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Comments on the Schuylkill Valley Metro MIS/DEIS

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Introduction

Background

From the time regular passenger rail service to Reading was suspended more than two decades ago, DVARP has been a strong advocate for the return of passenger rail service onto the line. DVARP has watched with dismay as auto-centric development swept through the Schuylkill Valley corridor. Though DVARP thought SEPTA was misguided when it proposed a light rail line to Reading called the Schuylkill Valley Metro (SVM) a decade ago, DVARP welcomed SEPTA's interest in expanding the region's rail network rather than shrinking it, and we looked forward to a study of the corridor where the costs and benefits of various alternative modes of service would be compared objectively, and the region could move forward with the most cost-effective plan.

DVARP's President, Donald Nigro, served as a representative of DVARP on the SVM Major Investment Study/Draft Environmental Impact Study (MIS/DEIS) Project Technical Advisory Committee (PTAC). This close proximity to the study permitted DVARP a number of crucial insights which are detailed in this document.

Summary

DVARP has found the SVM MIS/DEIS to be highly biased making: 1) some alternatives look more attractive than they really are; and 2) other alternatives less attractive. DVARP's insights to these biases and flaws are set forth below and are developed in the reciprocally numbered attached sections:

1. The ridership projections for the SEPTA-preferred Alternative 6, "MetroRail", (along with the light rail Alternatives 5E and 5ET) are erroneously and highly overestimated due to improper use of the region's travel simulation model;

2. Empirical data evidences that the capital costs for Alternatives 1D and 2D are overestimated;

3. Specific capital cost items for Alternatives 1D, 1E and 2D are identified as unnecessary or overinflated. These items contribute to the overestimated capital cost of the these three alternatives;

4. The operating costs are erroneously underestimated for Alternative 6 and erroneously overestimated for Alternatives 1D and 2D;

5. The service route plans for Alternatives 1D, 1E and 2D are unfavorably biased. The routes for these alternatives are planned in a manner which repressed ridership and political support, were not given the same favor as Alternative 6, and were contrary to the requests of the Montgomery County Planning Commission;

6. The travel time assumptions for Alternative 6 were favorably biased while the travel time assumptions for Alternatives 1D, 1E and 2D were unfavorably biased;

7. The track plan for (SEPTA's preferred) Alternative 6 is unworkable and fatally flawed; and

8. The financial plan is completely unrealistic.

Upon request, DVARP can provide copies of any information to which we refer in this document.

Before circumstances or an outside entity force or embarrass SEPTA into recognizing these biases, flaws and the incredible risks of Alternative 6 (i.e., MetroRail), DVARP most strongly urges SEPTA to change course and responsibly plan an attainable, cost-effective passenger rail alternative for the entire Philadelphia-King of Prussia-Reading corridor which will meet financial and operating performance expectations. Now is the time to pursue one of the study's risk mitigation strategies outlined on page 7-16 of Volume I of the MIS/DEIS: *Redefining the scope of the project*.

SEPTA's fixation first on doing this project as light rail (which can be easily documented) and then on having its own separate tracks for commuter rail (once the light rail plans were shown to be unworkable) has slowly gone nowhere for the past two years. SEPTA and BARTA need to stop hiding behind spin words such as "modern" and "exciting". A less costly plan with funds better spent is needed. The essence of this is to extensively share track with the Norfolk Southern freight railroad. An improved shared track configuration is much more efficient and less costly than maintaining separate environments for freight and passenger services. In recent years, shared track systems have cost up to $11 million per mile -- a fraction of the present plans.

SEPTA's and BARTA's separate track plan is tantamount to mandating separate highways for trucks and for cars. While such a plan has a certain appeal, it is fiscally irresponsible and out of touch with reality. It is completely contrary to the successful experience at so many other public transportation systems where service beyond 25 miles from the metropolitan core is provided on shared-use tracks rather than exclusive-use tracks.

DVARP recognizes that with bringing this project's budget below a billion dollars ridership won't be quite as high and the trains might be a minute or two slower, but with this approach, the trains will come, and they will meet financial and operating performance expectations. Certainly, the Schuylkill Valley corridor will get traffic relief much sooner. If ridership exceeds expectations, incremental improvements can be made to increase service and accommodate demand.

DVARP urges SEPTA and BARTA to take corrective measures now to a highly flawed alternatives comparison and its misguidedly deemed preferred alternative which is under-costed, overrated and fatally flawed.

Section One

Erroneously and Highly Overestimated Alternative 6 Ridership Forecast

The ridership projections for the SEPTA-preferred Alternative 6 (along with the light rail Alternatives 5E and 5ET) are erroneously and highly overestimated due to improper use of the region's travel simulation model.

The issue in contention is whether the Alternative 6's ridership forecast should be modeled on the DVRPC's Commuter Rail model or its Subway-Elevated model. The Commuter Rail model is the undisputed proper model for the trunk service of Alternatives 1D, 1E and 2D. However, DVARP believes that SEPTA made a grave mistake by selecting the Subway-Elevated model for the ridership modeling of Alternative 6. In its defense, SEPTA has stated, "[T]he service plans for Alternative 6 -- MetroRail and Alternative 2D -- Traditional Commuter Rail are significantly different." This is absolutely true, but their difference from each other is not the issue. What matters are the alternatives' relevant similarities to the DVRPC rail model on which their ridership forecast is based.

These are the salient characteristics of the two rail alternatives:

Alternative 6 -- MetroRail	**Alternative 2D**
Mixed densities.	Mixed densities.
15 minute peak headways.	30 minute peak headways.
30 minute off-peak headways.	60 minute off-peak headways.
Zoned fare structure.	Zoned fare structure.
Serves mostly non-transit dependent communities.	Serves mostly non-transit dependent communities.

Now, consider on which model their ridership projection should be based. The following are the characteristics on which each model is well tuned.

Subway-Elevated	**Commuter Rail**
High urban densities.	Mixed densities.
6-7 minute peak headways.	15-30 minute peak headways.
6-10 minute off-peak headways.	30-60 minute off-peak headways.
Flat fare structure.	Zoned fare structure.
Serves mostly transit dependent communities.	Serves mostly non-transit dependent communities.

Alternative 6 fits within the characteristics of the Commuter Rail model; it is foreign to the Subway-Elevated model. It is with the well-suited Commuter Rail model that Alternative 6 is forecasted to have 28-percent fewer riders (see Appendix A).

Alternative characteristics such as travel time, frequency and fare are factors in the ridership modeling regardless of mode of the model. However, the model chosen for the basis for an alternative should be the one with the closest fit. This increases the likelihood that the projected ridership will closely align with the actual ridership achieved. The above tables evidence that trunk service for all rail alternatives for the SVM MIS/DEIS are more appropriately modeled on DVRPC's commuter rail model. (Appendix A discusses the specifics of the modeling numbers and illustrates Alternative 2D capturing almost 90-percent of the properly forecasted number of Alternative 6 trips.)

In no document that has been made available by SEPTA to the study's PTAC was it ever explicitly disclosed that the ridership forecasting for Alternative 6 and the light rail alternatives (5 & 5E) would be or was generated with DVRPC's Subway-Elevated model. SEPTA has asserted that these alternatives are being modeled on the same model that the DVRPC applies to the Route 100. However, the DVRPC's last published major re-calibration indicates that the Subway-Elevated model does not yield valid results. Page 187 of the DVRPC document, "1990 Validation of DVRPC Travel Simulation Models" (published October 1997, Publication No. 97017) shows that the model overestimates Route 100 riders by 50.5 percent (11,742 simulated riders versus 7,800 actual riders). See Appendix B for relevant pages of the DVRPC document.

Mode	**1990 Modeled Volumes**	**1990 Actual Passenger Counts**	**Percent Difference**
Broad St. Subway/Ridge Avenue Spur	110,649	138,000	-19.8%
Market Frankford Subway-Elevated	196,830	171,930	14.4%
Norristown High Speed Line	11,742	7,800	50.5%
Subway-Elevated	319,221	317,730	0.5%

The SVM MIS/DEIS, as with most other transit studies which use the DVRPC transportation model, adjusted the model immediately before the forecast to essentially "zero-out" any significant discrepancies between the current actual counts and what is modeled. This is to facilitate a more accurate forecast of how new service would impact existing services. However, DVARP believes that such a "zeroing-out" in all likelihood involved overriding the characteristics of the Route 100 service and/or the demographics around the line which would do nothing to make the Subway-Elevated a more appropriate or accurate model on which to forecast ridership for the Schuylkill Valley Metro. The equally unattractive alternative for "zeroing-out" the Route 100 forecasted ridership to its actual ridership would be to adjust the Subway-Elevated model itself which would not only "zero-out" the discrepancy between model and forecast for the Route 100 but also would grossly disturb the proper modeling of the Philadelphia's subway-elevated lines.

In October, 2001, the DVRPC's Regional Citizens Committee (the MPO's citizen advisory committee) submitted seven questions to DVRPC staff in the quest for clarifying the matter (see Appendix C). To date, DVRPC staff has refused to answer the questions.

There remains no presented evidence that the Subway-Elevated model generates valid results for rail lines with any of these characteristics:

1. Mixed surrounding densities;
2. Peak headways that are larger than seven minutes;
3. Off-peak headways that are larger than ten minutes; and
4. Serving mostly non-transit dependent communities.

All of the alternatives of the Schuylkill Valley trunk have these characteristics. With them, only the Commuter Rail model has been shown to forecast ridership that is close to actual ridership.

As an obfuscation, SEPTA has discussed DVRPC developing a new ridership modeling tool and applying that at some future point, perhaps during the engineering phase. Such a possible new ridership modeling tool is irrelevant to the issue at hand -- properly and most accurately forecasting the ridership with the region's presently adopted travel forecasting model as required by Federal Transit Administration guidelines for New Starts.

As another obfuscation, SEPTA has discussed possibly forecasting the ridership Alternative 2D on the Subway-Elevated model. This misses the point. The model chosen for the basis for an alternative should be the one with the closest fit. Using the Subway-Elevated model makes no sense -- neither for Alternative 6 nor Alternative 2D.

As for the accountability for the initial decision to model Alternative 6 on Subway-Elevated, SEPTA claimed that it was the combined judgement of SEPTA, DVRPC and AECOM Transportation Consulting, Inc. At the July 26, 2001 DVRPC Board meeting, SEPTA presented a one-page statement which included the following paragraph:

> Mode 6 [the DVRPC Subway-Elevated model] is, in the combined judgment of SEPTA, DVRPC and AECOM Transportation Consulting, Inc. (formerly KPMG Peat Marwick Transportation Consulting Group), the most accurate representation of Schuylkill Valley MetroRail [Alternative 6] possible within the current capabilities of the DVRPC travel demand model. To have modeled Schuylkill Valley MetroRail [Alternative 6] using Mode 7 [Commuter Rail] of the DVRPC travel demand model, which is based on SEPTA's existing regional rail service, would seriously misrepresent the results Schuylkill Valley MetroRail will achieve.

In an October 10 letter, DVRPC denied that it took a position in concurrence with SEPTA on this issue (see Appendix C):

> *The decision about which transit submode to use was the prerogative of the consultant group. DVRPC takes no position on this technical issue.*

In fact, John Dawson, DVRPC's representative on the SVM MIS/DEIS Project Technical Advisory Committee (PTAC) and now retired, has gone on record saying that MetroRail *should have been modeled as regional (commuter) rail*. (See Appendix D.)

Even as forecasted on the Subway-Elevated model, Alternative 6's superior ridership draw over Alternative 2D is not so compelling when the length of these additional trips are considered. The Subway-Elevated model gives particular advantage to short trips over the Commuter Rail model. Consequently, many of Alternative 6's additional trips over Alternative 2D are short ones. Consider the following table.

Trip Origin and Destination	**Alt. 2D Trips**	**Alt. 6 Trips**	**Percent Greater**
Trips taken completely within range bounded by Ivy Ridge and 52nd Street	132	869	558%
Trips taken completely within range bounded by Manayunk and Temple University	548	2228	307%

It is short trips that the Subway-Elevated model most inflates. Therefore, what is a significant increase in boardings is significantly less so an increase in passenger miles. Nevertheless, in some sense, this is a moot point as Subway-Elevated is not the proper model with which to forecast ridership for Alternative 6. Commuter Rail is the proper model with which to forecast ridership for Alternative 6.

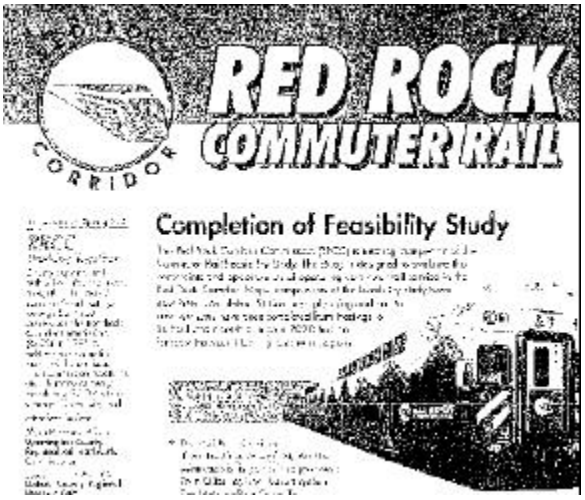
If constructed, Alternative 6 getting 28-percent fewer weekday riders than as originally forecasted with the Subway-Elevated model will financially bleed a system which is to operate trains at 15-minute headways in the peak and 30-minutes in the off-peak over an 18-hour operating day on a 63-mile corridor. It also will have demonstrated that a wildly excessive capital investment was made. Remember, it is SEPTA's hoped-for 50,000 riders per weekday that is used to justify 15-minute headways. Such headways will require completely separate track from the freight railroad, and the hoped-for 50,000 riders serve as justification for electrification between Port Kennedy through Berks County.

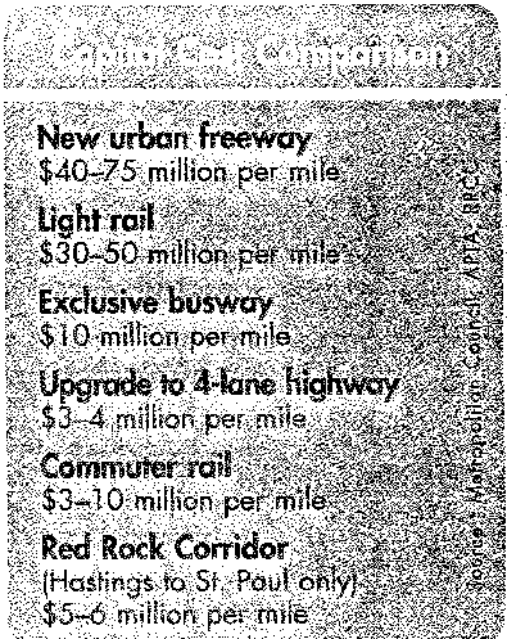
Section Two

Empirical Evidence of Overestimated Capital Costs for Alternatives 1D and 2D

Empirical data evidences that the capital costs for Alternatives 1D and 2D are overestimated. Appendix E lists the DVARP-known FRA-compliant passenger rail service extension projects. Our research shows that projects like this should cost between $5 million and $11 million per extended mile. SEPTA estimated cost per extended mile for Alternative 2D approaches $18 million. Yet, there is no other commuter rail project with a cost that exceeds $11 million per extended mile. SEPTA has attempted to deflect this criticism by making spurious comparisons to **non**-FRA compliant passenger rail service.

DVARP's $5 million to $11 million cost range finding is supported by the capital cost comparison conducted as part of the commuter rail feasibility study for passenger rail service between Minneapolis and St. Paul, Minnesota (Red Rock Corridor). The study's source for the commuter rail costs was the American Public Transportation Association (APTA). The study found that commuter rail projects cost between $3 million to $10 million per mile. The following is scanned from the study's literature.





Section Three

Alternatives 1D, 1E and 2D Contain Numerous Unnecessary or Overinflated Capital Costs

Alternatives 1D, 1E and 2D contain numerous unnecessary or overinflated capital cost items. Identified below, are the ones that DVARP was able to uncover.

ROW Agreements and Acquisitions Charges

The commuter rail ROW (right-of-way) agreements and acquisitions charges cost of $212,000,000 is ridiculous and way over the top for Alternatives 1D, 1E and 2D. Norfolk Southern's compensation will be the large infrastructure investment that is accounted for in the segment costs of the study. They would receive multiple passing sidings, a re-signaled line, and a bypass around the single-tracked Black Rock Tunnel. This is a strong advantage that the shared track-alternatives present. Unlike with Alternative 6 which presents no benefits to the freight railroad and consumes a large portion of its right-of-way, the $212,000,000 for Alternatives 1D, 1E and 2D mostly amounts to a double-charge.

Route 100 Segment Costs

The segment costs of the spur extension of the Route 100 to the King of Prussia Mall and Port Kennedy within Alternatives 1D, 1E and 2E has been inflated by $53 million from $98 million to $151 million from the Long List to the Short List Evaluation. SEPTA has said that this is due to the requirement by the Pennsylvania Turnpike Commission staff for the spur to go over rather than under the Pennsylvania Turnpike. From all that DVARP has been able to discern, this requirement has no substantive basis. At the location where the turnpike and the spur would intersect, the turnpike is on a 30 to 40 foot high embankment. It would require the spur to be elevated for many hundreds of feet to cross over the Turnpike.

It has been rumored that limestone deposits preclude the spur from going under the Turnpike. Given that the Turnpike is on such a high embankment, this makes no sense. This Turnpike requirement warrants much additional investigation and explanation.

DVARP is also quite concerned that project planners only discovered this "problem" at the very end of the study process. DVARP finds it implausible that SEPTA would not have consulted the Pennsylvania Turnpike Commission about this study until now, especially considering that the preliminary study investigated a Turnpike alignment for the Route 100 extension.

SEPTA has ignored DVARP's request to: 1) Document the Turnpike Commission's objection to a Route 100 tunnel through the Turnpike embankment; 2) Provide engineering proof that such a tunnel could not be constructed and operated safely; and 3) Explain why the Turnpike can go over nearby roads but not go over this proposed rail line.

DVARP has requested of PennDOT Deputy Secretary Richard J. Peltz to investigate the matter. He reported back to DVARP that he talked with Turnpike Commission and found that they are not opposed to a Route 100 extension going under the Turnpike.

On a related matter, the Short List Evaluation breaks down the facilities costs with the segment point being South Gulph Road rather than King of Prussia (Mall) as was done in the Long List Evaluation. This eliminates the possibility of a direct comparison to the Port Kennedy-King of Prussia light rail segment in Alternatives 5E and 5ET.

Why the change? What is being hidden? The Route 100 segment costs have gone up by $53 million. Why have the light rail segment costs between Port Kennedy and the Mall only gone up by $34 million if the only changes are north of the Mall (i.e., traversing the Turnpike)? What has changed south of the mall, since the Long List Evaluation, to raise the cost between the Mall and the Route 100 connection by $19 million?

Coaches and Locomotives

The last cost documents that DVARP saw showed commuter rail coach cars are still at a unit cost of $1,756,850. The minutes for the December PTAC meeting reflect that the consultant team acknowledged the cost should be $1.3 to $1.4 million. With "add-on percent", this would amount to a savings of up to $17,428,828 for Alternative 1D and a slightly higher savings for Alternative 2D.

Nine locomotives are needed for Alternative 1D, not twelve. This would appropriately yield a savings of $14.4 million. Four hours of cycle time for the Berks County equipment should be the maximum (Section Six). To run continuous half-hourly headways would take eight locomotives plus two (approximately 20%) for spares. As the half-hourly headways are not required to be sustained for long periods, all that is needed is seven locomotives plus two for spares.

Vehicles for the Route 100 Extension

Alternatives 1D, 1E and 2D include a capital cost for nine Route 100 light rail vehicles to cover the service on a Route 100 extension to the King of Prussia Mall and Port Kennedy Station. These cars, however, already exist. They were purchased and built several years ago for an expected expansion of service to King of Prussia and can be found on SEPTA property at 69th St. This amounts to an unnecessary cost of $23,544,000 ($19,620,000 plus 20-percent contingency) for Alternatives 1D, 1E and 2D.

Perkiomen Junction to Phoenixville Alignment

For this section of the corridor, multiple parameters were imposed uniformly on all alternatives. While these parameters are reasonable and often necessary for Alternatives 5E, 5ET and 6, due to their passenger-dedicated track requirement, they are questionable (even unidiomatic and oppressive) for Alternatives 1D, 1E and 2D.

The alternatives which require passenger-dedicated track (5E, 5ET and 6) prudently avoid the Black Rock Tunnel and instead use the old Pennsylvania Railroad (Pennsy) alignment. Given commuter rail's flexibility, however, one of three cost-saving Black Rock tunnel alternatives should have been embraced:

1. Enlarging the Black Rock tunnel to accommodate two tracks with double-stack clearances. SEPTA's consultant found that this would cost $11 million. The investment could be leveraged for both commuter and freight trains and would be an enticement for Norfolk Southern (NS);

2. Restoring two tracks to the Black Rock tunnel, with a center gauntlet track for double-stacks. This would facilitate two normal profile trains or one double stack train at any given moment. Approximately only 25 percent of NS's trains on this line are double-stacked; and

3. Rerouting of a portion of freight service to a restored single-track, CTC-signaled, Enola Branch. Such an investment in the Enola Branch (in part funded by a Schuylkill Valley project) would greatly reduce the need for a track and signal investment to accommodate passenger trains on the Schuylkill Valley corridor.

Facilitating a station at Oaks has been a major reason given to use the Pennsy alignment. The Feasibility Study completed in 1998 demonstrated that this cannot be used as justification:

1. Perkiomen Junction to Phoenixville stations are just 0.44 miles apart. This starkly goes against SEPTA's recently adopted Regional Rail Service Standards;

2. Perkiomen Junction and Oaks stations have the lightest activity of any of the commuter rail stations between Douglasville and Conshohocken (inclusively). The Feasibility Study dashed hopes that Oaks would be a popular park-and-ride station with its proximity to Route 422. The low number of boardings forecasted for an Oaks Station should not be a surprise. Unlike the Woodcrest park-and-ride station on the PATCO line which intersects with I-295 in a perpendicular fashion, Route 422 is roughly parallel to the proposed Schuylkill Valley rail line. (Why would anyone want to drive many miles south on Route 422 to catch the train at an Oaks Station when, instead, they could cath the train closer to home?);

3. Perkiomen Junction station can be accessed from the eastern shore of the Schuylkill River via Pawling Rd;

4. The previous Reading-Philadelphia rail service had no stops between Phoenixville and Valley Forge Park;

5. Accessing Oaks adds approximately 2.5 miles of circuitous running to the service. Appendix F provides a map; and

6. The circuitous routing and Oaks station stop adds approximately four minutes to the running time.

DVARP recognizes that the Pennsy alignment coordinates better with the redevelopment plans for the former Phoenix Steel site. This, however, needs to be weighed along with other factors:

1. The difference of 2.5 miles of circuitous running and capital costs; and
2. Four minutes of additional travel time.

It is important to note that either alignment does permit a station stop in Phoenixville.

Too Many Schuylkill Valley Stations

The list of proposed stations for the Schuylkill Valley service has grown alarmingly in the past five years. SEPTA ignored the ridership forecast data from the 1998 SVM Feasibility Study and the Long and Short List Evaluations of the SVM MIS/DEIS as opportunities to prune proposed stations with low projected boardings. Despite two studies, SEPTA failed to recognize that projected boardings at some stations would be unacceptably low, and did not take these stations out of the proposal, which would have lowered both cost and running time, increasing the cost-effectiveness of the project.

For SEPTA, avoiding such a rationalization is contrary to the recommendation of the March 1997 Phoenix audit of SEPTA which concluded that SEPTA needs to reduce the number of stops on commuter, light rail, and heavy rail lines. Of all of the commuter rail systems within the United States, SEPTA by far has the closest station spacing density. This is true even if surrogate rapid transit lines (Chestnut Hill East and West and Fox Chase) are discounted. Station spacing which is too close increases travel time and operating costs and decreases revenue.

All of the following stations but Oaks have either been:

1. Added since the 1998 SVM Feasibility Study;
2. Proposed for discontinuance in recent years; or
3. Actually discontinued with service bypassing the site to this day.

We know of no significant transit-oriented development projects that would meaningfully change projected ridership at these stations.

1. **Reading Outer Station** is approximately just 0.5 miles north of the proposed Reading BARTA intermodal station, it is not within walking distance of the Reading city shopping outlets or anything else that would significantly generate additional ridership.

2. **Limerick** is not within walking distance of anything that would significantly generate additional ridership. Park and ride patrons can access other stations.

3. **Oaks** is just 0.44 miles from Perkiomen Junction Station. According to the previous study, the two stations have the lightest activity of any of the commuter rail stations between Douglasville and Conshohocken (inclusively). Perkiomen Junction station can be accessed from the eastern shore of the Schuylkill River via Pawling Rd. Accessing Oaks adds

approximately 2.5 miles of circuitous running to the service. This routing off of the former Reading Railroad line and Oaks station stop itself adds approximately four minutes to the running time.

4. **Miquon** is presently an active station on the R6 Norristown Line. It is lightly patronized. The Regional Rail Ridership Census 1997 found the station to have 82 boardings on the weekdays.

5. **52nd Street** already is well served by the Subway-Surface system. Stopping R5 trains, as planned, will slow its service and impact ridership. For the alternatives which exclusively use commuter rail, 30th Street Station works as a transfer point for reverse commuters.

6. **Allegheny station**, little used, was once slated by SEPTA for closure. Political intervention kept it open. The Regional Rail Ridership Census 1997 found the station to have 43 boardings on the weekdays.

Not necessarily are each and every one of these stations a bad idea. However, SEPTA seems to be inclined to strongly favor pleasing area elected officials and other interests over developing a cost-effective project. The indiscriminate inclusion of stations also adds a greater percentage of capital cost to Alternatives 1D, 1E and 2D over Alternatives 5E, 5ET and 6.

Section Four

Operating Costs: Underestimated for Alternative 6; Overestimated for Alternatives 1D and 2D

The operating costs are erroneously underestimated for Alternative 6 and erroneously overestimated for Alternatives 1D and 2D.

Operating Cost Underestimations of Alternative 6

Until late in the MIS/DEIS process (beyond the development of the first draft of "Short List Evaluation" data), Alternative 6 was a light rail alternative. Its operating and maintenance (O&M) costs were modeled on the light rail unit costs of the Route 100. As late as February 10, 2000, SEPTA still had its sights on getting 27 cost-saving FRA waivers for Alternative 6 (see Appendix G).

Suddenly, in response to an outside peer-review of the study by David Gunn, Alternative 6 ended up as commuter rail which utilizes heavier equipment and is more stringently regulated than light rail. SEPTA proposes operating Alternative 6 trains without conductors. Nevertheless, its commuter rail equipment weight and the O&M regulations should significantly increase its unit O&M costs above that of light rail. The higher labor costs of railroad engineers over light rail operators should make the O&M cost difference only more pronounced. In the Executive Summary of the Schuylkill Valley Metro Alternative 6 Vehicle Report, SEPTA acknowledges:

1. On page 3, "the increased operating costs of railroad-qualified operating personnel";

2. On page 3, "the greater car weight per passenger required on railroad-compatible rolling stock"; and

3. On page 8, "In terms of weight and cost per seat, on FRA-compatible cars these factors will be greater than light rail cars, and maintenance costs will likewise be somewhat higher due to mandated features and overhaul intervals. Power costs will also be noticeably higher."

In the end, Section 6.2 of Volume I of the MIS/DEIS claims:

> [A] sensitivity analysis was performed by applying SEPTA's commuter rail cost model, modified to reflect MetroRail's staffing and operating characteristics. Specifically, the model was adjusted to reflect elimination of conductors on the trains and to add the cost of staff to cover monitoring and enforcement of the proposed self-service fare collection system. This resulted in an increase from $29.3 to $30.4 million in MetroRail's estimated incremental annual operating costs.

Such a small increase as a result of a proper cost modeling shift is unimaginable. The result is an underestimated O&M cost for Alternative 6. Consider the following table which is derived from: 1) Tables 3.5-1 and 3.5-2 of Volume I of the MIS/DEIS; 2) the adjustment factor cited in the preceding paragraph; and 3) Exhibit 3-2 of Deliverable 8.1, *Results Report: Patronage Forecasting*.

Wyomissing-Center City Service

Description	Alternatives		Difference
	1E	6	
O&M Cost	$22.6 M	$34.1	51%
Unlinked Boards	13,960	28,210	102%
O&M Cost per Unlinked Boarding	$1,619	$1,209	-25%

The Wyomissing-Center City service of Alternative 6 has twice the number of trains and is estimated by SEPTA to carry twice the number of passengers of that of Alternative 1E. Yet, the Alternative 6 service only incurs an approximately 50 percent increase in O&M costs. On an O&M cost per unlinked boarding, SEPTA asserts that it is 25 percent lower for Alternative 6 as compared to Alternative 1E. This savings cannot be fully explained by the elimination of conductors on the trains.

Upon DVARP's urging, SEPTA calculated the O&M costs on a one-conductor-per-train operation (regardless of the consist length) variation of Alternatives 1D, 1E, and 2D. (This would be just as the Miami area commuter rail line is operated.) SEPTA determined that this operational variation would result in the average number of conductors per consist dropping from two to one and would lower the alternatives' total O&M cost by six percent. By multiplication, one could hope that dropping the average conductor staffing from two down to zero would lower the total O&M cost by a maximum of twelve percent. However, eliminating the last conductor on the train would require a new dedicated staff of proof-of-payment spot fare checkers and a dramatic increase in security staff on the 62-mile line. The PATCO Police operating budget for 2001 is $2,933,711 for the 14.2-mile line (see Appendix H). The annual unit cost amounts to $206,604 per mile.

DVARP insists that SEPTA fully detail the O&M calculations of the Wyomissing-Center City service for:

- Alternative 1E;
- Alternative 6 with the light rail cost model; and
- Alternative 6 with the commuter rail cost model and subsequent adjustments.

Comparing just the Wyomissing service for just the two alternatives will help simplify the comparison.

DVARP is highly skeptical of the initiative to reduce the conductor staffing of Alternative 6 or the commuter rail trains of any other alternative down to zero:

1. It requires new, dedicated staff of proof-of-payment spot fare checkers;

2. It dramatically increases security costs (or at least it should with a responsible analysis);

3. It requires the construction of expensive full high level platforms (HLP) -- an infrastructure which interferes with freight train clearances and yet would not permit wheelchair-bound passengers to board or alight without crew assistance due to Pennsylvania's minimum distance requirement between HLP and track center;

4. Under federal regulation, numerous, sometimes-needed, train movements require a minimum train crew size of two (i.e, proceeding through a grade crossing that has non-functioning crossing signals);

5. It is completely unprecedented in North America and SEPTA's experience with novel technologies and operating modes is not cause for optimism; and

6. To DVARP's knowledge, neither Amtrak nor Norfolk Southern has given any indication that they will accept conductor-less trains on any of their track.

Operating Cost Overestimations of Alternatives 1D and 2D

The operating costs are erroneously overestimated for Alternatives 1D and 2D. DVARP has found that certain unit costs for the diesel locomotive hauled coaches ("diesel") within the study's Annual Operating & Maintenance Cost Model are inflated. **Train Miles** and **Track Miles** unit costs are too high for diesel. The operating and maintenance costs of electric power infrastructure (Facilities Maintenance category) that are allocated to Train Miles and Track Miles in the EMU Unit Costs are carried straight over to the diesel unit costs. SEPTA's erroneous and embarrassing rationale for this is that the cost of maintaining dozens of miles of catenary and multiple power substations is equivalent to maintaining one pumping station for diesel fuel. This error contributes to a significant overestimation of the O&M costs for Alternatives 1D and 2D.

SEPTA also has grossly overestimated **vehicle maintenance and inspection** unit costs for diesel. Presently the annual cost per peak coach is $76,512. The annual cost per peak EMU is $88,072. With this, SEPTA is saying that an unmotorized vehicle lacking any cab controls costs only 13 percent less to maintain than what it costs to maintain a powered vehicle, with control equipment and high-voltage equipment, and that for regulatory and inspection purposes, counts as a locomotive.

As for the projected annual cost per peak (diesel) cab (car), it is $90,423. This is more than the annual cost per peak EMU -- a ridiculous assertion. With this, SEPTA is saying that a vehicle with no power equipment costs more to maintain than a vehicle with motors, blowers, power equipment, and many other components the cab car does not have. This does not seem grounded in reality.

The projected annual maintenance and inspection cost per diesel locomotive also may be questionably high at 3.3 times that of the EMU cost. Both vehicles have the same FRA mandated inspections. Both are powered vehicles. While the horsepower rating for a locomotive is higher, it does not provide any seating capacity. The 3.3 times higher cost appears to be excessive.

SEPTA's Annual Operating & Maintenance Cost Model for Commuter Rail (1997 Dollars)

	Variable	Diesel Locomotive Hauled Coaches Unit Cost	EMU Unit Cost
A.	Train Hours	$58.16	$58.16
B.	Train Miles (also referred to as "Vehicle Miles" in the Estimation Methodology)	$2.14	$2.14
C.	Train Miles (Fuel)	$1.67	
C.	Car Miles (electricity)		$0.48
D.	Total Coaches (Vehicle maintenance & inspection)	$76,512	
D.	Total Cabs (Vehicle maintenance & inspection)	$90,423	
D.	Total Locomotives (Vehicle maintenance & inspection)	$292,865	
D.	Peak Vehicles (Vehicle maintenance & inspection included for EMU, not for Diesel)	$239,300	$327,372
E.	SEPTA Track Miles	$45,134	$45,134
E.	Amtrak Miles	$69,308	$69,308
E.	Total Track Miles	$13,826	$13,826

In took repeated questioning of SEPTA and its consultants to disclose and explain the parenthetical qualifiers of the above Category D costs. Once they were identified, their disassembly was possible facilitating an apples-to-apples comparison. SEPTA's erroneous premise: annual maintenance and inspection cost per coach is almost as high as that per EMU; and annual maintenance and inspection cost per unpowered cab cars is higher than that per EMU (see below).

Disassembled Annual Peak Vehicle (Category D) Costs

	Variable	Diesel Locomotive Hauled Coaches Unit Cost	EMU Unit Cost
D.	Total Coaches (Peak Vehicle maintenance & inspection)	$76,512	
D.	Total Cabs (Peak Vehicle maintenance & inspection)	$90,423	
D.	Total Locomotives (Peak Vehicle maintenance & inspection)	$292,865	
D.	Total EMUs (Peak Vehicle maintenance & inspection)		$88,072
D.	Peak Vehicles (Excluding vehicle maintenance & inspection)	$239,300	$239,300

This mistaken vehicle maintenance and inspection cost projection comes to an additional $183,841 per consist and nearly $2 million more per year for the entire fleet.

Annual Maintenance and Inspection Cost Per Peak Consist

EMU

Vehicle	Unit Cost	Units Per Train	Cost Per Train
EMU	$88,072	6	**$528,432**

Diesel Locomotive Hauled Consist

Vehicle	Unit Cost	Units Per Train	Cost Per Train
Locomotive	$292,865	1	$239,300
Coaches	$76,512	5	$382,560
Cab Car	$90,423	1	$90,423
Complete Consist			**$712,283**

This error combine with the flawed diesel Train Miles and Track Miles unit costs amounts to disturbing overestimation of the O&M costs for Alternatives 1D and 2D.

A Tangential Look at SEPTA's Obsession with Electrified Service

Outside of the Philadelphia region, every new or extended commuter rail line in the last two decades has been diesel (except for service on electrified Amtrak lines and South Shore's terminal relocation in South Bend). The very few electrifications of the past two decades have been on existing lines that have had proven success as diesel. SEPTA is going counter to the practice at every other railroad: the practice of beginning new or extended lines with basic levels of service and investment, and incrementally adding service and infrastructure as ridership grows.

SEPTA staff is correct in saying that the EMU cars that they have in mind for the project are similar to those in use on the Long Island Rail Road and Metro-North Commuter Railroad. It is also true that these commuter rail operators also own and utilize a sizeable fleet of modern dual-mode locomotives. Even in the New York City area with its higher population densities, a one-size-fits-all approach is rejected. Sound public transportation planning cannot come from blind adherence to one technology dogma or another or by putting management's convenience ahead of the riders' and taxpayers' interests. Sound public transportation planning means choosing appropriate technology.

The biggest factors that drove the push for electrification in the early part of the 20th Century were superceded in the latter half of the century:

1. EMU consists could operated equally well in either direction, and, therefore, eliminated the need to turn the train or a least its engine around at the terminus points. Modern diesel

locomotive-hauled push-pull consists eliminate the requirement to have the locomotive at the head of the train or for it to be facing forward; and

2. Electric trains could operate through tunnels and into enclosed stations. Modern, dual-mode locomotives which are available from General Electric and General Motors enable access through these facilities. Furthermore, Bombardier has proposed manufacturing diesel multiple unit (DMU) cars which can split and merge with EMUs and can be pulled (unpowered) by EMUs through the Center City tunnel (see Appendix I). Such is what occurs today in Denmark.

SEPTA is the only commuter rail system in North America that relies exclusively on electric power. It also has the shortest average route length of any commuter rail system in the U.S., other than the start-up service in Syracuse. There is a strong correlation between those two characteristics. SEPTA's past insistence on electrification is the reason SEPTA has failed to expand its rail network to the outer reaches of our region and the reason the region missed an opportunity to make sensible links between land use and transportation planning as sprawl took over our region in the past 20 years.

Rigid 'Clockface' Schedule Service Plan Disadvantages Alternatives 1D, 1E and 2D

For all of the alternatives, SEPTA planned a 'clockface' schedule. A liberal, consistently high frequency operating policy is more warranted for Alternatives 5E, 5ET and 6 with their lower unit operating costs. For Alternatives 1D, 1E and 2D with their higher unit operating costs, deliberate and judicious service planning for various market conditions in both directions is warranted and normally planned in commuter rail operations. Examples follow for which the lifting of arbitrary restrictions would positively impact the efficiency of Alternatives 1D, 1E and 2D:

1. For the Reading-Philadelphia service, off-peak headways of **about** one hour could save costs over rigidly adhering to headways of exactly 60-minutes. If equipment cycle times lend itself well to 65 or 73 minute headways, for instance, SEPTA incurs significantly more costs to provide service at exactly 60-minute headways;

2. For the Reading-Philadelphia service, Sunday headways of approximately 90 minutes or two hours would save costs while in all likelihood having a much smaller impact on the annual ridership;

3. Gaps in the off-peak and weekend schedule, where there would be longer headways, are acceptable if they help reduce operating costs. They may be particularly useful around noon (to allow for the crew to eat lunch) and in mid-evening; and

4. For the reverse peak service, SEPTA planned for two morning arrivals into Reading before 7:45 am. It is unimaginable how this could be warranted. SEPTA should not have planned the same level of reverse-peak service for Reading as it planned for the peak direction. Justified thirty-minute headways over two-plus hours for one market orientation should not have automatically equated to the justification and the planning of the same for the reverse

market. A more rational planning would have not only yielded significant savings in O&M costs but also in capital equipment costs as they are driven by the planning for the peak period.

Ignoring such possible service planning efficiencies does much to disadvantage Alternatives 1D, 1E and 2D.

Section Five

Unfavorably Biased Service Route Plan for Alternatives 1D, 1E and 2D

The service route planning of Alternatives 1E, 1D and 2D was done in a manner which repressed their ridership and political support and was contrary to the requests of the Montgomery Planning Commission.

Alternatives 1E, 1D and 2D all include a local EMU service which runs from Center City, Philadelphia to Port Kennedy. Passengers would get to the King of Prussia Mall (KOP) via the a transfer at Port Kennedy to the extended Route 100. Alternative 6 provides direct local service from Center City to the KOP. Its local service does not terminate at Port Kennedy but continues on to the KOP providing an attractive, highly marketable one-seat ride. The Montgomery Planning Commission recognized the value of such a one-seat ride. It repeatedly asked SEPTA to extend the Center City-Port Kennedy local EMU service of Alternatives 1D, 1E and 2D beyond Port Kennedy to KOP rather than extending the Route 100 all the way to Port Kennedy. SEPTA repeatedly refused apparently giving the impression that:

1. Such a routing between Port Kennedy and KOP was possible for a light rail vehicle technology (which Alternative 6 was originally); but

2. Such a routing was not possible for a heavier commuter rail vehicle technology.

This decision by SEPTA eventually reflected a high degree of bias toward the high frequency alternatives. After Alternative 6 adopted a heavy commuter rail vehicle technology, its local service from Center City was not cut back to Port Kennedy nor was the local service of Alternatives 1D, 1E and 2D extended to the King of Prussia Mall. This decision represses the forecasted ridership and the political support for Alternatives 1D, 1E and 2D.

Section Six

Travel Time Assumptions: Favorably Biased for Alternative 6; Unfavorably Biased for Alternatives 1D, 1E and 2D

The travel time for Alternative 1D and 2D are unfavorably biased. Travel times should be based on actual train performance, not worst train performance. SEPTA based the travel time of Alternatives 1D and 2D on the acceleration rate of six-car trains when actually only two of the roundtrips require a train with more than four coaches. General Electric's DC third rail-diesel dual-mode locomotive, a production unit, requires one-third less distance, almost a mile, to accelerate from zero to 70 mph when pulling four loaded coaches instead of six. This bias against locomotive-hauled trains significantly lengthens their travel time for every run but two. A fair approach would have factored an average travel time rather than taking the worst travel time.

The projected Reading to Pottstown travel time is actually slower than actual times in 1950, even with a higher top speed. More specifically, the BARTA ITF-Pottstown schedule time is inflated at 28 minutes for Alternative 1D and 2D and 26 minutes for Alternative 1E. Past service between these locations with one intermediate stop was scheduled at 24 minutes going back at least as far as 1950. With an additional stop, a higher top speed of 75 mph instead of 60 mph, and quicker acceleration on most trains, the scheduled travel time should be 25 minutes for Alternative 1D and 2D and 24 minutes for Alternative 1E.

The sub-optimal travel time of Alternatives 1D, 1E and 2D:

- Lowers ridership;
- Raises operating costs; and
- Raises capital costs by elongating equipment cycle time.

This is quite a contrast to the Alternative 6's vehicle which SEPTA counts on and has modeled to accelerate at least 50-percent faster than any other EMU in North America, 3.0 miles-per-hour-per-second (mphps.). While this high acceleration EMU is applied to Alternative 6, it is not applied to the EMU components of Alternatives 1D, 1E and 2D. Instead, a conventional acceleration EMU is applied to these alternatives. While the exact acceleration rate is unclear, SEPTA utilized a factor somewhere between 1.5 mphps and 2.0 mphps.

Furthermore, the service in Alternatives 1D, 1E and 2D was restricted to a top speed of 75 mph despite early assurances that it would be 79 mph. SEPTA's stated rationale is that it wanted to avoid the possibility of exceeding the 79 mph speed limit associated with the planned FRA class of track. Such a cautious approach to avoid an FRA speeding ticket is usually not the approach of commuter rail operators. It certainly did not inhibit SEPTA in its planning of Alternative 6. For it, SEPTA planned a 79 mph. top speed. These contrasts between Alternatives 1D, 1E and 2D and Alternative 6 amount to a highly uneven approach.

Section Seven

The Track Plan for Alternative 6 Is Unworkable and Fatally Flawed

DVARP has analyzed infrastructure and service proposals for Alternative 6, commonly called MetroRail, contained in the MIS/DEIS. DVARP finds that the MetroRail plan is **impossible** to implement as SEPTA proposes. SEPTA's desired level of service, on which ridership projections are based, cannot be achieved with the planned infrastructure improvements, because there are too many single-track segments and they are too long. These conclusions hold true even when assumptions most favorable to the SEPTA plan are made.

In order to successfully operate the projected level of service, SEPTA must either lengthen the double-track segments of the new route, significantly increase projected running times between Norristown and Reading, or share track with Norfolk Southern over a substantial part of the route.

Almost immediately upon reviewing the engineering drawings for the project, DVARP was struck by the amount of single track assumed in Alternative 6. Knowing of the problems single-track segments pose to the reliability of high-frequency passenger rail service, DVARP analyzed the track plan to see if it would be capable of supporting the 15-minute peak service frequency that SEPTA considers an essential element of the plan.

All data in this analysis is based on SEPTA's own figures. The sources of all figures and details of the calculations are documented in Appendix J, so these findings can be easily verified.

The Single-Track Segments

DVARP used track plans contained in Appendix 3 to the MIS/DEIS as the basis for this analysis of the proposed MetroRail infrastructure. These are detailed engineering drawings mapping the entire route of the proposed service, drawn to scale and including precise locations of stations, curves, grade crossings, and other landmarks.

From this information, DVARP ascertained the location and distance of all single-track and double-track segments between Port Kennedy and the end of the line in Wyomissing. For convenience, DVARP assigned a name to each track segment. The segments are listed in Table 1. Our assessment of the single-track segments included in the proposal is confirmed in the MIS/DEIS document, section 3.1.1.3.

(DVARP assumes that the double-track infrastructure between Philadelphia and Port Kennedy will have sufficient capacity for the proposed service, but conflicting movements at Port Kennedy to and from the King of Prussia branch could cause constraints on scheduling Reading trains over and above the constraints DVARP will demonstrate in this report. DVARP recommends that SEPTA's engineering consultants perform a complete analysis of proposed schedules through the Port Kennedy complex.)

Single- and Double-Track Segments

Name	Start	End	Length (miles)	Tracks	Stations Contained
Wyomissing	62.61	62.43	0.18	2	none
Outer	62.43	60.34	2.09	1	Wyomissing, Reading Outer
ITF	60.34	59.09	1.25	2	BARTA ITF
Titus	59.09	54.70	4.39	1	
Exeter	54.70	52.05	2.65	2	Exeter
Birdsboro	52.05	47.92	4.13	1	
Douglassville	47.92	44.66	3.26	2	Douglassville
Pottstown	44.66	41.72	2.94	1	Pottstown
Lower Pottsgrove	41.72	40.15	1.57	2	Lower Pottsgrove
Limerick	40.15	35.42	4.73	1	Limerick
Royersford	35.42	33.24	2.18	2	Royersford
Tunnel	33.24	30.29	2.95	1	
Phoenixville	30.29	26.23	4.06	2	Phoenixville
Perkiomen Jct.	26.23	21.36	4.87	1	Oaks, Perkiomen Jct.
Port Kennedy	21.36	17.20	4.16	2	Port Kennedy, Norristown

Schedule

The published MIS/DEIS document does not contain schedule information any more detailed than the endpoint running times in Table 3.3–1. Therefore, to create a projected schedule for Alternative 6, DVARP relied on station-to-station running times from the SEPTA document called: "Train Performance Estimation Spreadsheet: Alternative 6 Light Rail via Center City Tunnel–Express." The document was supplied by SEPTA to the Project Technical Advisory Committee and is reproduced in the Appendix. The times in this document (92 minutes from Wyomissing to Suburban Station via Cynwyd) are consistent with the times in MIS/DEIS Table 3.3–1 (97 minutes from Wyomissing to Market East via Cynwyd and Suburban Station), so DVARP concludes there have been no changes to the projected running times since the "Train Performance" document was completed.

The "Train Performance" document indicates a dwell time of 20 seconds at each station. DVARP has incorporated that dwell into our schedule model but has not accounted for acceleration or deceleration, nor for possible speed restrictions. These elements would be expected to shift train

times at any given point on the line by no more than a few seconds, and have no effect on our conclusions.

Service Frequency

Section 3.3.2 of the MIS/DEIS document states that Alternative 6 (MetroRail) service from Wyomissing to Philadelphia will operate every 15 minutes during peak periods (hours not specified in the report) and every 30 minutes during off-peak periods. Over the course of the study, SEPTA has argued that high-frequency service will yield a significant increase in ridership over levels of service with the commuter rail alternatives: every 30 minutes peak and every 60 minutes off-peak

The MIS/DEIS does not distinguish between peak period-peak direction service and peak period-reverse peak service, so DVARP presumes SEPTA intends to operate the 15-minute frequencies in both directions. Assuming a lower reverse-peak frequency does not change the conclusions of this analysis.

Model

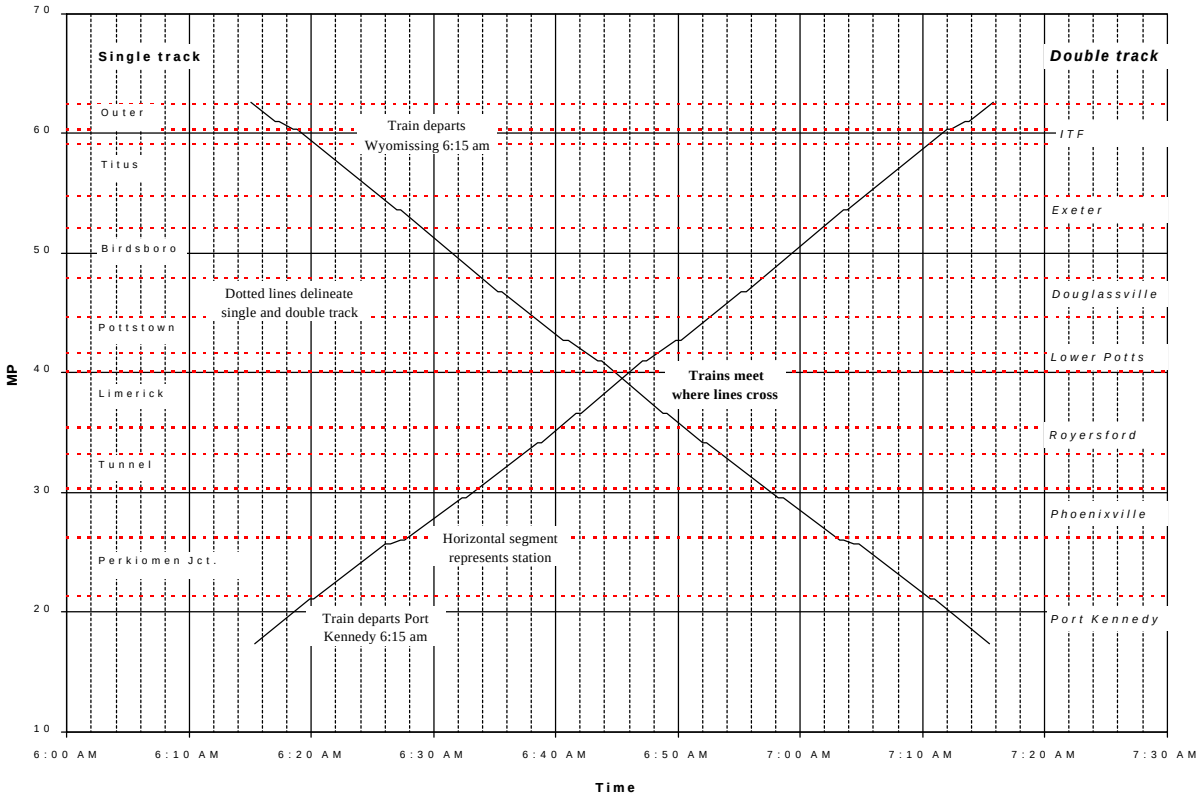
DVARP created a sample schedule using a computer spreadsheet. Milepost locations of each station were entered in one column, and arrival and departure times at the stations were entered in another column. From any desired departure or arrival time at Wyomissing, DVARP could calculate the scheduled arrival and departure at all the other stations. A series of sample trains arriving and departing in each direction at 15-minute intervals was set up. A sample page of the spreadsheet can be found in the Appendix.

The program also plots a time vs. distance graph of the type widely used in transportation system planning. These graphs are especially useful in planning rail services over single-track segments because each point where lines cross represents a scheduled meet between trains.

Each train is represented by a solid diagonal line. Lines running from bottom left to top right represent westbound trains (to Wyomissing) while lines running from top left to bottom right represent eastbound trains (to Port Kennedy and Norristown). Separate times are used for arrival and departure at each station, so station stops can be identified in the graph as short horizontal segments within each train schedule line. The top of each line represents time leaving or entering Wyomissing station, and the bottom of each line represents time entering or leaving Norristown Transportation Center.

Dotted horizontal lines have been plotted to identify the beginning and end of each single-track segment. Reference names for single-track segments are found in the left margin while references for double-track are found in the right margin. Vertical lines for time are plotted every two minutes.

Figure 1. Sample Schedule Graph



<u>The First Single-Track Segment is Too Long for Reliable Operation</u>

Upon examination of Figure 1, we can see that it will take approximately 7 minutes, 20 seconds for the head end of a train to pass through the first single-track segment, 4.87 miles between Port Kennedy and Oaks (the Perkiomen Junction segment). If trains are to operate every 15 minutes through any single track segment, trains can take no more than 7 minutes, 30 seconds to run through and clear the single track.

In fact, our assumptions about the time necessary for each train to pass through and clear the Perkiomen Junction segment are conservative. The model assumes the train is of zero length. In fact, a rush-hour train made up of four 85-foot MetroRail vehicles (MIS/DEIS Table 3.1–3) moving at 30 mph will take 8 seconds to completely pass a particular point. The model assumes that trains clear the single track segment the moment they clear the point of the switch. In fact, the clearance point of a switch (the point where two trains may safely pass each other) is located 100 feet or more from the switch itself (the exact figure depending on switch geometry), and the signal governing entrance to the single track will be located some additional distance from that clearance point. Finally, a period of time is necessary for even automated systems to detect that the single track is clear, throw and lock the switch, and clear the signal so the waiting train can proceed. Even under the best conditions, this will take at least ten seconds.

Therefore, DVARP concludes it will take more than 7 minutes, 30 seconds for each train to pass through and clear the single track between Port Kennedy and Oaks. Even with a railroad operation of unprecedented precision, it would be impossible to operate service every 15 minutes over this segment. In reality, some extra time in the schedule is necessary to allow for normal variations in running time as well as for minor delays to trains. Without that time, a single train delay will propagate throughout the system, and cause every succeeding train the rest of the day to be late.

The Second Single-Track Segment Forces Trains to Wait for a Meet

Even if we assume trains can be scheduled at 15 minute intervals through the Perkiomen Junction single track, the meets necessary at each end of this segment determine the scheduling of trains through the rest of the line.

The bottom of Figure 2 shows how trains can be scheduled through the Perkiomen Junction segment under ideal circumstances. Meets (intersections of the diagonal lines) occur at either end of the segment. The next scheduled meet is at MP 32, in the middle of the tunnel in Phoenixville. It would be difficult, if not impossible, to provide double track there for the meet. Therefore, in order to resolve this conflict, outbound trains must hold for six minutes at Phoenixville (Figure 3a) or both inbound and outbound trains must hold for three minutes at Phoenixville (Figure 3b).

The increase in running time necessary to resolve the scheduling conflict can be expected to cause a decrease in projected ridership.

Figure 2. Train Paths Conflict in the Phoenixville Tunnel

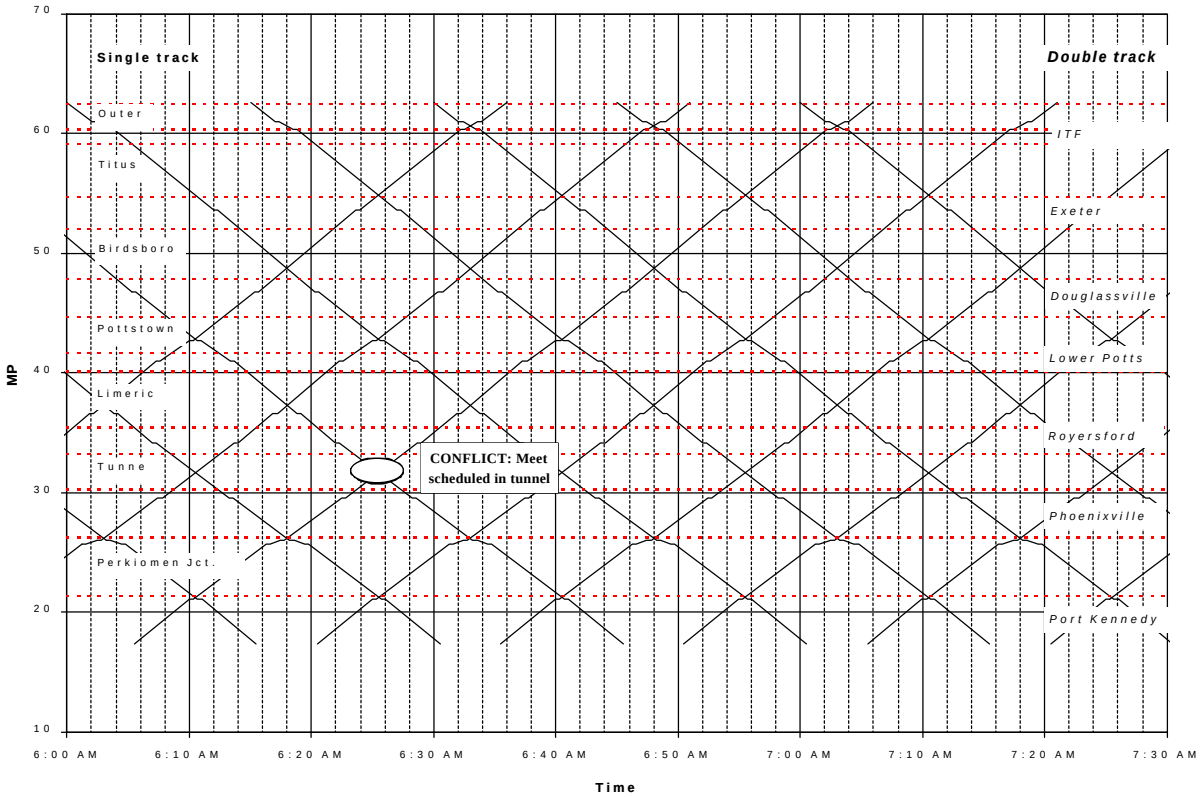


Figure 3a. Six Minute Hold for Outbound Trains

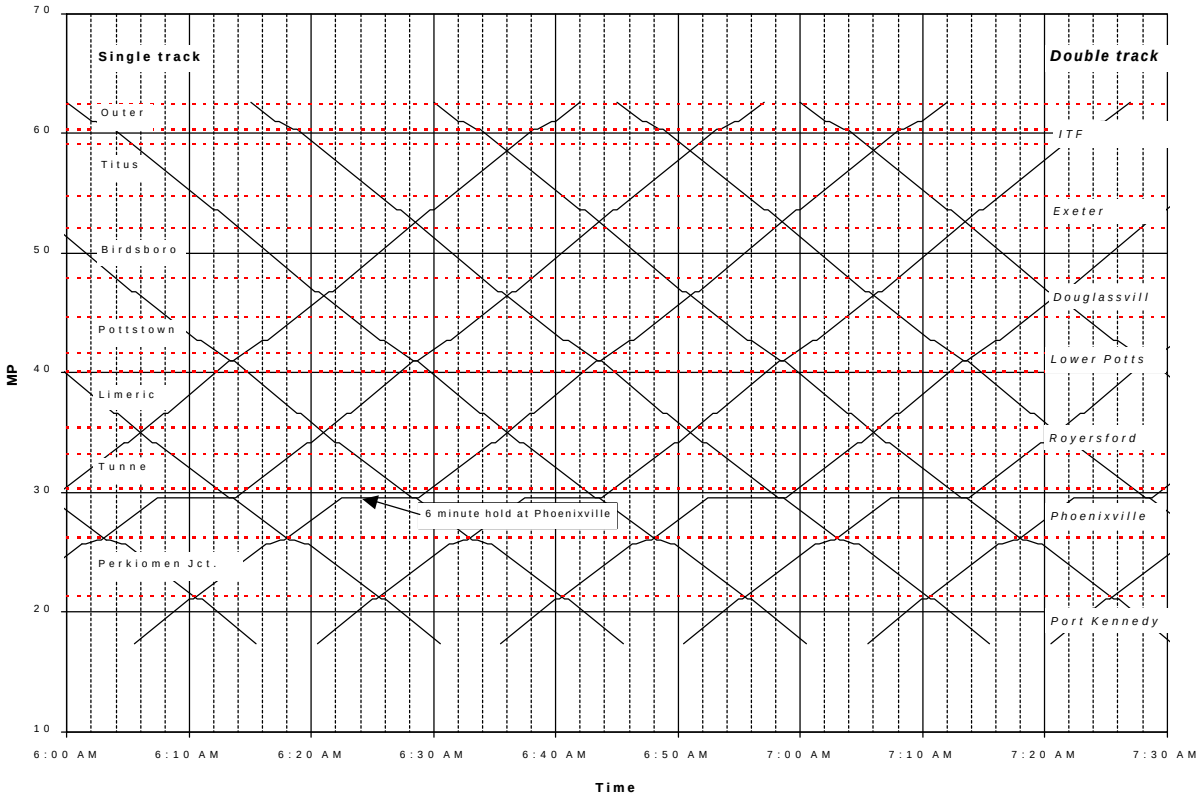
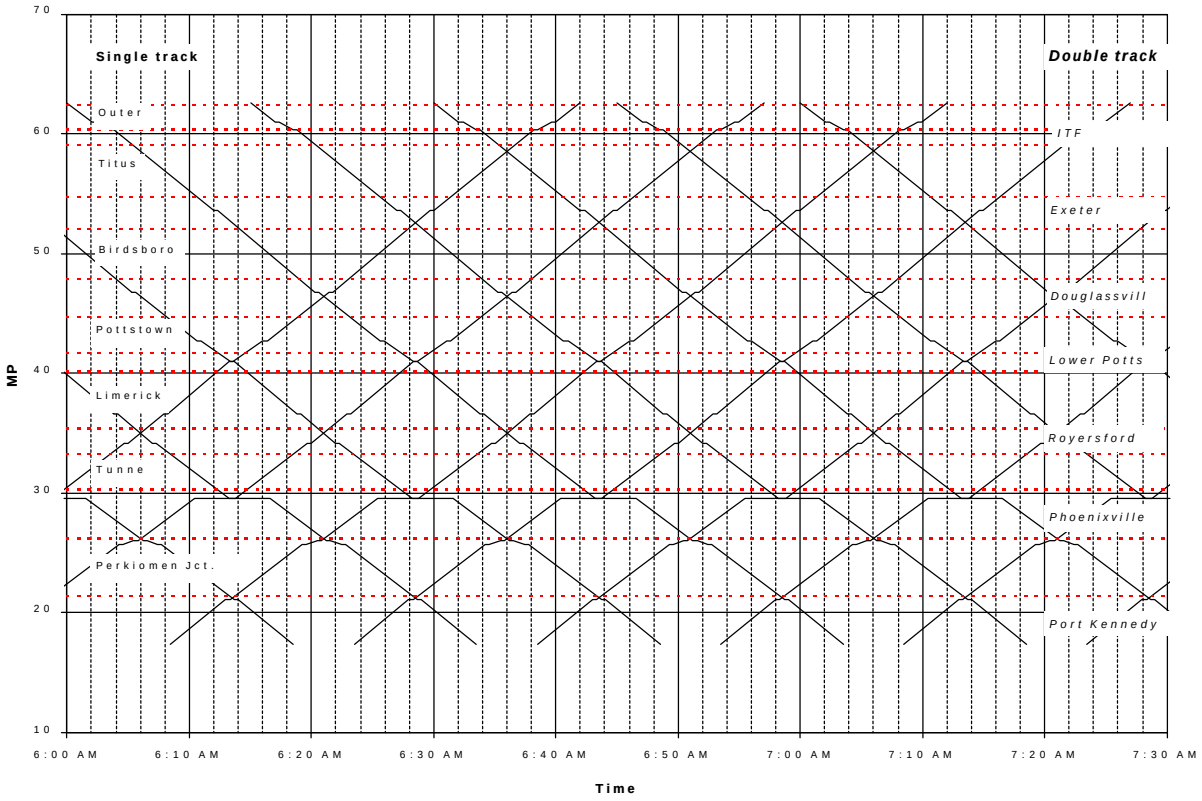


Figure 3b. Three Minute Hold for Inbound and Outbound Trains



Additional Conflicts Will Occur Farther Up the Line

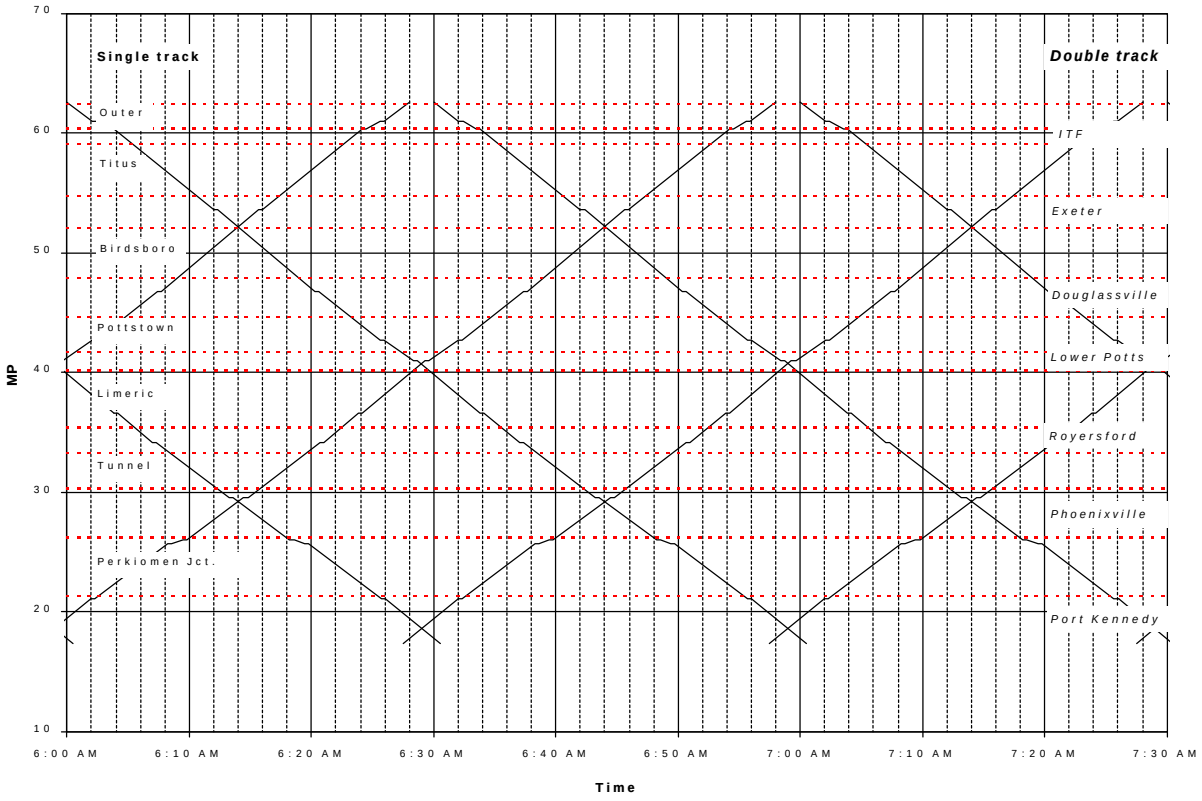
Resolving the schedule conflicts at Perkiomen Junction and in the Phoenixville tunnel is not the end of problems caused by SEPTA's excessive reliance on single track in the MetroRail plan. Figure 3 shows that additional meets will be necessary at points where the design calls for single track. Resolving some of them may require lengthy waiting time. Because the previously-mentioned conflicts completely invalidate the MetroRail plan, DVARP has not attempted to construct schedules that fix these problems.

Reducing Train Frequency Reduces, But Does Not Eliminate, the Conflicts

Figure 4 shows the effect of reducing service to every 30 minutes.

At a compromise peak frequency of every 20 minutes, the first three meets can be scheduled on double-track, but there will be conflicts further up the line.

Figure 4. Some Scheduling Conflicts Remain When Trains Are Scheduled at 30-Minute Intervals



Discussion

The MetroRail plan as envisioned by SEPTA in the Schuylkill Valley MIS/DEIS is fatally flawed. Because of SEPTA's insistence on having its own tracks dedicated to passenger trains, and

Norfolk Southern's retaining two tracks for its own use, more than half the new route between Norristown and Reading must be single track. Location of the double-track segments is constrained by tunnels, bridges, cuts, and other physical features of the right of way. As a result, it is impossible to operate trains at the frequency and speed desired by SEPTA, and assumed in the study's ridership and revenue projections.

There are only four ways that the plan can be modified so SEPTA can operate all the way to Wyomissing on its own dedicated track:

1. Obtain new right of way, by purchase or condemnation, and construct additional double track;

2. Shift some freight trains to another route such as the Enola Branch (now partially-abandoned) so Norfolk Southern can operate on a single track for all or part of the Reading-Norristown route;

3. Increase running times substantially to allow for trains to meet; and

4. Reduce peak frequency in both directions to every 30 minutes.

All of them adversely impact the cost-effectiveness calculations on which the choice of MetroRail as locally-preferred alternative was made, and thus call that choice into question. DVARP does not doubt it would be possible to modify the infrastructure plan in one way or another to increase the amount of double track for SEPTA's use. However, this will add substantially to MetroRail's already-exorbitant cost.

This confirms what DVARP has known since the Schuylkill Valley Metro project was first conceived, and what DVARP has been warning SEPTA throughout the study process: the only reasonable way to extend passenger train service to Reading is with track-sharing between passenger and freight trains over a large portion of the route.

Section Eight

Unrealistic Financial Plan

SEPTA's financial plan to move forward with Alternative 6 lacks federal precedent and state support. It calls for more than $1.2 billion in federal funds for this single line. To DVARP's knowledge, the FTA has never contributed a billion-plus dollars to a single passenger rail line project whether it be commuter rail, rapid transit or light rail. With its application to the FTA, SEPTA has called on the federal government to cover 80-percent of the project's capital cost. In these times, even projects that have been planned with the utmost professionalism and integrity only hold well-grounded hope for receiving 50- to 60-percent of their needed funds from the federal government.

As for the remaining capital cost, SEPTA submits in its application for federal "New Starts" grant money that the Pennsylvania Department of Transportation (PennDOT) shall pay the full remaining 20-percent, $366.4 million. The Pennsylvania State Legislature has authorized a maximum of $300 million for the project. Furthermore, SEPTA has ignored PennDOT's repeated and sometimes publicly stated position that PennDOT will not stray from its longstanding requirement that local governments contribute one dollar for every five dollars contributed by the state for the cost of major transit projects–particularly for a billion-dollar-plus Schuylkill Valley Metro project (see Appendix K).

In addition, PennDOT Deputy Secretary Richard J. Peltz has made it clear in published statements that PennDOT wants a much more rational, less costly project. Most critically, PennDOT has called for a plan that has extensive track sharing between Norfolk Southern and the passenger trains rather than MetroRail's balkanized, uneconomical approach to infrastructure in the current SEPTA/BARTA plan. Furthermore, PennDOT calls for a plan having a more moderate frequency, significantly sharing track with Norfolk Southern and implementing non-electrified service beyond King of Prussia (see Appendix K). DVARP believes that PennDOT Deputy Secretary Peltz is right in his call for the Schuylkill Valley project to:

1. **Significantly share track with the Norfolk Southern.** Alternative 6's plan calls for essentially completely separate tracks. In the business world, companies work together and build synergies when there is benefit to be had. SEPTA appears to be either uninterested in such synergies or unable to understand how they would be able to be made to work;

2. **Plan for a medium frequency of service instead of a high frequency of service.** The high frequency of service requires a much larger investment in track capacity but attracts (when properly modeled) only a relatively small additional number of riders. Alternative 6's plan is for trains to run every 15-minutes in both directions during the AM and PM rush hours between Reading and Philadelphia. In the United States, no other passenger rail line of this length or longer provides such a high frequency due to the cost-benefit; and

3. **Not electrify the tracks beyond the King of Prussia area.** The MetroRail plan calls for the construction of catenary (pick up power lines for electric trains) and power substations all the way to Reading. Outside of the Philadelphia region, every new or extended commuter rail

line in the last two decades has been on non-electrified tracks (except for service on electrified Amtrak lines). For the long distance service between Reading and Philadelphia, one of several possible non-electrified propulsion technologies should be used.

Q **Delaware Valley Association of Rail Passengers**

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Comments on the Schuylkill Valley Metro MIS/DEIS

March 25, 2002

Appendix

Appendix A

Detail Behind the Two Ways of Modeling the Ridership Forecast for Alternative 6

In Section One, DVARP set forth why it is more appropriate to forecast the ridership of Alternative 6 with DVRPC's Commuter Rail model rather than DVRPC's Subway-Elevated model. At the urging of DVARP, SEPTA has modeled Alternative 6 as Commuter Rail but only as an exercise. SEPTA submitted the MIS/DEIS data to the FTA with the ridership forecast of Alternative 6 modeled on Subway-Elevated.

Unlinked Trunk Trips is the sole figure that SEPTA provided us to compare the results of the two modelings of Alternative 6.

Average Weekday Trips

		Unlinked Trunk Trips
Alt. 6 Modeled on Subway-Elevated		47,830
Alt. 6 Modeled on Commuter Rail		34,660

Alternative 6 when modeled on Commuter Rail instead of Subway-Elevated is projected to have 28% fewer weekday unlinked trips on its trunk. While this is enough information to raise doubts about the selection of Alternative 6 as the preferred alternative, it is not enough information to make a good comparison to other alternatives. (For the sake of simplifying comparisons, DVARP focuses on comparing Alternative 6 to Alternative 2D as 2D is most similar to Alternative 6 in routing and, like Alternative 6, does not utilize light rail on the Cynwyd side.)

SEPTA should have presented the number of linked trips for the two compared alternatives (2D and 6) in their entirety rather than solely focusing on unlinked trips for the trunk operation of the alternatives. This is because the trunk operation of the two alternatives differs in length and the number of stations served. For Alternative 6, the trunk operation includes First Avenue and King of Prussia Mall stations in King of Prussia. Alternative 2D's trunk operation does not include these stations nor the Alternative 2D's extension of the Route 100 to these stations and Port Kennedy station where passengers could interchange with the SVM trunk.

This evasion of the linked trips number amounts to double penalty for Alternative 2D.

Penalty #1: Despite Montgomery County's repeated requests, SEPTA refused to structure Alternative 2D so that direct trunk service would be provided from Philadelphia to First Avenue and King of Prussia Mall stations. Not doing this for Alternative 2D but doing this for Alternative 6 penalizes Alternative 2D by discouraging trips from the SVM trunk to these two key King of

Prussia stations. (This lack of direct service also penalizes Alternative 2D in terms of political support.)

Penalty #2: While SEPTA structured Alternative 2D so that no direct trunk service is provided between Philadelphia and King of Prussia, Alternative 2D does include the benefit and the cost of an extension of the Route 100 to the King of Prussia stations connecting with the SVM trunk at Port Kennedy. With SEPTA citing unlinked trips for just the trunk of Alternative 2D rather than the linked trips of the complete alternative, SEPTA veils how close the ridership is between the two alternatives when Alternative 6 is more appropriately modeled on DVRPC's commuter rail model.

In all of its public outreach on the SVM, SEPTA has consistently cited linked trips for the complete alternative -- after all, it is only appropriate to compare the entire benefit of a project to its entire cost. Now, even after repeated requests by DVARP, SEPTA does not reveal the linked trips number for the complete alternative. This in all likelihood would show Alternative 2D capturing approximately 90% of the number of linked trips that Alternative 6 would capture.

Nevertheless, there is one established fact that should give cause for pause. Alternative 6 when modeled on Commuter Rail instead of Subway-Elevated is projected to have 28% fewer weekday unlinked trips on its trunk.

Average Weekday Trips

		Unlinked Trunk Trips
Alt. 6 Modeled on Subway-Elevated		47,830
Alt. 6 Modeled on Commuter Rail		34,660

An estimate of total linked trips for Alternative 6 based on the 28-percent drop in unlinked trunk trips yields 36,059 linked trips. Alternative 2D captures approximately 90% of the number.

Average Weekday Trips

	Linked Trips	**Unlinked Trunk Trips**
Alt. 6 Modeled on Subway-Elevated	49,760	47,830
Alt. 6 Modeled on Commuter Rail *	36,059	34,660
Alt. 2D Modeled on Commuter Rail	32,030	25,680

* The 28-percent drop in linked trips is an estimate based on the 28-percent drop in unlinked trunk trips as documented by SEPTA.

For purposes of verification and to permit a more detailed look at the ridership forecasts, DVARP has request SEPTA to provide in hardcopy and electronic spreadsheet format (e.g., Excel), the Station-to-Station Volumes (Production-Attraction format) spreadsheets for Alternative 6 modeled on Commuter Rail. SEPTA has refused to provide this.

These numbers can be confusing or dizzying; however, an intuitive reality check is available. SEPTA's grant application asserts that Alternative 6 would attract approximately 50,000 weekday trips. This SEPTA-forecasted number is well more than two times that of the 21,000 weekday riders on SEPTA's **high-frequency** R5 Paoli/Thorndale line. Is SEPTA's projection of approximately 50,000 weekday trips for Alternative 6 a reasonable forecast? Quite frankly, DVARP believes that it is preposterously high.

Even as modeled as commuter rail, 34,660 unlinked trips for Alternative 6 seems excessive when compared to the 25,680 unlinked trips of Alternative 2D. It is doubtful that the combined difference in the alternative's frequencies and the service patterns to the King of Prussia Mall are fully responsible for the 35-percent difference in the number of trips. The DVRPC commuter rail model factors headways into its calculations by dividing it by two and capping the maximum resulting factor at 8 (see Appendix B). Hence, the factor for a 30 minute headway alternative is 8 minutes and the factor for a 15 minute headway is 7.5 minutes -- a 6.7-percent difference. It is doubtful that this combined with Alternative 6's one-seat ride to First Avenue and King of Prussia Mall stations can explain a 35-percent difference in the modeling of both alternatives on commuter rail.

Were there different land use or density assumptions made for any of the modelings of any of the alternatives? This is the only thing that DVARP can imagine which would result in such a difference in ridership forecast. If SEPTA answers "no" to the above question. DVARP requests that SEPTA explain in detail the large difference in the projected ridership when Alternatives 2D and 6 are both modeled on commuter rail.

Appendix B

1990 Validation of DVRPC Travel Simulation Models

The following are salient pages of the DVRPC document, "1990 Validation of DVRPC Travel Simulation Models" (published October 1997, Publication No. 97017). The document shows that the Subway-Elevated model overestimates Route 100 riders by 50.5 percent (11,742 simulated riders versus 7,800 actual riders).

There has been no presented evidence the Subway-Elevated model generates valid results for rail lines with any of these characteristics:

1. Mixed surrounding densities;
2. Peak headways that are larger than seven minutes;
3. Off-peak headways that are larger than ten minutes; and
4. Serving mostly non-transit dependent communities.

All of the trunk alternatives of the Schuylkill Valley trunk have these characteristics. With them, only the Commuter Rail model has been shown to forecast ridership that is close to actual ridership.

(*six pages inclusive*)

Appendix C

Various Communications Concerning the Modeling of Alternative 6

A series of communications between the DVRPC Regional Citizens Committee, SEPTA, DVARP, and DVRPC staff concerning the ridership modeling Alternative 6 have been exchanged. (See Section One for an explanation of the key issues concerning these documents.) The documents are:

1. The DVRPC Regional Citizens Committee Schuylkill Valley Metro carried motion of May 16, 2001;

2. SEPTA's Response of June 26, 2001 to #1;

3. The DVRPC Regional Citizens Committee July 26, 2001 Schuylkill Valley Metro Recommendations to the DVRPC Board;

4. DVARP's letter of September 16, 2001 to the DVRPC which includes a one paragraph excerpt from SEPTA's statement in response to #3 at the DVRPC Board meeting;

5. DVRPC's letter of October 10, 2001 in response to #4;

6. The DVRPC Regional Citizens Committee seven questions of October 16, 2001 which are in follow-up to #5 which the DVRPC Board said that they would forward onto DVRPC's and SEPTA's staff for answers. To date, no answers have been provided;

7. Staff Summary of DVRPC Board Response to RCC Recommendations (including #6) presented on October 25, 2001. Note that the DVRPC Board response was that the RCC questions "will be forwarded to DVRPC's and SEPTA's staff for a response"; and

8. DVRPC Regional Citizens Committee January 15, 2002 recommendation urging the DVRPC Board to direct DVRPC staff to answer the RCC questions submitted in #6 followed by the Board's. DVRPC has refused to provide answers to these questions.

(*seventeen pages inclusive*)

Appendix D

Lead DVRPC SVM Expert Critical of Modeling Alternative 6 as Subway-Elevated

John Dawson, DVRPC's representative on the SVM MIS/DEIS Project Technical Advisory Committee (PTAC) and now retired, has gone on record saying that Alternative 6 *should have been modeled as regional (commuter) rail*.

Date: Thu, 3 May 2001 07:39:46
From: "John Dawson" <johnmargedawson@worldnet.att.net>
To: nigro@erols.com

Don,

I do agree that the winning alternative for the Schuylkill Valley Metro should have been modeled as regional (commuter) rail. It might be informative to compare passenger-miles instead of just passengers for the competing alternatives. Alternative 6 included a significant number of short-haul riders, such as from Port Kennedy to King of Prussia or East Falls to Suburban Station. These are not the markets that the SVM is designed to serve.

John

Appendix E

DVARP-known FRA-compliant Passenger Rail Service Extension Projects

The following is the list of DVARP-known FRA-compliant passenger rail service extension projects.

Appendix F

Perkiomen Junction to Phoenixville Alignment: The Circuitous Oaks Detour

The following map illustrates the circuitous routing of the Oaks detour which adds approximately 2.5 miles to the trip. This detour wastefully adds approximately four minutes of running time and considerable capital and operating costs for Alternatives 1D, 1E and 2D. For reasons explained in Section Three, this detour is unidiomatic and oppressive for these alternatives which can share track with freight trains on the existing, historic route.

Appendix G

Costs Savings That SEPTA Once Hoped to Obtain with Alternative 6

Until late in the MIS/DEIS process (beyond the development of the first draft of "Short List Evaluation" data), Alternative 6 was a light rail alternative. It's O&M costs were modeled on the light rail unit costs of the Route 100. As late as February 10, 2000, SEPTA still had its sights on getting 27 cost-saving FRA waivers for Alternative 6 as documented by the following page..

Alternative 6 ended up as a commuter rail which utilizes heavier equipment and is more stringently regulated than light rail.

Appendix H

PATCO's Security Costs for a Conductor-less Passenger Rail Service

The following PATCO letter documents its total operating budget for security in 2001. Its O&M costs for security is $2,933,711. PATCO's system is 14.2-miles. The annual unit cost amounts to $206,604 per mile.

Appendix I

Diesel Multiple Unit Commuter Rail Vehicles

The following Bombardier Transportation letter documents the company's proposal to manufacture diesel multiple unit (DMU) cars for application on the Schuylkill Valley corridor. Such a technology is one attractive alternative to providing costly electrification to Reading, Pennsylvania.

Appendix J

Data Sources and Analytical Methods Utilized to Establish that the Track Plan for Alternative 6 is Unworkable and Fatally Flawed

Verifying the Single Track Sections

Track plan data was taken from Appendix 3 to the DEIS: *Conceptual Engineering Plans*. The document was downloaded from the project web site at www.svmetro.com in February 2001. Plans are dated October 2000.

The configuration of tracks is most clearly described in the Functional Track Diagrams M.LD.01-05. They give the location of all tracks and switches, along with stations, bridges, and other landmarks. While locations are identified by survey station and nominal milepost, precise measurements of single- and double-track sections are not possible from these diagrams. Fortunately, the main MetroRail Alignment sheets M.01-56 include accurate drawings including switch locations and the stations and other landmarks. Survey stations are numbered every 500 feet, with curves and other key points marked with full-precision numbers. These drawings are at 1" to 200 feet scale, allowing measurement of distances to 1/100 mile or greater precision.

Survey stations were used to locate each of the switches—they are identified by a number of the form 1684+44 (west portal of the Phoenixville tunnel). The number represents the distance in feet from a reference point, in this case 168,444 feet (or 31.90 miles). For purposes of this analysis, stations were located to the nearest 100 feet. Precision of distance measurements is therefore ± 0.01 mile, adequate for our purposes.

DVARP took a conservative approach in estimating the length of single-track sections. While DVARP chose a point a small distance from the point of the switch because the entrance of the single track must be clear of the fouling point, we did not adjust for the length of trains passing through. That could add as much as an additional tenth of a mile to the effective length of each single-track segment.

So for example, sheet M.01 shows end of track at station 3377+42, end of double track at 3370, and Wyomissing station extending from 3363 to 3368. The remaining key points from Wyomissing to Port Kennedy were identified and their station locations entered into a computer spreadsheet. Nominal NS, PRR, and SEPTA milepost numbers from the track diagrams were also recorded as a check on calculated distances. The mileposts should not be considered definitive because the line traverses lines with several different sets of mileposts. Station numbers were converted to miles by multiplying by 100 and dividing by 5,280. Then they were normed to SEPTA mileposts, using DeKalb St. in Norristown (MP 17.16, station 978.2) as the reference point. Mileposts used in this analysis may differ from those in study documents because of different reference points, but distances between stations and lengths of single-track segments remain the same.

Configuration of the tracks was verified in Section 3.1.1.3 of the DEIS: *Alignment and Profile–Light Rail Alternatives*. While DVARP confirmed that the plan included these single-track segments, particularly the segment from Port Kennedy to Oaks, several discrepancies between text and diagrams were found. In particular, the text describes Wyomissing as a two-track station while the diagram shows the end of double-track (two tail tracks) just west of Wyomissing. Also, the maps show a balloon configuration for the King of Prussia branch at Port Kennedy, while the text makes no mention of this, suggesting there is only a single connection to the branch.

Time Data

Station to station time data were taken from the project document: *Train Performance Estimation Spreadsheet: Alternative 6 Light Rail via Center City Tunnel–Express*. It models station to station times for each station, then adds 10% to account for "vehicle and operator vagaries." This yields a more realistic simulated schedule. Running time from Wyomissing to Port Kennedy is 56 minutes, to Market East via Cynwyd is 97 minutes. The simulated schedule and running times include a 20-second dwell time at each station.

DVARP has taken these figures as is from the SEPTA documents. DVARP has not attempted to validate SEPTA's assumptions of running times, nor have we attempted to determine if these assumptions account for speed restrictions at switches or possible delays at signals. In reality, signals do not clear immediately when a train clears a single-track segment, so if one train must wait for a meet, the actual waiting time will be longer than the time needed for the approaching train to pass through the switch,

Graphing and Analysis

Once source data was obtained and verified, it was entered into a personal computer spreadsheet (Excel 2000, Microsoft Corp.) for graphing and analysis of possible conflicts. Running times were converted to simulated train schedules. DVARP's base case analysis scheduled trains at 15 minute intervals in both directions, as per SEPTA's description of the Alternative 6 service model (DEIS Table 3.3-1). Only trains continuing west of Port Kennedy were modeled. The entire alignment from Port Kennedy to Philadelphia is double-tracked, so there are no scheduled meets for the King of Prussia-Philadelphia trains.

Simulated schedules were plotted as line graphs of position (milepost) as a function of time. Each train is represented by a solid diagonal line. Lines running from bottom left to top right represent westbound trains (to Reading) while lines running from top left to bottom right represent eastbound trains (to Port Kennedy). Separate times are used for arrival and departure at each station, so station stops can be identified in the graph as short horizontal segments within each train schedule line. The top of each line represents time leaving or entering Wyomissing station, and the bottom of each line represents time entering or leaving Norristown Transportation Center.

Dotted horizontal lines represent the beginning and end of each single-track segment. Reference names for single-track segments are found in the left margin while references for double-track are found in the right margin. Vertical lines for time are plotted every two minutes.

Each intersection of diagonal lines represents a scheduled meet of trains in opposite directions. These meets must occur in double-track segments in order for the schedule to be workable. The purpose of these models is to identify the locations where meets are necessary and to test alternative ways to accommodate the desired level of service.

Base Case

DVARP's initial model called for arrivals and departures at Wyomissing to be at clockface intervals: 00, 15, 30, and 45 minutes past the hour. As seen in Figure 1, this schedule forces meets on the single-track segment between Port Kennedy and Oaks (the Perkiomen Junction segment). To alleviate this, DVARP shifted westward departure times six minutes later. This results in our base case schedule (Figure 2).

Appendix K

PennDOT Public Statements on SEPTA's Schuylkill Valley Metro Preferred Alternative and the MIS/DEIS Financial Plan

The following pages are articles which contain PennDOT statements on SEPTA's Schuylkill Valley Metro preferred alternative and the MIS/DEIS Financial Plan for it. It is clear from the articles that:

1. The State does not support the financial plan for SEPTA's preferred alternative; and

2. The State would like to see a more rational passenger rail plan for Philadelphia-Reading corridor.