Metropolitan Council

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MEMORANDUM

Date: February 8, 2007

To: Peter Bell, Chair
Tom Weaver, Regional Administrator

From: Arlene McCarthy, Director - Metropolitan Transportation Services
Mark Fuhrmann, Deputy General Manager - Metro Transit

Subject: Evaluation of Proposed Downtown St. Paul LRT Loop

Metropolitan Council/Metro Transit staff has reviewed the December 7, 2006 draft *Technical Memorandum: Evaluation of Proposed Downtown St. Paul LRT Loop.* This evaluation was authorized and financed by Ramsey County Regional Rail Authority (RCRRA) through a $40,000 contract with the same consultant team that prepared the Central Corridor Alternatives Analysis/Draft Environmental Impact Statement (AA/DEIS) technical analysis.

The memo describes the proposed St. Paul loop (Loop) and then offers comparison to the Locally Preferred Alignment (LPA) on Cedar and 4th Streets. Table A summarizes physical characteristics and key evaluation factors for both the Loop and LPA.

Summary

- The Loop alternative presents serious operational and reliability issues because trains would operate like streetcars sharing the right-of-way (ROW) with automobile traffic in multiple sections of the Loop, and the single track does not allow for bypassing stalled vehicles (as the double track operation does) in the event of train breakdowns and track blockages.

- Since the Loop track only operates in one direction, round-trip travel times are longer for all downtown passengers because they must backtrack in one direction or the other and because layover/recovery is needed within the Loop to maintain schedule reliability.

- The Loop alternative has a higher capital cost (+$49 million) and higher operating cost ($1 million per year) than the LPA option which makes it more difficult to meet the FTA cost effectiveness requirement. These cost estimates for the Loop could be seriously underestimated given several potential engineering and operational problems.

- Downtown St. Paul average weekday boardings with the Loop are less than one-third of the boardings for the LPA (1,490 versus 6,430 riders). The overall LRT ridership for the entire corridor would be about 13% lower with the Loop (5,870 fewer riders).

- The Loop alternative would require re-opening the DEIS process and would result in delays and further cost escalations to the project.

Key Factors

Staff highlights and concurs with the following key factors presented in the technical memo. More detail on each of these factors is provided in the technical memo.

Operational Reliability and Safety:

- *Single track* – If a train is stalled on the Loop or the track is blocked, the likely operating scenario is to temporarily end all LRT trips at the Rice Street Station and deploy buses to replicate the LRT service on the Loop. The LPA's double tracks allow "reverse running" between crossover points along the line. When a train is stopped on the track (for a mechanical or signal system problem or an accident including those between two autos), trains traveling in the same direction as the stopped vehicle can bypass it by switching over to the adjacent, opposite direction track for a short section. This allows service to continue with minimal disruption. The Loop's single track does not offer this flexibility.

- *Shared running* – Shared running increases the potential for impacts to traffic, accidents and on-time performance of LRT trains – all significant operating concerns. Traffic and pedestrian control, particularly along Kellogg during special events, will be a challenge to LRT reliability. The LPA has dedicated right-of-way (ROW) its entire length providing maximum service reliability. Loop trains would run in dedicated ROW on the aerial structure between the Cathedral to Xcel/RiverCentre, on 2nd Street to the Depot to 4th Street, and on University north of the Capitol. However, the remaining sections are proposed to have trains run in mixed traffic lanes shared with autos including on Rice Street, John Ireland Blvd, Kellogg Blvd south of Xcel/RiverCentre, as well as Wacouta, 7th and Jackson Streets.

- *Traffic and Signals* – The Loop alignment crosses 29 streets at-grade, 21 of which are controlled by traffic signals. A detailed analysis will model how LRT operations would impact motor vehicle traffic and vice versa, especially given the shared running situation. It will be important that traffic signals give signal priority to trains and that adequate time is provided to "clear out" the autos from the shared lanes in advance of the approaching train. Auto, pedestrian and LRT interaction, especially at times of Xcel/RiverCentre special events, is of great concern in the vicinity of Kellogg Blvd where all three converge in a confined space. If a wide variation in travel time through downtown exists due to the intersections and shared running, then additional recovery time may be required which increases overall travel time.

- *Downhill grades* – During winter conditions, the loss of traction between the train wheels and the rails is a serious concern. The existing grade on Mother Teresa Way (between the Cathedral and I-35E) is steep. We agree with the consultant's finding that the profile may need to be adjusted requiring an extended length of aerial structure over I-35E, particularly when considering 3-car trains (see Other Considerations).

- *Scheduled Recovery at Union Depot* – The Loop alignment requires the designation of a St. Paul "end of the line," most likely at Union Depot for scheduled layovers. The Minneapolis Multi-Modal Station is the corresponding western end of the line. Scheduling of recovery time at each end is standard practice in the transit industry to ensure each trip departs on time even if it arrived late. Recovery is critical to the success of any LRT operation as it provides for more reliable operations and on-time performance along the entire corridor.

Scheduling all the recovery time at the Minneapolis end of the line would provide for unreliable service, particularly on westbound trips leaving St. Paul. The need for on-time performance is heightened given the alternating Central and Hiawatha trips every 3.75 minutes during rush hours in downtown Minneapolis sharing common track and stations. The technical memo estimate of 8 minutes and 45 seconds recovery time at Union Depot is reasonable.

Travel Time: The circuitous pattern results in longer travel times for most passengers. Trip distances and travel times are imbalanced by one-way operations forcing a ride all the way around the loop.

In addition to the indirect route path, passengers traveling through the "end of the line" Union Depot would have a 3 to 8 minute wait during the scheduled recovery time. The best case 3-minute scenario would be plausible during rush hours (7.5 minute frequency) if one leaves the arriving train and transfers to a soon-to-depart train across the platform. During non-rush hours, a 5 to 8 minute wait will be more typical. For example, a student leaving St. Paul Technical College to travel toward Minneapolis would have about a 28-minute trip to reach the Rice Street Station compared to walking directly in about 11 minutes.

Traveling from some downtown stations to another, a LRT transfer is required at Rice Street Station. For example, a resident living near 7th and Wacouta traveling to Xcel/RiverCentre would have a trip time of about 28 minutes using LRT, but could walk directly in about 17 minutes.

Transit customer surveys indicate that waiting time is perceived by transit riders to be two to three times longer than it actually is. The combination of an indirect travel path plus an inconvenient transfer or wait at the Union Depot is highly undesirable and makes the time to travel in downtown St. Paul disproportionately high to the total trip time.

Access to Activity Centers: The Loop does not provide high quality service to the core of downtown where the greatest density of downtown employees exists. The Loop provides access to some major activity centers (the Cathedral, Xcel Energy Center, Science Museum and Regions Hospital) as well as some businesses on the edge of the downtown business core. However, the aggregate of downtown businesses and downtown employees – who ride much more frequently and in larger volumes than those attending special events - are much better served by the LPA's faster travel times and shorter walk distances.

While not cited in the technical memo, we also note that one of the objectives of the St. Paul Central Corridor Capitol/Downtown Task Force is to bring more downtown pedestrian activity to the street level in St. Paul's central business district. The Loop alignment does not support this local objective.

Ridership: Overall LRT ridership for the entire line would be reduced by 5,000 to 6,000 passengers per day. In downtown St. Paul, only 1,940 people would board trains along the loop alternative versus 6,430 for the LPA alignment. Many of those rides shift to buses which provide a more time competitive trip. The ridership loss estimate appears reasonable given the difference in activity centers and corresponding number of people served.

Capital Cost: The $49 million capital cost increase (in year of expenditure dollars) is considered a best case estimate. Structural concerns not addressed in the technical memo (see Other Considerations – Kellogg Street Structures and 2nd Street Underpass) may have significant capital cost impacts.

We concur with the consultant's report that structural components addressed in the technical memo may have higher capital costs. As listed below, the Loop requires several new elevated structures as well as modifications to two existing I-94 overpasses plus additional stations. The technical memo calls for further detailed analysis, particularly for the I-94 overpasses and the 5% grade of the aerial structure around Xcel/RiverCentre.

- Existing John Ireland Bridge over I-94 – requires further study to determine which options are feasible.

- New Bridge to cross over I-35E continuing above Kellogg to cross over Smith Avenue, 7th Street and Eagle Street and then descending for 600 feet at a 5% slope to meet the street at-grade in the vicinity of pedestrian overpass bridge serving Xcel/RiverCentre. The pedestrian overpass bridge would need to be relocated.

- Elevated Smith Avenue Station just south of I-35E.

- New Bridge to cross over Jackson Street between Robert and Sibley streets; bridge would generally follow 2nd Street alignment.

- New Bridge to cross over Kellogg between the Union Depot deck (immediately adjacent to south side of Kellogg) and 4th Street.

- Existing Jackson Street Bridge over I-94 – requires further study to determine which options are feasible.

- Existing Cedar Street Bridge over University – clearance issues may require shifting track alignment to center of the street.

Operating Cost: Annual LRT operating costs will increase by nearly $1 million due to the longer travel time. If actual travel time conditions are slightly less reliable than estimated in the technical memo – a concern given the shared running and crossing through more intersections - then additional train sets may be needed to provide the same schedule of service. This will increase the capital cost (for additional vehicles) as well as the operating cost.

The technical memo does discuss the fact that the Loop will push more transit passengers to bus, primarily Route 94 with a 118% increase in ridership. However, the technical memo does not address the corresponding increased operational cost for the additional bus service to meet the higher demand. As a result, the $1 million increase in operating cost is understated.

Cost Effectiveness Index: As a result of the decreased ridership, slower travel times, decreased user benefits, increased operating cost and increased capital cost, the CEI is negatively impacted by approximately $2.43 raising it from $24.84 to $27.27 based on the technical memo estimates. Higher capital and operating costs are anticipated if the more detailed analysis recommended in the technical memo would be completed, thus raising the CEI differential.

Other Considerations

Re-opening the DEIS – The Loop represents a substantial change to the LPA. The Loop alignment did not go through the federally-mandated DEIS process led by Ramsey County Regional Rail Authority. The DEIS analysis would need to be completed for the Loop to be compliant with the National Environmental Protection Act (NEPA). This process, which includes a pubic hearing requirement, will delay the overall project.

Visual and Historic Considerations: The DEIS process considers visual, aesthetic and historic aspects of an alignment. The proposed aerial structure starting over I-35E with an elevated station at Smith Avenue and continuing around Xcel/RiverCentre as it descends will have a visual and aesthetic impact that has not been

addressed. In addition, the State Historic Preservation Office (SHPO) has jurisdiction to review the Loop's Cathedral Station and possibly others in the Lowertown Historic District.

CAAPB Approval: The Capitol Area Architectural and Planning Board (CAAPB) has statutory authority to approve the LRT alignment and stations within the Capitol area. The CAAPB endorsed the LPA alignment. However, the CAAPB may take issue with the Loop alignment in the vicinity of the Capitol as well as on John Ireland Blvd.

Kellogg Street Structures – Kellogg Street from the RiverCentre loading dock (about 400 feet south of 7th Street) to east side of Market Street is predominantly a bridge structure. An area way exists on the south side of Kellogg from Market to just west of St. Peter that extends 2-3 feet into the street. Kellogg from St. Peter to Wabasha is also bridge structure. All of these structures need to be analyzed for carrying capacity and, at a minimum, would require re-decking for the embedded track.

2nd Street Underpass – The Loop uses 2nd Street under the Kellogg Mall to travel from Kellogg to Jackson. An analysis is needed to determine if current vertical clearances are adequate. If not, modification costs could be significant as 2nd Street itself is a bridge deck. This bridge deck also must be analyzed for structural capacity. At the east end of 2nd Street, an analysis is needed to determine if vertical clearance is adequate for the transition to the bridge over Jackson.

Kellogg Street ROW – The limited ROW along Kellogg, particularly at the busy 7th Street intersection, is a concern for the City of St. Paul. The space for the LRT bridge piers must fit within the existing ROW along with all current traffic lanes.

3-car trains: In granting approval to enter Preliminary Engineering, the FTA advised that the project may require 3-car trains to handle ridership demand in 2030. If further analysis determines that 3-car trains are necessary, that requirement would apply to both the LPA and Loop alignments. Our initial estimate of increased capital costs to the project for the LPA is $93 million ($39M for light rail vehicles, $16M for longer station platforms, $24M for increased vehicle storage facility capacity and $14M for increased propulsion system capacity). The capital cost for 3-car trains with the Loop alignment would be somewhat higher given the increased number of stations as well as the more costly elevated station.

The Smith Avenue Station has an added complication in that a longer level platform length will push 100 feet further east the point where the aerial structure lands on Kellogg between Xcel/RiverCentre and the Science Museum. This may require moving the Science Museum Station to between Washington and Market Streets.

Special event ridership – The ridership modeling captures special event ridership and other off-peak ridership by applying an "annualization factor." The high annualization factor for Central Corridor negotiated with the FTA reflects the high off-peak and special event ridership occurring on Hiawatha LRT which serves the Metrodome and Target Center. Vikings games (64,000 capacity) and Twins games (56,000 capacity) are the significant generators of special event ridership with both requiring increased LRT service to meet the demand. Rail ridership to Timberwolves games (20,500 capacity) is comparatively low and does not require any additional LRT service.

LRT ridership for Wild hockey games (18,000 capacity) and other Xcel events is anticipated to mimic Timberwolves ridership at best. While the Hiawatha line serves suburban riders with park-and-ride lots, Central does not. People would not likely drive to the center city and then board Central LRT to Xcel or board Hiawatha at a park-and ride lot and transfer in Minneapolis to Central LRT. In both cases the trip is not time competitive with driving. Driving directly, particularly given the lower parking rates in St. Paul is more likely.

Number of stations: The tech memo analysis was based on nine stations along the Loop. It is our understanding that a subsequent Loop alignment without the Capitol Station on Rice Street and combining two stations (Jackson & 9th and Wacouta & 7th) has been proposed, but not evaluated. The travel time around the Loop would essentially stay the same given the difference in travel time would be added to the recovery at the Union Depot to retain the same cycle time. The capital cost estimate would be reduced by up to $7 million. We would not expect much difference in the ridership projections.

TABLE A: Characteristics and Key Factors for Locally Preferred Alternative (LPA) and Downtown St. Paul Loop

	LPA	Loop *
Characteristics		
One-way Route in Downtown St. Paul (feet)	8,580	17,360
Single Track length (feet)	17,160	17,360
Number of Stations in Downtown St. Paul	5	9
Peak Weekday Headways (minutes)	7.5	7.5
Operating Run Times (minutes)		
• End-to-end for entire LRT line (one-way)	39.5	41.5
• Rice St. Station to Union Depot (one-way)	9.5	11.5
Average Weekday Boardings		
Downtown St. Paul Stations	6,430	1,940
Entire LRT Line	43,330	37,460
Travel Times		
Travel Times *to* Minneapolis from: (minutes) **		
• Rice Street Station	46	46
• Union Depot	48	52
• 6th and 7th streets (just east of Mears Park)	47	46
Travel Times *from* Minneapolis to: (minutes) **		
• Rice Street Station	46	46
• Union Depot	48	55
• 6th and 7th streets (just east of Mears Park)	47	69
Costs (in millions)		
Annual O & M Costs (2006 $)	$ 52.3	$ 53.2
Total Capital Costs (year of expenditure 2014 $)	$ 932	$ 981
Cost Effectiveness Index (CEI) ***	$ 24.84	$ 27.27

*With layover/recovery at Union Depot Station

**Includes travel time on train, as well as wait time at station and walk time to ultimate origin and destination.

***FTA's threshold to enter preliminary engineering is $ 28.99 and $ 22.99 for final design and construction.

Source: Draft Technical Memorandum: Evaluation of Proposed Downtown St. Paul LRT Loop, December 7, 2006