in bus loading areas that will require sprinkler protection to be added to protect below these ceilings. Protection above ceiling will need to remain or be added where existing protection is not currently installed.

The existing fire alarm devices, wiring, and associated conduit for the existing Transit Station shall be demolished and prepare areas of the Mall to be remodeled. The new Transit Station will be provided with a fire alarm and detection system. The system will be designed as an extension of the existing Mall system and designed in accordance with NFPA 72, Minnesota State Building and Fire Codes, and Mall of America Code Analysis. The fire alarm will be a

digital addressable system and will have emergency voice/alarm occupant notification system. The design of the system includes automatic detection for all areas, duct smoke detection for any new smoke or fire/smoke dampers and air handler unit shut down (if required), and monitoring of any new water flow switches or control valve tamper switches for the automatic sprinkler system. The new fire alarm system will be SimplexGrinnell to be compatible with the current Mall system.

F. ZONING CODE ANALYSIS

The project site is currently zoned as CX-2 Mixed Use Planned Development (PD), and the Airport Runway AR-17 Overlay. This project will renovate the existing Transit Station and transit facility. No changes to the City of Bloomington Zoning are required.

G. PARKING ANALYSIS

The project will modify employee and vendor parking at the MOA, with the most impact at Level 0 of the East Parking Ramp. According to the 2015 Mall of America Holiday Parking Study, dated March 11, 2016, the MOA has a total of 17,094 parking spaces. The East Parking Ramp has a total of 5,845 parking spaces, including the employee and vendor lots.

The existing parking on Level 0 of the East Ramp is not public parking, as it is accessed by MOA employees and vendors via the existing Gate 6 security checkpoint. The proposed project will not be adding public parking on Level 0. MOA employee parking is being reconfigured within the project area, and access will be via the proposed entrance from Killebrew Drive. The project will restore 2 parking spaces to public parking on Level 1 at the location of the existing dry cooler, immediately south of the transit station escalator building.

The proposed project does not generate more parking demand. A goal of the project with the MOA was not to reduce MOA employee and vendor parking. To achieve that goal, 21 parking spaces are proposed along the ring road adjacent to the lower level of the LL Bean anchor building. See the following summary:

	Existing Parking Spaces	Proposed Parking Spaces	Net Parking Loss
Green Lot	142	98	-44
Blue Lot	165	172	+7
Yellow Lot	45	44	-1
Management Lot	5	23	+18
LL Bean Ring Road	0	21	+21
Existing Dry Cooler	0	2	+2
Total	**357**	**364**	**+3**

The net parking impact of the project is 3 parking spaces gained.

Metro Transit is contemplating a second LRT platform located west of the existing platform. Among the many issues that this second LRT platform creates, it has an impact on the Level 0 MOA employee and vendor parking. It is anticipated that a potential future second LRT

platform will remove an additional 56 parking spaces.

The City of Bloomington has directed this project to provide no net loss of parking and consider parking impacts associated with the potential second LRT platform during that future potential project.

H. STORM WATER MANAGEMENT

Most of this project is located under the MOA East Parking Ramp. The upper floors of the parking ramp drain to storm sewer and the lowest level of the ramp, Level 0, drains to the sanitary sewer. The proposed land disturbance of improvements outside the parking ramp will not exceed one acre and result in a decrease in the impervious surface area. The resulting storm water rate and volume would decrease. Section IV, 4A of the City of Bloomington Surface Water Management Plan does not apply to this project.

Area Impacted Outside the Parking Ramp	0.96 acres
Impervious Area before Project	0.67 acres
Impervious Area after Project	0.52 acres

Because the proposed land disturbance of improvements outside the parking ramp will not exceed one acre, the threshold for obtaining and NPDES General Storm Water Permit for Construction Activity (CSW Permit) will not be met, and therefore no CSW Permit will not be required. This has been confirmed by the MPCA.

Roof leaders for the East Parking Ramp will be rerouted within the proposed Transit Station and discharge to existing storm sewer below Level 0. The area drains at Level 0 will discharge to the sanitary sewer that is routed through a flammable waste trap.

There are a number of locations where storm sewer connections are proposed for catch basin modifications in 24th Avenue South and Killebrew Drive. These will require the construction of manholes over the existing large storm sewer. Catch basins will be 2x3 inlets.

All RCP and PVC storm sewer lines under the proposed Transit Station building will be excavated and replaced with new restrained joint DIP Class 52 pipe. Construction joints will be constructed at the material transitions.

I. UTILITIES

1. Sanitary Sewer

The proposed Transit Station 8" sanitary sewer service will connect to the existing 21" RCP sanitary sewer main in the northbound lanes of 24th Avenue South. An inspection manhole will be constructed just east of the building. The service will tie into an existing manhole in 24th Avenue South. This line may be horizontally directionally drilled.

All PVC sanitary sewer lines under the proposed Transit Station building will be excavated and replaced with new restrained joint DIP Class 52 pipe. Construction joints will be

constructed at the material transitions.

2. Watermain

The domestic water and fire protection water that serve the existing Transit Station will be extended to the proposed Transit Station building. The existing 12" private watermain that is located under the proposed Transit Station building will be offset west and installed in a 24" steel casing pipe. 12" isolation gate valves will be installed on the north and south sides of this casing. An existing water service to the building will be removed. A new 3" domestic water service is required north of the proposed Transit Station building. Refer to mechanical.

An existing private fire hydrant located near the existing loading dock will need to be relocated to accommodate the construction of the proposed Transit Station building. A new tapping sleeve, tapping valve, 6" hydrant lead, and relocated hydrant assembly will be installed south of the current location in a parking island south of the new loading dock. There are currently no fire hydrants on the west side of 24th Avenue South or east of the LRT platform. The City has requested a public fire hydrant on the west side of 24th Avenue South near the busway entrance. This will prevent the Fire Department from running fire hose across 24th Avenue South in an event. This new hydrant will connect to existing 12" CIP watermain located in the northbound lanes. Modification of the utility easement may be required.

There are a number of places that overhead dry fire protection lines will need to be sleeved through the new walls of the proposed Transit Station.

3. Private Utilities

The new Transit Station sub-fed from an existing Mall of America electric service, so coordination with Xcel Energy on a new service will not be required. The existing transformers on the south side of the East Ramp, adjacent to the new access point along Killebrew Drive, may require review with Xcel for location and depth of the primary underground distribution lines. A design coordination meeting with Xcel will be scheduled after 90% construction documents are prepared.

Other private communication and data utilities will be relocated from the existing Transit Station to the new Transit Station. There may be impacts to existing private utilities with the improvements in 24th Avenue South and Killebrew Drive. A design coordination meeting with CenturyLink, Comcast, CenterPoint, and other private utility companies that serve the area will be scheduled after 90% construction documents are prepared.

The existing Metro Transit private utility infrastructure for the Transit Station, bus gates, and LRT (both platform and LRT traction power, signal, and communication utilities) are being coordinated with the Metro Transit internal functional groups.

J. CONSTRUCTION PHASING

The existing bus operations will be temporarily relocated to the existing MOA Employee Blue Lot, in the southeastern corner of the Level 0 parking ramp for the duration of the project. This relocation of bus operations will occur immediately upon commencement of construction, which

will allow the contractor to have almost complete access to all work areas on Level 0. Temporary pedestrian access routes will be provided from the existing transit station to the temporary bus gates. Temporary driver facilities will also be provided.

We anticipate that due to the timing of the project bidding, construction will commence in the winter months. Partial demolition of the existing transit station, and construction of the new transit station will commence upon notice to proceed, utilizing construction enclosures and heating, as necessary. The civil removals and new work will commence during the typical construction season. Once the new bus gates are substantially completed, bus operations will be permanently relocated to the new operations area, and the temporary facilities will be removed.

K. ATTACHMENTS (to the Project Narrative)

- Attachment A - Technical Memorandum - Metro Transit – MOA Transit Station Renovations Traffic Study, dated May 24, 2016

Attachment A

Technical Memorandum
Metro Transit – MOA Transit Station Renovations Traffic Study
May 24, 2016

DRAFT Technical Memorandum

To: Thomas Bowlin, PE
City of Bloomington

From: Matthew Jensen, Project Manager, PE
Emily Gross, Senior Engineer, PE

Date: May 24, 2016

Subject: Metro Transit – MOA Transit Station Renovations Traffic Study

Introduction

As requested, a traffic study has been completed for the Mall of America (MOA) Transit Station project, which is generally located in the northwest quadrant of the Killebrew Drive/24th Avenue intersection in the City of Bloomington. Currently all transit buses and MOA commercial vehicles access the MOA via the security check-point at Gate 6, which is located on 24th Avenue between 82nd Street and Killebrew Drive. MOA employees can also access at Gate 6, but non-authorized vehicles are not permitted to use this access. As part of this study, alternative access locations for transit buses and/or MOA commercial vehicles/employees will be evaluated. The main objectives of the study are to review existing operations, evaluate potential traffic impacts of concept scenarios, and recommend improvements to ensure safe and efficient operations of the local roadway system. The following information provides the assumptions, analysis results, and study recommendations offered for consideration.

Existing Conditions

The existing conditions were reviewed to establish a baseline to compare and better determine the traffic impacts of the build concept scenarios. The evaluation of existing conditions includes peak hour intersection turning movement counts, field observations, vehicle inspection service times, and an intersection capacity analysis.

EXISTING LAYOUT

As shown in Figure 1, Gate 6 is located on 24th Avenue between 82nd Street and Killebrew Drive and serves as the MOA security check-point location. The check-point is located on 24th Avenue and not internal to the site. Only authorized vehicles (transit buses and MOA commercial/employee vehicles) are permitted to enter at Gate 6. All rejected/errant vehicles are directed back onto 24th Avenue.

DATA COLLECTION

Weekday p.m. and Saturday midday peak intersection turning movement counts were collected at the 24th Avenue/Gate 6 intersection on Tuesday, February 9, 2016 and Saturday, February 6, 2016. For use in the analysis, previously collected traffic volumes at the remaining study intersections of 24th Avenue/82nd Street, 24th Avenue/Killebrew Drive, and 22nd Avenue/Killebrew Drive were reviewed and adjusted accordingly based on the updated count information at the Gate 6 intersection.

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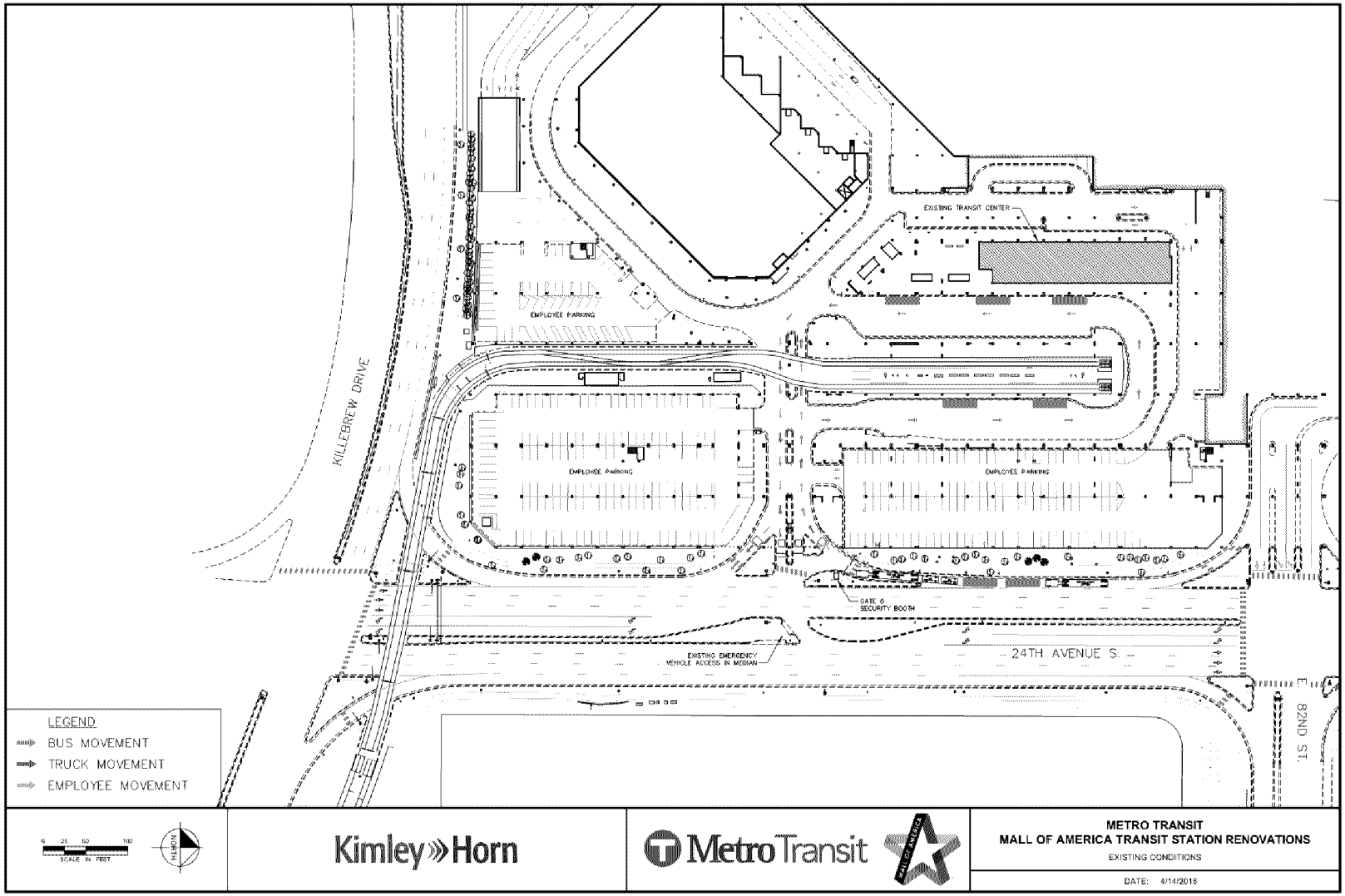
Figure 1: Existing MOA Transit Station Layout



Vehicle type at Gate 6 were also collected. Currently, Gate 6 is used by transit buses and MOA commercial/employee vehicles. A summary of the entering vehicle count data during the weekday p.m., Saturday midday, and the delivery peak hours is shown in Table 1. The delivery peak hour (which occurs during the weekday a.m. peak period) was included since the peak count for MOA commercial/employee vehicles occur at this time. Traffic volumes on 24th Avenue and Killebrew Drive are significantly lower during the weekday a.m. peak period than during the weekday p.m. and Saturday midday peak periods. Therefore the weekday a.m. peak hour was not analyzed. It should be noted that all vehicles that were rejected (i.e. turned away) are also included in the table.

Table 1. Entering Vehicles at Gate 6

Vehicle Type	Weekday P.M. Peak Hour (1)	Saturday Midday Peak Hour (1)	Gate 6 Entering Peak Hour (1)
Bus	32	25	32
Commercial Vehicle	2	3	28
MOA Employees	16	81	85
Rejected Vehicles (2)	1	7	2
Total Entering	**50**	**109**	**145**

(1) Counts were collected on Tuesday, February 9, 2016 and Saturday, February 6, 2016

(2) Majority of rejected vehicles were errant passenger vehicles

Vehicle inspection service times at Gate 6 were also collected. Service time represents the time from when a vehicle arrives at the gate until the time the vehicle is cleared and able to enter the facility. This time does not include any time waiting in a queue. As shown in Table 2 the service times vary by vehicle type. These times were verified by data provided by the MOA as well as field observations. This information was used in the calibration of existing traffic operations model.

Table 2. Gate 6 Vehicle Type Inspection Service Time

Vehicle Type	Average Service Time (seconds)
Bus	9
Commercial Vehicle	63
Passenger Car	11

FIELD OBSERVATIONS

Within the study area, 24th Avenue is generally a six-lane divided roadway with turn lanes. Currently traffic signals are located at all study intersections. The Blue Line LRT crosses 24th Avenue on the north approach of the Killebrew Drive intersection.

Observations were completed on Tuesday, February 9 during the a.m. and p.m. peak periods and on Saturday, February 6, 2016 during the midday peak period to identify queues, delays, and service times. Supplemental information and photos were also provided by the City of Bloomington. Based on a review of this data, southbound queues at the Gate 6 entrance occasionally extend to 82nd Street, and infrequently farther to the north. These southbound queues develop during the peak delivery time periods, which typically occurs during the weekday a.m. peak period. During the field observations collected for this study, southbound queues from Gate 6 did not extend more than four vehicles.

It should be noted that queues from the internal LRT crossing were observed to extend back to Gate 6. During the Saturday midday peak the internal queues from the LRT crossing prevented four passenger cars and four transit buses from entering. These queues were also observed during the weekday p.m. and prevented two passenger cars from entering.

EXISTING ISSUES

Transit buses, MOA commercial vehicles, and MOA employees enter via the same location. Commercial vehicles have significantly longer service times at the security check-point, which adds delay to transit buses and employees entering at Gate 6. This makes it difficult to provide consistent and reliable transit services.

During peak delivery time periods, Gate 6 queues on 24th Avenue have been observed to extend to 82nd Street and periodically extend mid-way to Lindau Lane. These queues impact traffic operations on 24th Avenue and adds delay to vehicles waiting to access Gate 6.

Commercial vehicles accessing the internal MOA roadway need to cross the Blue Line LRT tracks internal to the site. This occasional results in internal queues extending into Gate 6. These internal queues also block buses from exiting at Gate 6.

INTERSECTION TRAFFIC OPERATIONS

An operations analysis was conducted to determine how traffic operates at the study intersections under existing conditions. PTV Vissim (Version 8.00-09) was used to provide a consistent analysis tool between existing and future conditions, and Vissim is a good tool to analyze LRT operations and scenarios where service times vary by vehicle type.

Results of the weekday p.m. and Saturday midday peak hours shown in Table 3 indicate that all study intersections currently operate at acceptable levels of service except at the 22nd Avenue/Killebrew Drive intersection during the Saturday midday peak hour which operates at LOS E. Since the MOA Transit Station project is not expected to significantly impact traffic operations at the 22nd Avenue/Killebrew Drive intersection, no mitigation was assumed as part of this study. However, the City of Bloomington and SRF are currently working on the South Loop District Traffic Study Update. This study will identify if mitigation is needed and if so what improvements should be implemented.

Table 3. Existing Peak Hour Capacity Analysis

Vehicle Type	Weekday P.M. Peak Hour		Saturday Midday Peak Hour		Gate 6 Entering Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
24th Avenue/82nd Street	B	15 sec.	B	19 sec.	C	28 sec.
24th Avenue/Gate 6	A	4 sec.	A	3 sec.	C	30 sec.
24th Avenue/Killebrew Drive	C	32 sec.	C	34 sec.	C	32 sec.
22nd Avenue/Killebrew Drive	C	22 sec.	E	61 sec.	C	22 sec.

Consistent with field observations collected for this study during the peak hours, southbound queues at Gate 6 did not extend to 82nd Street (max queues were three to four vehicles). In addition an average bus delay at Gate 6 was found to be 22 seconds during the weekday p.m. and 28 seconds during the Saturday midday peak. Detailed traffic operations for the existing traffic operations analysis are provided in the appendix.

To replicate a scenario where Gate 6 southbound entrance queues extend to 82nd Street, the Gate 6 entrance counts during the weekday p.m. peak hour scenario were modified to match the peak Gate 6 count. During the traffic simulation under this scenario, southbound queues at Gate 6 were observed to extend to 82nd Street and the average bus delay at Gate 6 was 242 seconds (approximately four minutes). Since this is the scenario that this project is intended to mitigate, the build analysis was tested based on this higher volume set.

Concept Review

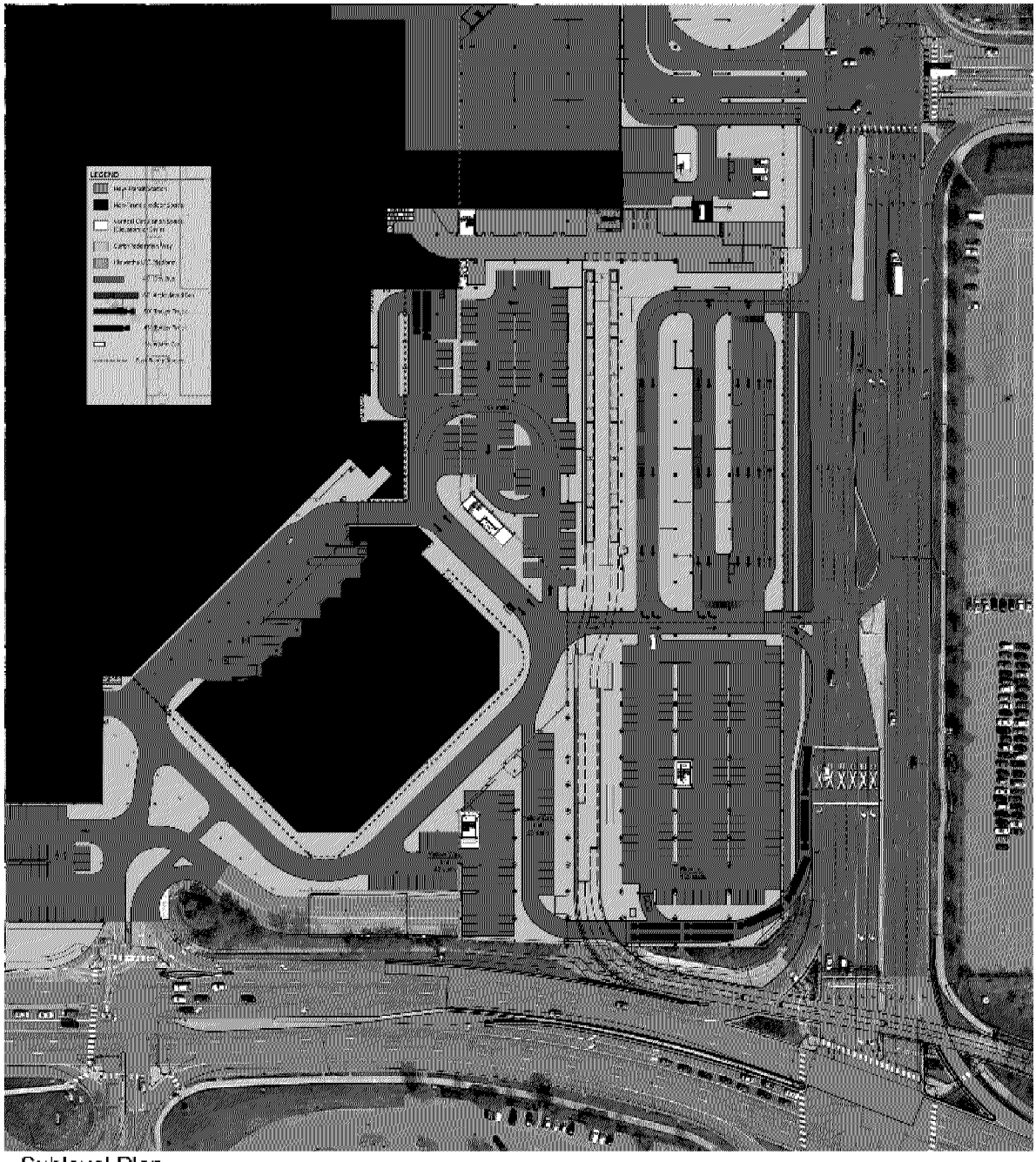
One of the primary goals of this project is to separate the Metro Transit buses from the MOA commercial/employee vehicles. As mentioned under existing conditions, currently transit buses and MOA commercial/employee vehicles access at the same locations and go through the same security check-point. If buses were separated from other MOA vehicles this would reduce the delay and provide more reliable and consistent service.

A concept was developed as part of the MOA Transit Station Master Planning work. As shown in Figure 2, the Master Plan concept provides a transit only access on 24th Avenue between 82nd Street and the existing Gate 6. A separate authorized MOA only access for commercial vehicles/employees is provided on 24th Avenue between Gate 6 and Killebrew Drive. The existing Gate 6 access is reconfigured to exit only under this concept.

This study reviewed the proposed Master Plan concept from a design feasibility perspective, and application of additional site and survey data. While the MOA Master Plan concept met many of the project goals, it was determined that the LRT clearance heights needed for the MOA delivery access are not sufficient. The existing OCS contact wire height is 13'-8" near the fascia beam at the south end of the MOA parking ramp. A 14'-6" clearance requirement is needed for overheard physical obstructions and a minimum OCS contact wire height of 16'-0" is required to satisfy NESC electrical clearances. It was further determined that lowering the LRT tracks to provide the needed height was not a feasible option. Therefore, this concept was dismissed from further review. To meet the LRT clearance heights, alternative access locations for MOA commercial vehicles were evaluated and are discussed in the next section.

Concepts were evaluated based on the peak Gate 6 entrance count scenario. Since entering/exiting volume into the MOA Transit Station area is not expected to significantly increase, traffic volumes were not adjusted. However, year 2030 traffic volumes published from previous studies in the South Loop area were considered when evaluating concept alternatives (existing and year 2030 traffic volumes are provided in the appendix). As previously mentioned, the City of Bloomington and SRF are currently working on the South Loop District Traffic Study Update. Results from this study may impact future intersection design on 24th Avenue and/or Killebrew Drive.

Figure 2: MOA Transit Station Layout – Master Plan Recommendation



Development of the MOA Transit Station concepts was an iterative process that took into consideration design feasibility and impacts to traffic on 24th Avenue and Killebrew Drive. The focus of this technical memorandum is to identify traffic impacts to the external roadway network.

PRELIMINARY CONCEPTS

Four preliminary concepts were evaluated to determine where access should be located and the general internal circulation. These concepts were evaluated with project staff as well as the MOA and City of Bloomington. A few modifications are consistent for all four preliminary concepts including the location of the transit station/bus loading area, removal of the channelized eastbound right-turn at the 24th Avenue/82nd Street intersection, and the new transit only access on 24th Avenue between 82nd Street and the existing Gate 6 intersections.

Concept A

Concept A (shown in Figure 3) proposes to provide a transit only access on 24th Avenue between 82nd Street and Gate 6. Authorized MOA commercial/employee vehicles would enter via a new security check point near the 22nd Avenue/Killebrew Drive intersection. The existing Gate 6 intersection would be reconfigured to exit only.

Under Concept A, MOA commercial and employee vehicles waiting at the security gate will queue into the internal roadway system. These queues will block access for vehicles exiting the MOA East Parking Ramp. There is also the potential for these queues to frequently extend into the 22nd Avenue/Killebrew Drive intersection. Storage of vehicles on Killebrew Drive waiting to access the security check point would impact traffic operations on Killebrew Drive. This location would also be challenging to properly and safely accommodate rejected vehicles. Rejected vehicles would likely need to travel through the MOA internal network which poses of significant security risk concern for the MOA.

Concept A was removed from further consideration. No detailed traffic operational analysis was conducted on this option.

Concept B

Concept B (shown in Figure 4) proposes to provide a transit only access on 24th Avenue between 82nd Street and Gate 6. Authorized MOA commercial/employee vehicles would enter via a new security check point access just south of where vehicles currently access at Gate 6. The existing Gate 6 intersection would be reconfigured to exit only.

Under Concept B, the security check-point is located internal to the site. There is only space for one lane of storage internally for MOA commercial/employee vehicles going through the security check point. Queues from vehicles waiting to access, will extend onto 24th Avenue and likely block vehicles exiting at Gate 6. Once through the security check point, commercial vehicle turning radius paths cannot easily navigate the columns. This location would also be challenging to properly and safely accommodate rejected vehicles.

Concept B was removed from further consideration. No detailed traffic operational analysis was conducted on this option.

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Figure 3: MOA Transit Station – Concept A

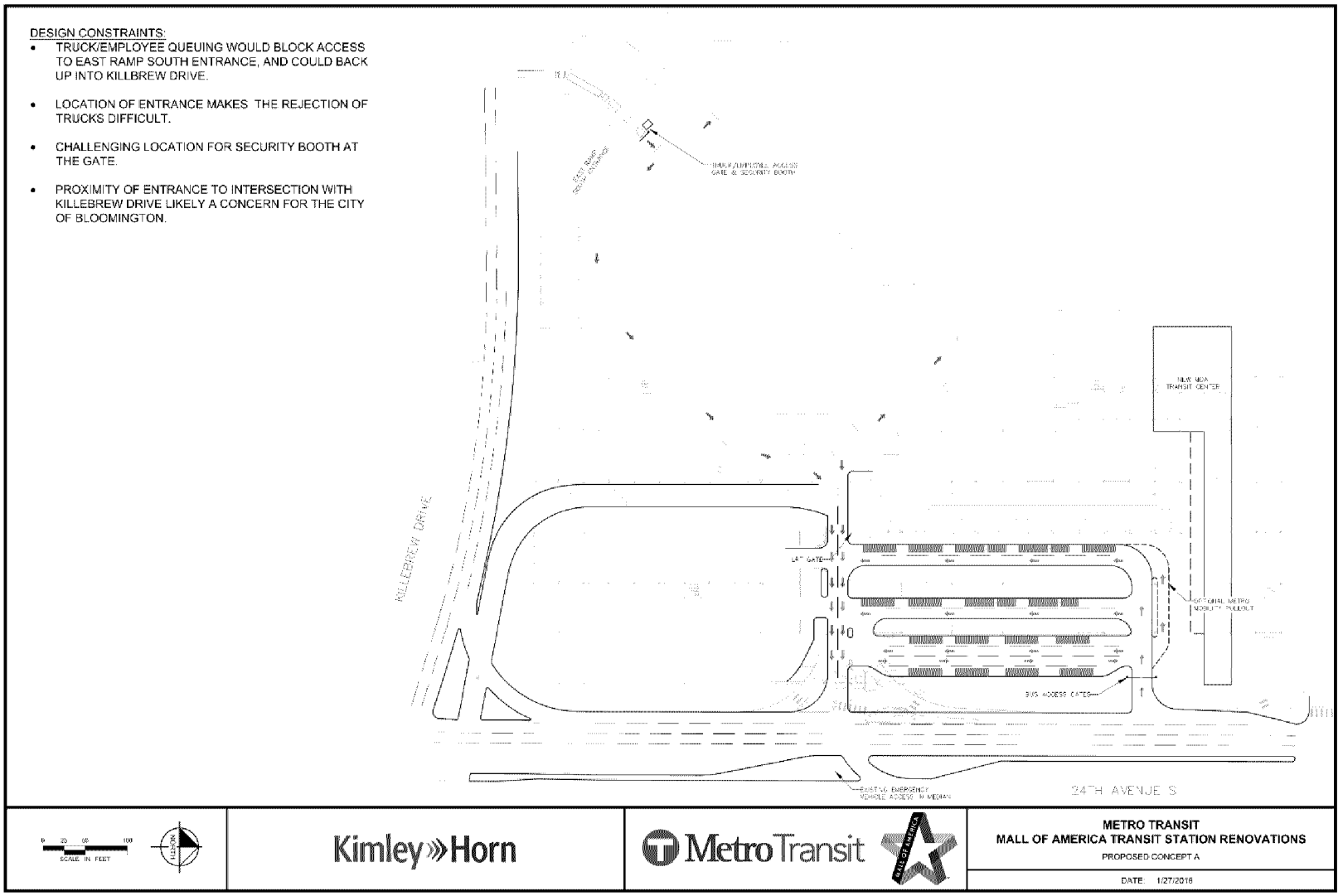

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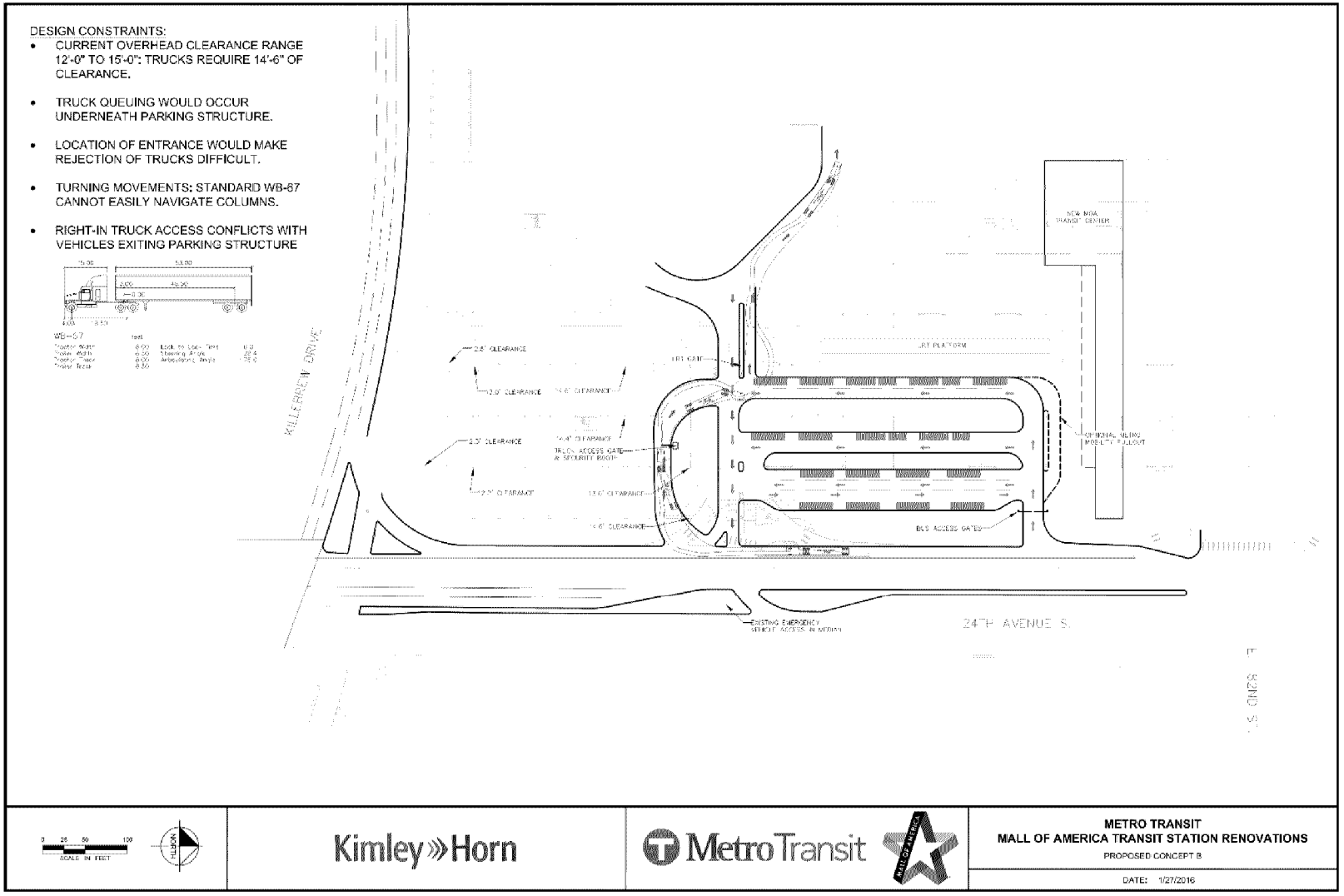
Figure 4: MOA Transit Station – Concept B



Concept C

Concept C (shown in Figure 5) proposes to provide a transit only access on 24th Avenue between 82nd Street and Gate 6. Authorized MOA commercial/employee vehicles would enter via a new security check point access on Killebrew Drive approximately 300 feet west of 24th Avenue. The MOA commercial/employee access will provide two lanes of storage internally. However, it is assumed that only one security guard would be present so both lanes are not checked concurrently under this scenario. The existing Gate 6 intersection would be reconfigured to exit only.

A traffic operations analysis was conducted on this alternative to better understand the impact to the local roadway network. The weekday Gate 6 entering peak hour traffic volume set was used to evaluate Concept C since this is the scenario that this project is intended to mitigate. Results of the traffic operations analysis shown in Table 4 indicate that all intersections will continue to operate at an acceptable level of service, with negligible impacts to traffic operations at the 24th Avenue/Killebrew Drive and 22nd Avenue/Killebrew Drive intersections. With the removal of the security check point at Gate 6, the 24th Avenue/82nd Street and 24th Avenue/Gate 6 intersections will operate better than existing conditions (under the peak Gate 6 count scenario). It should be noted that the average bus delay is also provided in Table 4. This analysis assumed that the buses would have a similar inspection service time as was observed under existing conditions.

Table 4. Concept C Gate 6 Entering Peak Hour Capacity Analysis

Vehicle Type	Gate 6 Entering Peak Hour	
	LOS	Delay
24th Avenue/82nd Street	B	15 sec.
Average Bus Delay at 24th Avenue Access	B	18 sec.
24th Avenue/Gate 6	A	4 sec.
24th Avenue/Killebrew Drive	C	31 sec.
22nd Avenue/Killebrew Drive	C	22 sec.

This concept provides many benefits from a traffic operations perspective, including:

- Bus Evaluation
  - Bus delay decreases from 242 seconds/bus to 18 seconds/bus.
  - Buses do not cross LRT tracks.
  - Exiting/circulating buses do not conflict with entering vehicles.
  - Southbound right-turn into new bus access has adequate storage.
    - Some deceleration of buses will occur in thru lane on 24th Avenue.
- MOA commercial/employee vehicle access
  - MOA commercial/employee vehicles do not cross internal LRT tracks on entry.
    - MOA delivery vehicles cross LRT tracks at Killebrew Drive/24th Avenue.

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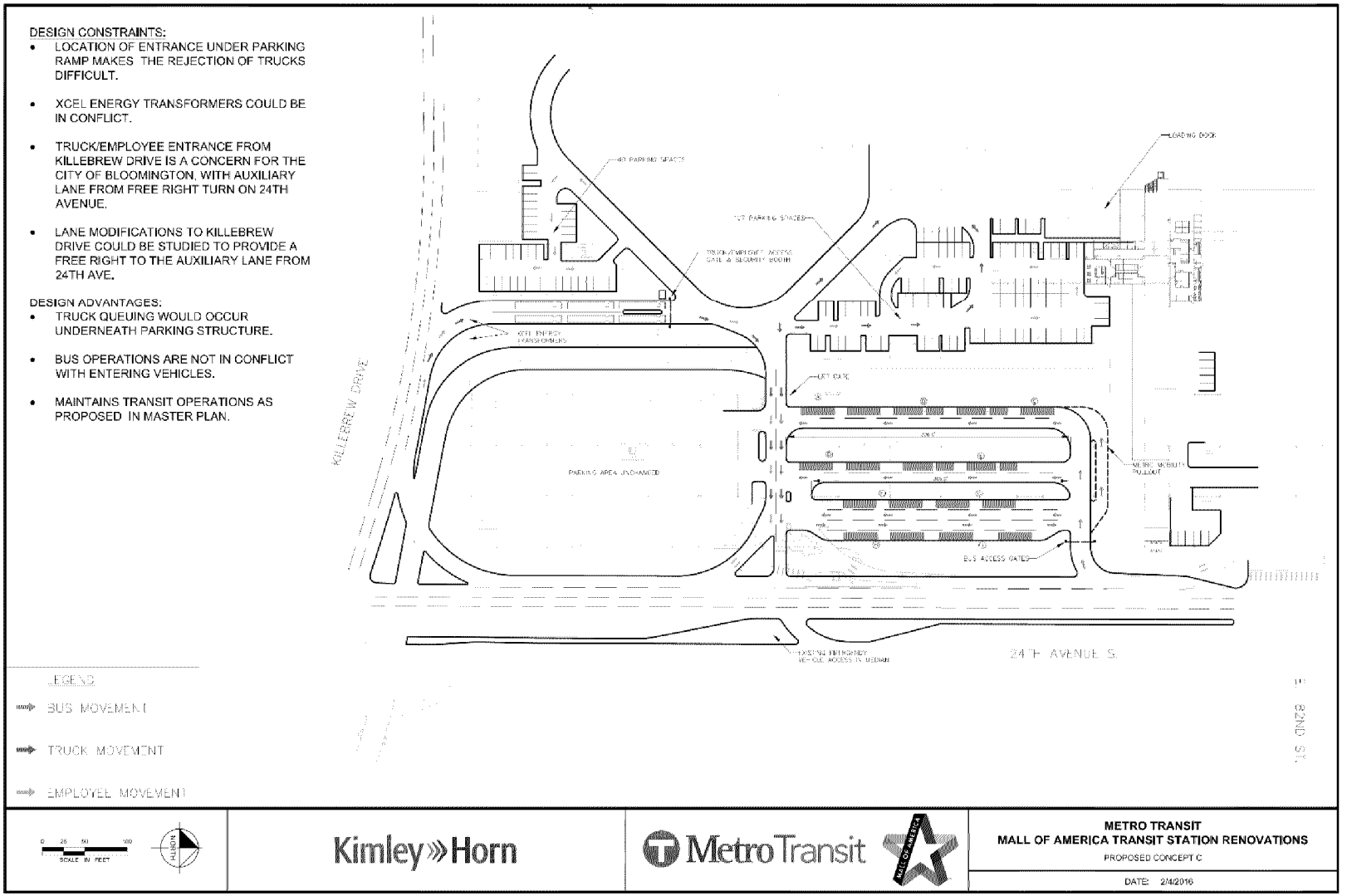
Figure 5: MOA Transit Station – Concept C



- Adequate storage to accommodate queues internally.
  - Max queues during Gate 6 enter peak hour entering conditions range from 175 to 200 feet (230 feet of storage provided for each lane).
- Ability to service two commercial/employee vehicles concurrently if needed.

- Minor increase in southbound right-turn delay (2 sec.) at Killebrew Drive/24th Avenue from additional commercial/employee vehicles making this movement

Concerns from a traffic perspective are listed below:

- MOA commercial/employee vehicle access
  - Rejected vehicles need to circulate internally. This poses a security risk concern to MOA; significant modifications would be needed to enhance security of building.
  - Errant vehicles may enter at either the transit access on 24th Avenue or MOA authorized access on Killebrew Drive.
    - Since the check points are not on-street and are internal to the site, additional consideration is needed to determine how security handles vehicles that unintentionally enter these access points.
  - Delivery vehicles making a right-turn into the new MOA authorized access on Killebrew Drive will need to decelerate in the lane to make the turn.
    - Access is provided from the westbound auxiliary/acceleration lane, which is an add-in lane from the free southbound right-turn at the 24th Avenue/Killebrew Drive intersection. Vehicles currently can make this turn at higher speeds. There are also some sight distance issues.

In order to address the concerns, refined/modified Concept C options were evaluated. These options considered modifying the southbound free-right turn at the 24th Avenue/Killebrew Drive intersection to be for MOA authorized vehicles only and moving all other southbound right-turning vehicles to the make the turn at the intersection. In addition, an on-street security check-point on Killebrew Drive was considered to better handle rejected vehicles and the MOA security concerns. However, these concepts were removed from further consideration after discussion with City staff for the following reasons:

- Based on discussions with City staff, for both the Killebrew Drive internal and the on-street security check-point concepts, the free southbound free right-turn needs to be maintained at the 24th Avenue/Killebrew Drive intersection to provide for free flow traffic conditions during gate closure days (i.e. this right-turn cannot be signalized and cannot be exclusive to MOA authorized vehicles only).
  - It should also be noted that the general public has been programmed to use this movement as a free right for more than 20 years. It would be difficult to restrict or prevent use of the free right turn if this movement were no longer free.

- Under the Killebrew Drive on-street check-point concept alternative:
  - Assuming the free right-turn movement is maintained, southbound vehicles are directed into an add-lane which leads to the on-street security access. There is not sufficient storage available between the proposed on-street security check point on Killebrew Drive and the southbound free right-turn for vehicles to safely weave out of the security check point queueing lane.
  - Queues from the proposed on-street security check point access are expected to extend beyond/onto the LRT tracks. City staff is not comfortable with the safety implications of these queues. Additional signage/signal timing modifications were discussed, however with City staff's previous comment that the free-right needs to be maintained for all modes of traffic, the Killebrew Drive on-street configuration was determined not to be feasible.

Concept C was recommended for further consideration.

Concept D

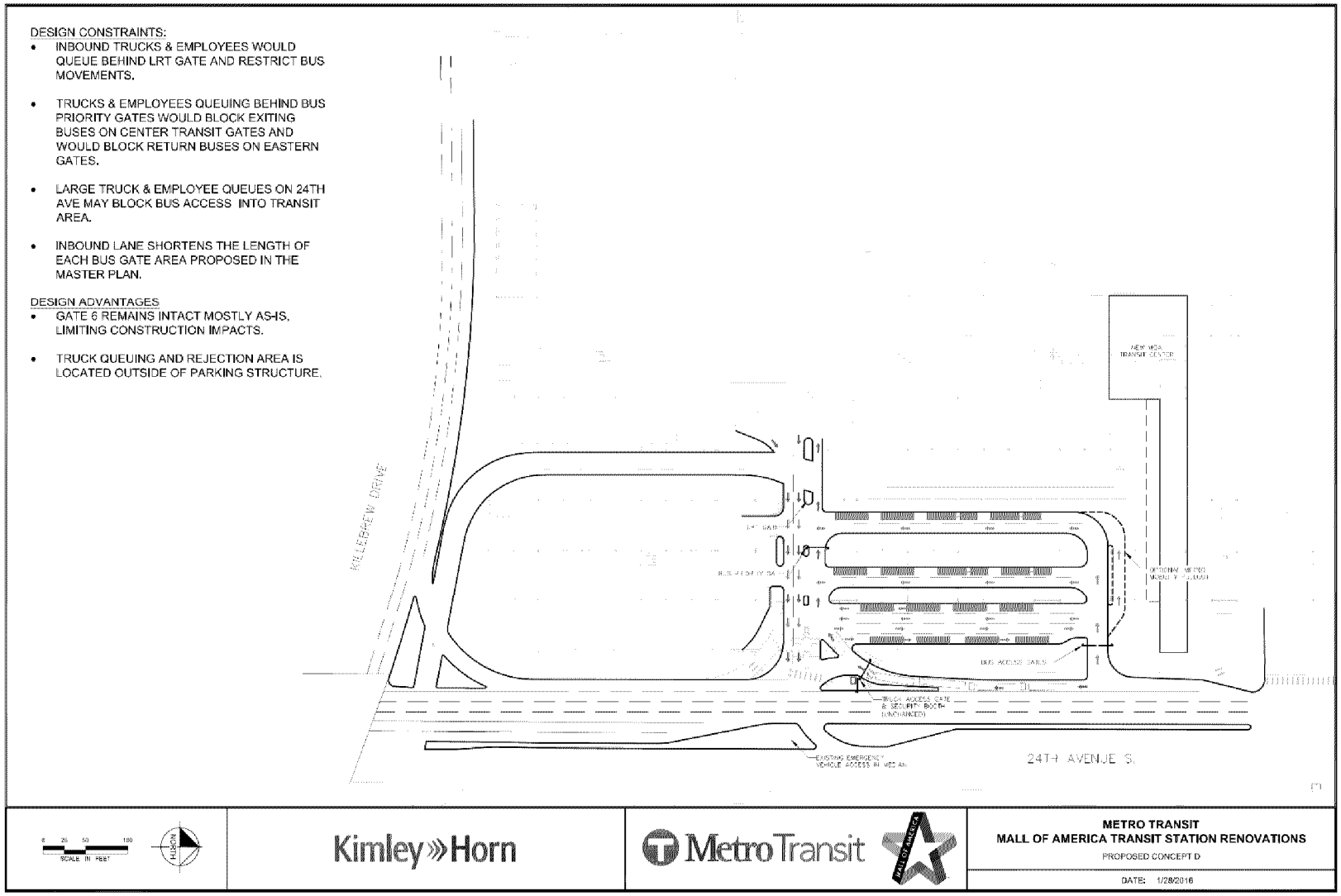
Concept D (shown in Figure 6) proposes to provide a transit only access on 24th Avenue between 82nd Street and Gate 6. Authorized MOA commercial/employee vehicles would enter at the current Gate 6 location.

A traffic operations analysis was conducted on this alternative to better understand the impact to the local roadway network. The weekday Gate 6 entering peak hour traffic volume set was used to evaluate Concept D since this is the scenario that this project is intended to mitigate. Results of the traffic operations analysis shown in Table 5 indicate that all intersections will continue to operate at an acceptable level of service, with negligible impacts to traffic operations at the 24th Avenue/Killebrew Drive and 22nd Avenue/Killebrew Drive intersections. With the removal of the security check point at Gate 6, the 24th Avenue/82nd Street and 24th Avenue/Gate 6 intersections will operate better than existing conditions (under the peak Gate 6 count scenario). It should be noted that the average bus delay is also provided in Table 5. This analysis assumed that the buses would have a similar inspection service time as was observed under existing conditions.

Table 5. Concept D Gate 6 Peak Hour Capacity Analysis

Vehicle Type	Gate 6 Entering Peak Hour	
	LOS	Delay
24th Avenue/82nd Street	B	17 sec.
Average Bus Delay at 24th Avenue Access	B	18 sec.
24th Avenue/Gate 6	A	3 sec.
24th Avenue/Killebrew Drive	C	32 sec.
22nd Avenue/Killebrew Drive	C	22 sec.

Figure 6: MOA Transit Station – Concept D



This concept provides many benefits from a traffic operations perspective, including:

- Bus Evaluation
  - Bus delay decreased from 242 seconds/bus to 21 seconds/bus.
  - Buses do not cross LRT tracks.
  - Southbound right-turn into new bus access has adequate storage.
    - Some deceleration of buses will occur in thru lane on 24th Avenue.
- MOA commercial/employee vehicle access
  - Dedicated turn lane/deceleration lane for delivery vehicles to enter facility.
  - Vehicle rejection can occur on-street; vehicles would not need to circulate internally.

Some of the concerns from a traffic perspective are listed below:

- MOA commercial/employee vehicle access
  - Max southbound queues from Gate 6 extend to the bus access, preventing buses from entering.
  - Delivery vehicles cross LRT tracks within facility.
- Bus Evaluation
  - Two way traffic at Gate 6 increases the number of conflict points and increases the delay for buses exiting the Transit Station
  - Delivery vehicles queuing at the LRT track will block buses from circulating to exit

Concept D was removed from further consideration.

Proposed Concept

Based on a review of the preliminary concepts, Concept C was selected for further development. Additional site and survey data was provided to modify the concept based on design feasibility and constructability. The project team worked with the MOA and City of Bloomington to address concerns identified under the preliminary concept review. Modifications to the preliminary Concept C to develop the preferred concept include:

- Removal of the westernmost southbound through lane on 24th Avenue.
  - Improves the sight distance and reduces the turning speed for vehicles making a southbound right-turn at the 24th Avenue/Killebrew Drive intersection.
  - Provides space for a drop-off only and bus bridge pullout location on 24th Avenue between the bus access and Gate 6.
- Bus access has been modified based on the grade change.
  - It is assumed that technology will be added at the bus access gate so that the gates will be open prior to the bus arriving. For purposes of the traffic analysis, the inspection service time delay for transit buses accessing at this location was assumed to be zero seconds.

- It should be noted that a test was completed to determine the traffic impacts if no technology is added or there is a technical issue at the gate. Assuming an average bus service time of nine (9) seconds (existing), the average delay is approximately 20 seconds and the max queue is estimated to be 45 feet.

- Complete separation of transit buses and MOA commercial/employee vehicles.
  - Transit buses will exit from a bus-only lane at the 24th Avenue/Gate 6 intersection. Buses would be permitted to make both a left-turn to northbound 24th Avenue and a right-turn towards southbound 24th Avenue.
  - MOA commercial/employee vehicles exiting will not be permitted to make a left-turn; all vehicles will make a right-turn to southbound 24th Avenue.

- The security check-point is located closer to the Killebrew Drive for security reasons. To provide sufficient storage for MOA commercial/employee vehicles, three storage lanes are provided (a total of 500 feet of internal storage provided – western and center lane provide approximately 180 feet of storage and the eastern employee only lane provides approximately 140 feet of storage..
  - MOA employees will be able to access via a card reader, which decreases the delay employee vehicles will experience at the security check point and reduces internal queues.
  - For purposes of the traffic analysis, one MOA staff was assumed to be located at the security check point. There is opportunity to service two commercial vehicles concurrently if needed, but it would require more than one security check-point staff.
  - Queues at the security check-point are not expected to extend to Killebrew Drive.

A traffic operations analysis was conducted for the preferred alternative shown in Figure 7. Once again the weekday Gate 6 entering peak hour traffic volume set was used for evaluation. Results of the traffic operations analysis shown in Table 6 indicate that all intersections will continue to operate at an acceptable level of service, with negligible impacts to traffic operations at the 24th Avenue/Killebrew Drive and 22nd Avenue/Killebrew Drive intersections. It should be noted that the average bus delay is also provided in Table 6.

Table 6. Preferred Concept Gate 6 Entering Peak Hour Capacity Analysis

Vehicle Type	Gate 6 Entering Peak Hour	
	LOS	Delay
24th Avenue/82nd Street	B	15 sec.
Average Bus Delay at 24th Avenue Access	A	1 sec.
24th Avenue/Gate 6	A	5 sec.
24th Avenue/Killebrew Drive	C	32 sec.
22nd Avenue/Killebrew Drive	C	22 sec.

Metro Transit – MOA Transit Station Renovations
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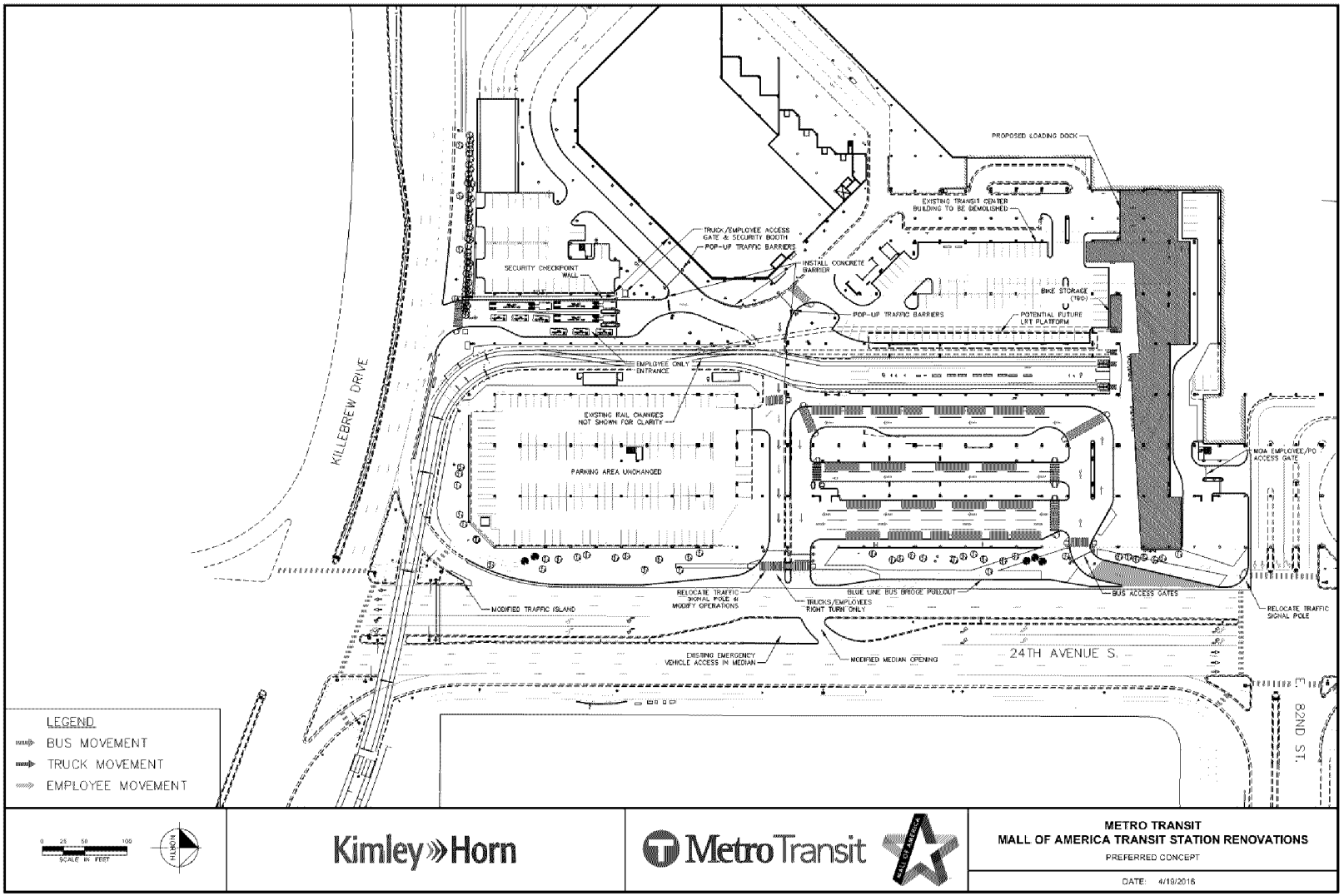
Bloomington, MN

Figure 7: MOA Transit Station – Preferred Concept



Conclusions

Based on the traffic operations analysis, the following study summary and conclusions are offered for consideration:

EXISTING

- Transit buses, MOA delivery vehicles, and MOA employees enter via the same location (Gate 6). Delivery vehicles have significantly longer service times at the security check-point, which adds delay to transit buses and employees entering at Gate 6. This makes it difficult to provide consistent and reliable transit services.
- During peak delivery time periods, Gate 6 queues on 24th Avenue have been observed to extend to 82nd Street and outside this study these queues have been observed to extend past 82nd Street. These queues impact traffic operations on 24th Avenue and adds delay to vehicles waiting to access Gate 6.
- Inbound MOA delivery trucks accessing the internal MOA roadway need to cross the Blue Line LRT tracks internal to the site. This occasional results in internal queues extending into Gate 6. These internal queues also block buses from exiting at Gate 6 and can create queuing onto 24th Avenue.

CONCEPT EVALUATION

- The Master Plan concept was evaluated from a design feasibly perspective and found to not be a constructible option due to the LRT clearance heights needed for MOA delivery trucks. This concept was dismissed from further review.
- The project team developed four preliminary concept alternatives (A-D) for evaluation. These concepts proposed alternative access locations for the MOA commercial/employee vehicles.
    - Under all preliminary concepts that the transit bus services was relocated to provide a transit only access on 24th Avenue between 82nd Street and the existing Gate 6 intersections.
- Based on input provided by the project team, MOA, and City of Bloomington, preliminary Concept C was selected for further development. In general, Concept C proposes a new MOA commercial/employee access on Killebrew Drive approximately 300 feet west of 24th Avenue.
    - This concept was selected because it completely separates transit bus and MOA commercial/employee vehicles internal to the site. This significantly improves bus operations and reliability.
- The preferred concept is shown in Figure 7.

APPENDIX

_2016_PM_Existing
MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	218	37	215	33.6	C	26.1	C	22.0	C	223	218	-5
	Thru	12	37	214	38.4	D					13	12	-1
	Right	93	9	155	7.1	A					97	93	-4
Southbound	Left	73	17	181	33.8	C	14.4	B			72	73	+1
	Thru	10	17	178	34.7	C					11	10	-1
	Right	304	1	60	9.1	A					304	304	0
Eastbound	Left	211	26	109	33.9	C	24.1	C			209	211	+2
	Thru	224	21	113	26.1	C					224	224	0
	Right	112	0	30	1.6	A					117	112	-5
Westbound	Left	116	16	123	28.1	C	22.6	C			120	116	-4
	Thru	470	29	145	24.8	C					471	470	-1
	Right	86	0	31	3.5	A					89	86	-3

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	100	30	102	74.8	E	28.1	C	32.0	C	103	100	-3
	Thru	237	22	115	31.1	C					243	237	-6
	Right	202	0	0	1.5	A					197	202	5
Southbound	Left	9	2	25	57.8	E	23.7	C			8	9	1
	Thru	356	38	222	30.0	C					352	356	+4
	Right	247	22	230	13.4	B					251	247	-4
Eastbound	Left	109	29	103	68.7	E	27.7	C			105	109	4
	Thru	69	12	59	41.5	D					71	69	-2
	Right	212	0	0	2.1	A					210	212	2
Westbound	Left	470	81	302	50.1	D	42.7	D			489	470	-19
	Thru	328	32	125	34.9	C					328	328	0
	Right	27	1	24	10.3	B					27	27	0

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	371	1	56	1.9	A	2.6	A	3.5	A	375	371	-4
Southbound	Thru	570	3	95	3.2	A	4.5	A			583	570	-13
	Right	48	0	0	0.6	A					47	48	1
Eastbound	Left	35	8	63	31.2	C	16.9	B			35	35	0
	Right	32	0	7	1.3	A					33	32	-1

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	46	11	59	52.8	D	13.8	B	15.3	B	47	46	-1
	Thru	343	8	107	9.0	A					351	343	-8
	Right	14	0	0	1.4	A					15	14	-1
Southbound	Left	24	5	40	45.1	D	4.9	A			23	24	1
	Thru	536	5	103	4.5	A					545	536	-9
	Right	328	0	28	2.6	A					341	328	-13
Eastbound	Left	287	50	189	47.2	D	41.8	D			286	287	1
	Thru	8	2	24	47.3	D					7	8	1
	Right	41	0	7	3.6	A					43	41	-2
Westbound	Left	45	14	74	48.3	D	24.0	C			45	45	0
	Thru	9	3	29	54.2	D					10	9	-1
	Right	61	0	15	1.5	A					62	61	-1

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	53	14	60	56.0	E	7.4	A	9.7	A	58	53	-5
	Thru	630	4	90	3.3	A					642	630	-12
	Right	1	0	0	0.6	A					1	1	0
Southbound	Left	13	4	37	58.1	E	7.2	A			15	13	-2
	Thru	811	19	172	8.6	A					827	811	-16
	Right	295	0	0	1.0	A					283	295	12
Eastbound	Left	135	26	95	46.6	D	29.8	C			137	135	-2
	Thru	4	1	17	42.9	D					3	4	1
	Right	80	0	0	0.6	A					82	80	-2
Westbound	Left	1	1	9	51.3	D	10.9	B			2	1	-1
	Thru	8	2	24	58.3	E					9	8	-1
	Right	43	0	15	1.1	A					44	43	-1

Gate 6 Buses

Volume	Delay
(buses/hr)	(sec/bus)
32	22.2

_2016_SAT_Existing
MOA Transit Station
Arterial MOEs (Saturday MD Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	172	81	299	69.8	E	56.1	E	60.6	E	167	172	+5
	Thru	26	80	300	71.5	E					28	26	-2
	Right	89	38	241	25.3	C					85	89	+4
Southbound	Left	313	**671**	**1,084**	106.2	F	106.0	F			321	313	-8
	Thru	24	**671**	**1,084**	135.1	F					28	24	-4
	Right	737	**481**	**1,087**	105.0	F					743	737	-6
Eastbound	Left	407	52	194	42.6	D	29.9	C			404	407	+3
	Thru	538	50	266	25.1	C					540	538	-2
	Right	90	0	17	1.3	A					92	90	-2
Westbound	Left	45	13	83	52.2	D	32.9	C			47	45	-2
	Thru	387	38	165	40.1	D					388	389	+1
	Right	141	3	76	6.7	A					142	141	-1

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	134	26	106	47.8	D	32.5	C	33.7	C	132	134	+2
	Thru	183	21	100	36.7	D					185	183	-2
	Right	89	0	0	1.0	A					87	88	+1
Southbound	Left	17	3	36	42.9	D	23.6	C			15	17	+2
	Thru	202	45	**304**	39.6	D					195	202	+7
	Right	370	34	**315**	14.0	B					381	370	-11
Eastbound	Left	579	122	**545**	61.2	E	42.3	D			604	579	-25
	Thru	174	13	80	21.7	C					181	174	-7
	Right	183	0	0	2.1	A					182	183	+1
Westbound	Left	81	11	62	29.4	C	24.6	C			85	81	-4
	Thru	67	7	46	27.7	C					63	67	+4
	Right	35	1	26	7.4	A					37	35	-2

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	795	2	79	1.9	A	2.8	A	3.2	A	845	795	-50
Southbound	Thru	539	2	109	4.5	A	4.8	A			527	539	+12
	Right	76	0	0	0.4	A					81	76	-5
Eastbound	Left	20	5	67	29.3	C	13.0	B			22	20	-2
	Right	35	0	23	3.7	A					33	35	+2

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	108	22	103	53.7	D	14.4	B	19.1	B	111	114	+3
	Thru	545	12	163	10.0	B					569	545	-24
	Right	162	0	16	2.8	A					165	162	-3
Southbound	Left	0	-	-	-	A	7.2	A			1	0	-1
	Thru	445	11	144	9.8	A					451	445	-6
	Right	444	2	115	4.6	A					453	444	-9
Eastbound	Left	319	60	274	49.4	D	41.3	D			320	319	-1
	Thru	60	14	62	50.8	D					59	60	+1
	Right	87	0	23	5.1	A					87	87	0
Westbound	Left	100	33	126	56.1	E	48.1	D			101	100	-1
	Thru	20	6	36	59.1	E					22	20	-2
	Right	22	0	11	1.4	A					24	22	-2

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	109	24	97	55.0	D	10.7	B	13.3	B	113	109	-4
	Thru	770	7	115	4.5	A					793	770	-23
	Right	7	0	0	0.6	A					7	7	0
Southbound	Left	9	3	28	53.7	D	8.8	A			11	9	-2
	Thru	762	28	210	11.3	B					779	762	-17
	Right	306	0	0	1.0	A					305	306	+1
Eastbound	Left	217	40	137	49.6	D	32.1	C			221	217	-4
	Thru	10	2	27	44.6	D					10	10	0
	Right	126	0	0	0.9	A					128	126	-2
Westbound	Left	3	1	13	48.0	D	35.8	D			3	3	0
	Thru	11	4	34	57.4	E					13	11	-2
	Right	8	0	6	1.6	A					8	8	0

Gate 6 Buses

Volume (buses/hr)	Delay (sec/bus)
25	27.7

_2016_PM_Existing w/Peak Deliveries
MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	218	36	211	32.6	C	25.3	C	22.0	C	223	218	-5
	Thru	12	36	210	37.0	D					13	12	-1
	Right	93	8	151	6.7	A					97	93	-4
Southbound	Left	74	17	194	34.4	C	14.4	B			82	74	-8
	Thru	10	18	193	35.8	D					11	10	-1
	Right	304	1	55	8.9	A					304	304	0
Eastbound	Left	211	26	108	33.5	C	23.6	C			209	211	2
	Thru	223	20	108	25.3	C					224	223	-1
	Right	113	0	28	1.6	A					117	113	-4
Westbound	Left	115	17	118	28.7	C	23.6	C			117	115	-2
	Thru	466	30	145	26.0	C					471	466	-5
	Right	85	0	29	3.7	A					89	85	-4

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	99	31	104	76.8	E	28.5	C	32.4	C	103	99	-4
	Thru	236	22	114	31.4	C					243	236	-7
	Right	202	0	0	1.5	A					197	202	5
Southbound	Left	10	3	23	61.5	E	24.3	C			9	10	1
	Thru	355	39	230	30.3	C					362	355	-7
	Right	242	22	223	13.9	B					237	242	5
Eastbound	Left	109	29	105	68.2	E	27.6	C			108	109	1
	Thru	69	12	61	41.5	D					71	69	-1
	Right	212	0	0	2.2	A					210	212	2
Westbound	Left	470	83	**303**	51.1	D	43.3	D			483	470	-13
	Thru	327	32	125	34.8	C					326	327	1
	Right	27	1	24	10.3	B					27	27	0

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Thru	371	1	53	1.7	A	1.7	A	30.1	C	375	371	-4
Southbound	Thru	552	2	67	3.1	A	47.5	D			548	552	4
	Right	120	**363**	**543**	251.5	F					145	120	-25
Eastbound	Left	24	6	54	33.1	C	12.6	B			55	24	-31
	Right	44	0	10	1.4	A					55	44	-11

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	45	12	55	53.0	D	13.4	B	27.5	C	47	45	-2
	Thru	335	7	97	8.5	A					351	335	-16
	Right	14	0	1	1.2	A					15	14	-1
Southbound	Left	23	5	44	47.5	D	22.0	C			23	23	0
	Thru	611	39	177	31.5	C					547	611	64
	Right	333	0	21	3.0	A					341	333	-8
Eastbound	Left	266	47	183	48.1	D	62.0	E			268	266	-2
	Thru	6	26	61	50.8	D					7	6	-1
	Right	29	65	150	191.7	F					43	29	-14
Westbound	Left	43	15	73	69.4	E	31.5	C			45	43	-2
	Thru	9	3	29	53.4	D					10	9	-1
	Right	61	0	13	1.5	A					62	61	-1

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS	Target Volume (vph)	Simulated Volume (vph)	Difference (vph)
Northbound	Left	51	13	58	55.1	E	7.3	A	9.7	A	56	51	-5
	Thru	603	4	84	3.3	A					642	603	-39
	Right	1	0	0	0.5	A					1	1	0
Southbound	Left	14	4	35	51.1	D	7.2	A			15	14	-1
	Thru	902	20	181	8.6	A					917	902	-15
	Right	294	0	0	1.0	A					289	294	5
Eastbound	Left	135	26	97	47.3	D	29.9	C			137	135	-2
	Thru	4	1	13	47.6	D					3	4	1
	Right	83	0	0	0.7	A					85	83	-2
Westbound	Left	1	1	9	55.5	E	11.9	B			2	1	-1
	Thru	9	2	24	58.8	E					9	9	0
	Right	43	0	11	1.1	A					44	43	-1

Gate 6 Buses

Volume	Delay
(buses/hr)	(sec/bus)
28	241.8

_2016_PM_Concept C
MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	219	37	212	33.9	C	26.2	C	22.0	C
	Thru	12	37	212	33.8	C				
	Right	93	9	153	7.1	A				
Southbound	Left	74	17	177	33.5	C	14.2	B		
	Thru	10	17	178	39.2	**D**				
	Right	305	1	52	8.7	A				
Eastbound	Left	210	25	108	33.2	C	23.9	C		
	Thru	223	21	105	26.4	C				
	Right	112	0	28	1.6	A				
Westbound	Left	117	17	119	28.9	C	22.8	C		
	Thru	467	29	140	24.7	C				
	Right	86	0	30	4.1	A				

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	31	109	74.7	**E**	28.0	C	31.3	C
	Thru	236	22	114	31.1	C				
	Right	202	0	0	1.5	A				
Southbound	Left	10	3	24	59.2	**E**	21.6	C		
	Thru	358	46	**330**	29.6	C				
	Right	353	33	**340**	12.5	B				
Eastbound	Left	109	29	102	69.0	**E**	27.7	C		
	Thru	69	11	61	40.8	**D**				
	Right	211	0	3	2.2	A				
Westbound	Left	469	84	300	51.8	**D**	43.7	**D**		
	Thru	328	31	121	35.0	C				
	Right	27	1	24	10.3	B				

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	370	1	58	1.9	A	1.9	A	3.9	A
Southbound	Thru	674	3	105	3.6	A	3.6	A		
Eastbound	Left	32	7	60	31.4	C	16.8	B		
	Right	36	0	33	3.9	A				

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	11	60	51.4	**D**	13.3	B	15.0	B
	Thru	341	7	102	8.7	A				
	Right	14	0	1	1.4	A				
Southbound	Left	23	5	44	47.5	**D**	5.4	A		
	Thru	626	8	146	5.2	A				
	Right	333	0	28	2.7	A				
Eastbound	Left	287	49	189	46.7	**D**	42.0	**D**		
	Thru	7	2	34	46.6	**D**				
	Right	42	5	54	8.8	A				
Westbound	Left	45	15	75	50.0	**D**	24.6	C		
	Thru	9	3	29	54.2	**D**				
	Right	61	0	12	1.5	A				

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	14	64	56.5	**E**	7.4	A	9.7	A
	Thru	628	4	88	3.3	A				
	Right	1	0	0	0.4	A				
Southbound	Left	14	4	35	51.1	**D**	7.3	A		
	Thru	901	21	198	8.6	A				
	Right	294	0	0	1.0	A				
Eastbound	Left	135	26	96	47.0	**D**	29.6	C		
	Thru	4	1	13	41.9	**D**				
	Right	83	0	0	0.7	A				
Westbound	Left	1	1	9	52.1	**D**	12.1	B		
	Thru	9	2	24	59.8	**E**				
	Right	43	0	12	1.2	A				

New Gate: Buses

Volume (buses/hr)	Delay (sec/bus)
32	17.5

New Gate: Deliveries and Employees (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	103	82	179	154.2	F	154.2	F	154.2	F

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MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	218	36	207	33.4	C	25.8	C	22.0	C
	Thru	12	36	207	35.5	D				
	Right	93	8	148	6.7	A				
Southbound	Left	74	16	184	32.3	C	13.9	B		
	Thru	9	17	184	34.2	C				
	Right	304	1	44	8.8	A				
Eastbound	Left	210	27	107	35.0	C	24.3	C		
	Thru	223	21	110	25.6	C				
	Right	112	0	25	1.6	A				
Westbound	Left	116	17	121	28.8	C	23.1	C		
	Thru	471	29	134	25.3	C				
	Right	86	0	24	3.0	A				

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	30	101	74.2	E	28.2	C	34.9	C
	Thru	236	22	117	31.7	C				
	Right	202	0	0	1.5	A				
Southbound	Left	10	3	23	55.9	E	34.0	C		
	Thru	357	57	285	30.6	C				
	Right	250	56	284	37.9	D				
Eastbound	Left	110	27	100	65.7	E	26.8	C		
	Thru	68	11	58	40.1	D				
	Right	211	0	3	2.2	A				
Westbound	Left	470	85	310	52.1	D	43.9	D		
	Thru	328	32	128	35.0	C				
	Right	27	1	24	10.3	B				

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	371	1	62	2.1	A	2.7	A	3.6	A
Southbound	Thru	684	3	134	3.0	A	4.2	A		
Eastbound	Left	32	7	59	30.5	C	19.1	B		
	Right	35	1	82	8.6	A				

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	11	59	52.5	D	13.7	B	15.1	B
	Thru	342	7	106	8.9	A				
	Right	14	0	0	1.5	A				
Southbound	Left	23	5	44	47.6	D	5.2	A		
	Thru	626	7	134	5.0	A				
	Right	333	0	29	2.6	A				
Eastbound	Left	287	50	192	47.1	D	42.1	D		
	Thru	7	2	34	46.6	D				
	Right	43	5	55	8.5	A				
Westbound	Left	45	15	71	50.9	D	24.9	C		
	Thru	9	3	29	54.2	D				
	Right	61	0	11	1.4	A				

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	52	13	62	54.7	D	7.2	A	9.6	A
	Thru	628	4	85	3.3	A				
	Right	1	0	0	0.5	A				
Southbound	Left	14	4	35	51.1	D	7.2	A		
	Thru	902	20	183	8.5	A				
	Right	294	0	0	1.0	A				
Eastbound	Left	136	26	97	47.1	D	29.7	C		
	Thru	4	1	13	41.5	D				
	Right	83	0	0	0.6	A				
Westbound	Left	1	1	9	55.6	E	11.9	B		
	Thru	9	2	24	58.3	E				
	Right	43	0	14	1.2	A				

New Gate: Buses

Volume (buses/hr)	Delay (sec/bus)
32	20.7

New Gate: Deliveries and Employees (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	99	88	200	173.3	F	173.3	F	173.3	F

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MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	219	36	209	33.3	C	25.8	C	22.1	C
	Thru	12	36	208	35.7	D				
	Right	93	8	149	6.6	A				
Southbound	Left	74	17	203	32.5	C	14.3	B		
	Thru	10	17	197	35.4	D				
	Right	305	1	50	9.2	A				
Eastbound	Left	211	26	109	34.4	C	23.9	C		
	Thru	223	21	111	25.1	C				
	Right	112	0	29	1.6	A				
Westbound	Left	117	17	124	28.8	C	23.4	C		
	Thru	470	30	137	25.8	C				
	Right	86	0	27	3.2	A				

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	30	104	74.6	E	28.2	C	34.8	C
	Thru	236	22	117	31.6	C				
	Right	202	0	0	1.5	A				
Southbound	Left	10	3	23	54.8	D	33.8	C		
	Thru	357	56	284	30.6	C				
	Right	250	56	283	37.7	D				
Eastbound	Left	110	27	99	64.5	E	26.4	C		
	Thru	68	11	59	40.2	D				
	Right	211	0	3	2.2	A				
Westbound	Left	469	85	309	52.0	D	43.9	D		
	Thru	328	32	129	35.0	D				
	Right	27	1	24	10.3	B				

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	371	1	63	2.1	A	2.7	A	3.7	A
Southbound	Thru	684	4	134	3.1	A	4.3	A		
Eastbound	Left	32	7	59	30.5	C	19.1	B		
	Right	35	1	82	8.8	A				

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	46	11	57	52.8	D	13.6	B	15.1	B
	Thru	342	7	105	8.9	A				
	Right	14	0	0	1.5	A				
Southbound	Left	23	5	44	47.4	D	5.2	A		
	Thru	626	7	134	5.0	A				
	Right	333	0	30	2.6	A				
Eastbound	Left	287	50	193	47.0	D	42.1	D		
	Thru	7	2	34	46.6	D				
	Right	43	5	55	8.5	A				
Westbound	Left	45	15	71	51.1	D	25.0	C		
	Thru	9	3	29	54.2	D				
	Right	61	0	13	1.4	A				

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	52	14	61	55.2	E	7.3	A	9.7	A
	Thru	628	4	85	3.4	A				
	Right	1	0	0	0.5	A				
Southbound	Left	14	4	35	51.1	D	7.2	A		
	Thru	902	20	183	8.5	A				
	Right	294	0	0	1.0	A				
Eastbound	Left	136	26	97	47.0	D	29.7	C		
	Thru	4	1	13	42.1	D				
	Right	83	0	0	0.6	A				
Westbound	Left	1	1	9	55.6	E	11.9	B		
	Thru	9	2	24	58.3	E				
	Right	43	0	13	1.2	A				

New Gate: Buses

Volume (buses/hr)	Delay (sec/bus)
32	20.9

New Gate: Deliveries and Employees (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	100	130	321	160.4	F	160.4	F	160.4	F

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MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	217	38	225	34.6	C	26.7	C	22.2	C
	Thru	12	38	225	34.4	C				
	Right	92	9	165	7.0	A				
Southbound	Left	75	18	183	35.0	D	14.7	B		
	Thru	9	18	184	38.6	D				
	Right	304	1	60	9.0	A				
Eastbound	Left	211	27	112	34.3	C	24.4	C		
	Thru	224	21	111	26.5	C				
	Right	112	0	29	1.7	A				
Westbound	Left	119	17	127	29.1	C	22.4	C		
	Thru	472	29	142	24.2	C				
	Right	85	0	27	3.4	A				

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	30	99	75.3	E	28.0	C	32.1	C
	Thru	236	22	112	31.0	C				
	Right	202	0	0	1.5	A				
Southbound	Left	10	3	24	61.1	E	23.2	C		
	Thru	361	38	228	29.1	C				
	Right	252	22	224	13.3	B				
Eastbound	Left	109	28	101	66.6	E	27.3	C		
	Thru	67	12	64	42.7	D				
	Right	211	0	1	2.1	A				
Westbound	Left	471	84	**304**	51.9	D	43.8	D		
	Thru	326	32	126	34.9	C				
	Right	27	1	24	10.3	B				

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	371	1	52	1.8	A	1.9	A	2.8	A
Southbound	Thru	569	2	66	2.3	A	3.0	A		
	Right	102	0	0	0.2	A				
Eastbound	Left	24	6	55	33.2	C	16.0	B		
	Right	44	1	58	6.7	A				

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	11	53	52.8	D	13.7	B	15.9	B
	Thru	334	7	101	9.0	A				
	Right	14	0	1	1.0	A				
Southbound	Left	23	5	44	47.4	D	8.3	A		
	Thru	626	10	152	9.9	A				
	Right	333	0	30	2.7	A				
Eastbound	Left	286	49	188	46.7	D	42.7	D		
	Thru	7	3	35	48.6	D				
	Right	42	6	57	14.9	B				
Westbound	Left	44	15	75	52.0	D	25.2	C		
	Thru	9	3	29	54.2	D				
	Right	61	0	14	1.5	A				

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	13	59	54.7	D	7.4	A	9.7	A
	Thru	620	4	88	3.4	A				
	Right	1	0	0	0.5	A				
Southbound	Left	14	4	35	51.1	D	7.2	A		
	Thru	901	20	181	8.5	A				
	Right	294	0	0	1.0	A				
Eastbound	Left	135	26	96	47.2	D	29.8	C		
	Thru	4	1	13	48.1	D				
	Right	83	0	0	0.6	A				
Westbound	Left	1	1	9	55.5	E	11.9	B		
	Thru	9	2	24	58.5	E				
	Right	43	0	12	1.1	A				

New Gate: Buses

Volume (buses/hr)	Delay (sec/bus)
32	21.1

Gate 6: Deliveries and Employees (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Right	103	119	292	144.8	F	144.8	F	144.8	F

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MOA Transit Station
Arterial MOEs (P.M. Peak)

SRF Consulting Group, Inc.

Killebrew Dr/22nd Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	219	37	218	33.8	C	26.3	C	22.2	C
	Thru	12	37	218	33.5	C				
	Right	93	9	150	7.7	A				
Southbound	Left	73	19	186	34.7	C	15.0	B		
	Thru	10	18	180	35.8	D				
	Right	304	1	64	9.6	A				
Eastbound	Left	211	26	112	34.7	C	24.6	C		
	Thru	224	21	111	26.5	C				
	Right	113	0	27	1.6	A				
Westbound	Left	117	16	120	28.8	C	22.5	C		
	Thru	472	29	136	24.2	C				
	Right	87	0	32	4.2	A				

Killebrew Dr/24th Ave (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	99	30	103	73.4	E	27.7	C	31.6	C
	Thru	235	22	116	31.0	C				
	Right	202	0	0	1.5	A				
Southbound	Left	10	3	23	58.0	E	22.8	C		
	Thru	371	45	**318**	30.1	C				
	Right	354	32	**341**	14.1	B				
Eastbound	Left	108	29	101	67.7	E	27.4	C		
	Thru	68	12	63	41.8	D				
	Right	211	0	2	2.2	A				
Westbound	Left	468	84	299	51.9	D	44.0	D		
	Thru	328	32	123	35.5	D				
	Right	27	1	24	10.4	B				

24th Ave/Transit Station (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	371	2	62	2.6	A	2.6	A	4.8	A
Southbound	Thru	683	6	156	4.0	A	4.0	A		
Eastbound	Left	18	7	74	30.4	C	24.5	C		
	Right	50	8	73	22.4	C				

24th Ave/82nd St (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	45	12	54	54.4	D	13.9	B	15.1	B
	Thru	329	7	102	8.8	A				
	Right	14	0	0	1.3	A				
Southbound	Left	23	5	44	47.9	D	5.3	A		
	Thru	626	8	151	5.1	A				
	Right	333	0	28	2.7	A				
Eastbound	Left	286	50	191	46.9	D	42.2	D		
	Thru	7	2	33	48.6	D				
	Right	42	5	54	9.0	A				
Westbound	Left	45	15	74	50.2	D	24.7	C		
	Thru	9	3	29	54.2	D				
	Right	61	0	11	1.5	A				

24th Ave/Lindau Ln (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	52	14	64	56.4	E	7.3	A	9.7	A
	Thru	618	4	84	3.2	A				
	Right	1	0	0	0.5	A				
Southbound	Left	14	4	35	51.7	D	7.2	A		
	Thru	901	20	195	8.5	A				
	Right	294	0	0	1.0	A				
Eastbound	Left	135	27	95	47.8	D	30.2	C		
	Thru	4	1	13	48.5	D				
	Right	83	0	0	0.6	A				
Westbound	Left	1	1	9	51.7	D	11.9	B		
	Thru	9	2	24	59.1	E				
	Right	43	0	14	1.1	A				

New Gate: Buses

Volume (buses/hr)	Delay (sec/bus)
32	0.6

New Gate: Deliveries and Employees (Traffic Signal)

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Thru	105	14	155	103.3	F	103.3	F	103.3	F