

Technical Memorandum #4

DATE: 9 Jan 2008
TO: Joe Dills, OTAK; Andy Back, Washington County
FROM: Carl Springer, PE; Chris Maciejewski, PE
SUBJECT: **Refined Transportation Plan Analysis for North Bethany Concept Plan**

TASK: Work Scope Task II-3

P#06215-000

This memorandum presents findings related to transportation issues that have been raised in response to our 5 July 2007 memorandum on the North Bethany Concept Plan transportation system needs. That memo laid out the street functional class hierarchy for new streets within the concept plan, identified off-site street and highway improvements that would be necessary to support planned growth, and provided cost estimates for all roadway improvements. Several other consultants, on behalf of affected property owners, reviewed the technical findings and recommendations contained in the July memo, and suggested a variety of alternative improvements to lessen or replace improvements that we recommended. Particular interest was focused on the capacity needed for Road "A", a major east-west arterial route, and the timing of its extension from the Concept Plan area to 185th Avenue.

Subsequently, Washington County Land Use and Transportation Department directed DKS Associates to further investigate the relative performance for a range of transportation system options, using the most current Concept Plan prepared by the consultant team (referred to as Illustrative Plan, 11 Sept 2007; see figure at right).

In addition, an alternative travel forecast was made for a lesser plan, one that provides 4,000 dwelling units (DU), rather than the 5,000 DU expected in the previous Concept Plan forecasts.

The results of these new travel forecasts, and our refined findings are presented in the following sections.

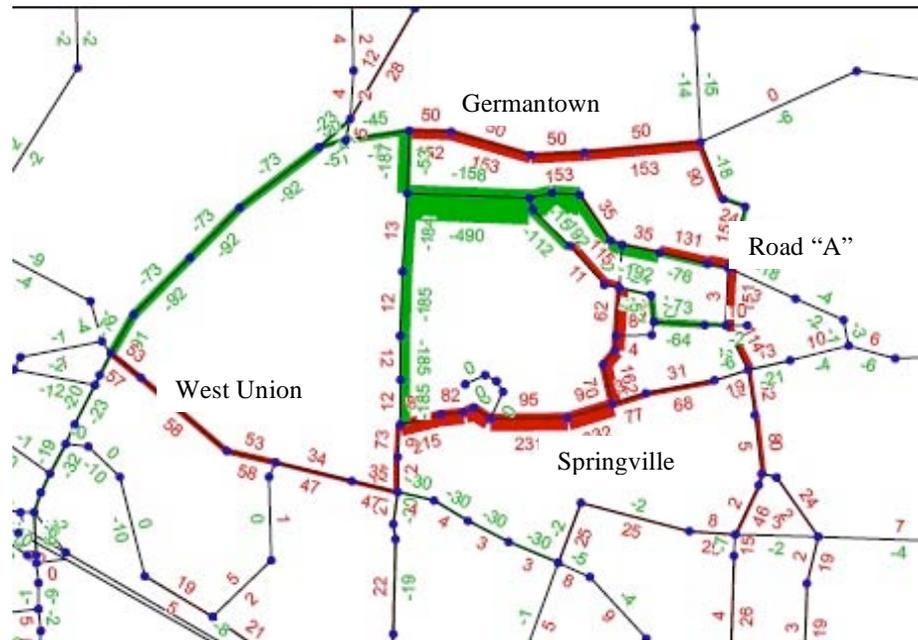


Effectiveness and Timing of Road “A” Improvement

The Concept Plan includes new east-west streets that provide alternative routes to Springville Road or Germantown Road within the plan area. The most significant new road of this type recommended in the Concept Plan is Road “A”, which is designated as an arterial facility. As represented in the Concept Plan, Road “A” would be a 3-lane major arterial that extended from Springville Road to Kaiser Road to 185th Avenue. It was also identified that sufficient right-of-way be set aside to allow for the widening of Road “A” to five-lanes, if additional land was brought inside the urban boundary. Given the scale and estimated costs of Road “A” as represented in the Concept Plan, further testing was done as follows.

Option 1: Without the Road “A” connection from Road “B” to 185th Avenue

The first test evaluated the changes in traffic volumes if the Road “A” link to 185th Avenue were deferred until a later planning stage. The net change in peak hour volumes is illustrated at right which is a snapshot of a raw model plot. The values shown in green are reductions in volume (relative to the concept plan), and the red values are additions.



About 200 more peak hour vehicles will be shifted to Germantown Road and the north end of Kaiser Road. We expect that there is sufficient capacity on the intervening roadways to adequately handle this shift in traffic. Note that this shift includes routes that front planned elementary school sites, the first located west of Kaiser Road and north of Road “A”, and the second located north of along Road “F”, which is the main access to Arbor Oaks development. The 185th Avenue volume is reduced by roughly the same level. In this configuration, the recommended improvements on 185th Avenue could be deferred until urban development occurs along its frontage.

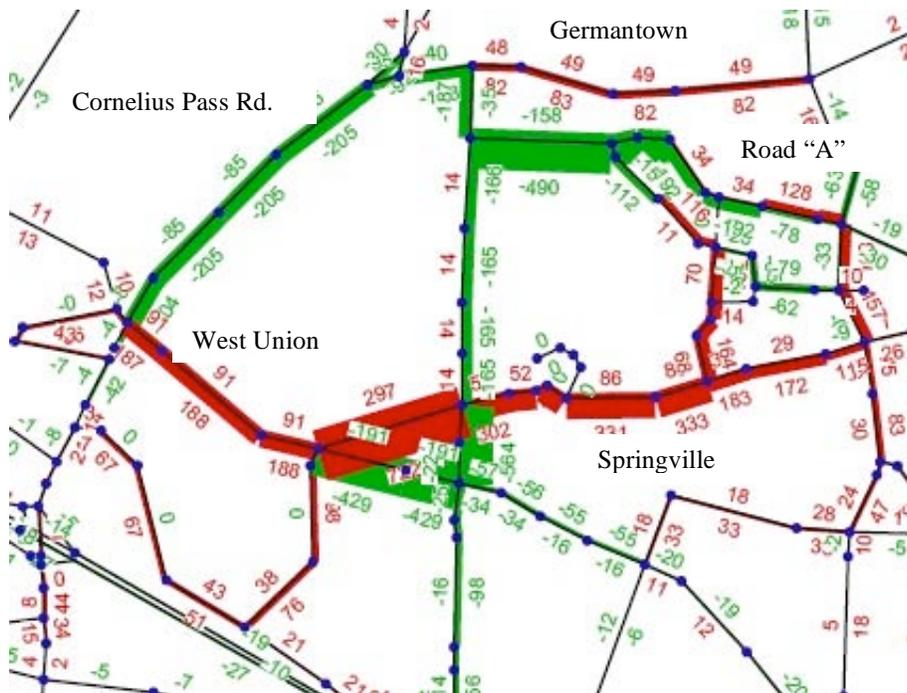
Furthermore, the removal of the Road “A” segment would shift 200 to 300 peak hour vehicles onto Road “F” and Springville Road. We would expect that the added volume could be addressed in the design of Springville Road, but we expect that adding roughly 2,000 to 3,000 more vehicles daily on Road “F” would be a significant impact to fronting residential lots. The total volume will be 6,000 to 7,000 ADT, which is very significant for a residential collector roadway. One of the County’s goals in this process is to design a transportation

Option 3: Option 1 plus Springville Road extension in Option 2.

The combination of Options 1 and 2 has a more significant cumulative effect, as illustrated in Figure C below. The reduction of traffic on Cornelius Pass Road (CPR) drops the directional peak hour volumes closer to the carrying capacity of a 3-lane road. The initial recommendation of a 5-lane facility north of West Union Road could be deferred. However, the shift would require a 5-lane West Union Road from CPR to 185th and a major re-design of the major intersections at both ends.

Also, the net shift onto Springville Road, and its westerly extension helps to reduce the heavy turning volumes at 185th Avenue / Springville Road, but the overall congestion level is expected to be similar. The main benefit of this configuration is that the storage area needed for the large storage space needed for turning vehicles without the extension can now be designed into the new eastbound cross street approaches. Further south, at 185th Avenue and West Union Road, the drop in heavy eastbound left-turns (roughly 400 vph less) makes this intersection more feasible to design and serve expected volumes. This intersection could operate within acceptable standards.

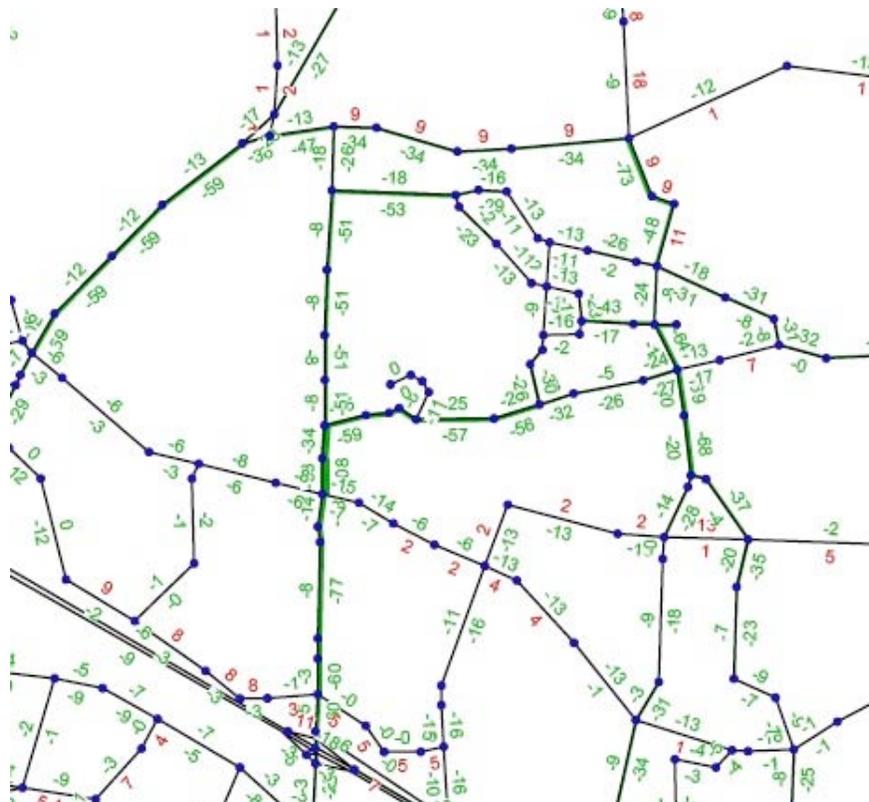
Figure b: Net Peak Hour Volume Change with both options (Option 3)



Reduced Housing Density in Concept Plan

A new forecast was prepared to represent a less intense scale of residential development, specifically with a maximum dwelling unit count of 4,000, instead of the 5,000 included in the foregoing analysis. This 4,000 DU forecast was made by factoring the residential portions of the site by 80 percent, and re-assigning the reduced vehicle trip table to the same Illustrative Concept Plan network. The results are illustrated in Figure D, which shows small to modest volume reductions throughout the study area. Nearly all of the roads within the Concept Plan were recommended as 2 or 3 lane roadways. The only exception was Springville Road, which was recommended as 5-lanes between Road “F” and 185th Avenue. In most cases reviewed in Figure D, the expected change on any one roadway segment is less than 5 percent of the carrying capacity (40 vph), and never more than 10 percent (75 vph). The total volume change at any one point in the system is expected to be below 1,000 ADT. This small margin of change is not sufficient to modify any of the previous Concept Plan recommendations. Therefore, if development is limited to 4,000 DU, the same street requirements would be needed to support it, however some minor changes to intersection designs might occur (note, a specific intersection analysis has not been undertaken looking at 4,000 versus 5,000 DU).

Figure c: Net Volume Change with 1,000 fewer DU in Concept Plan



Revised Forecasts for Alternative Combinations of Off-Site Improvements

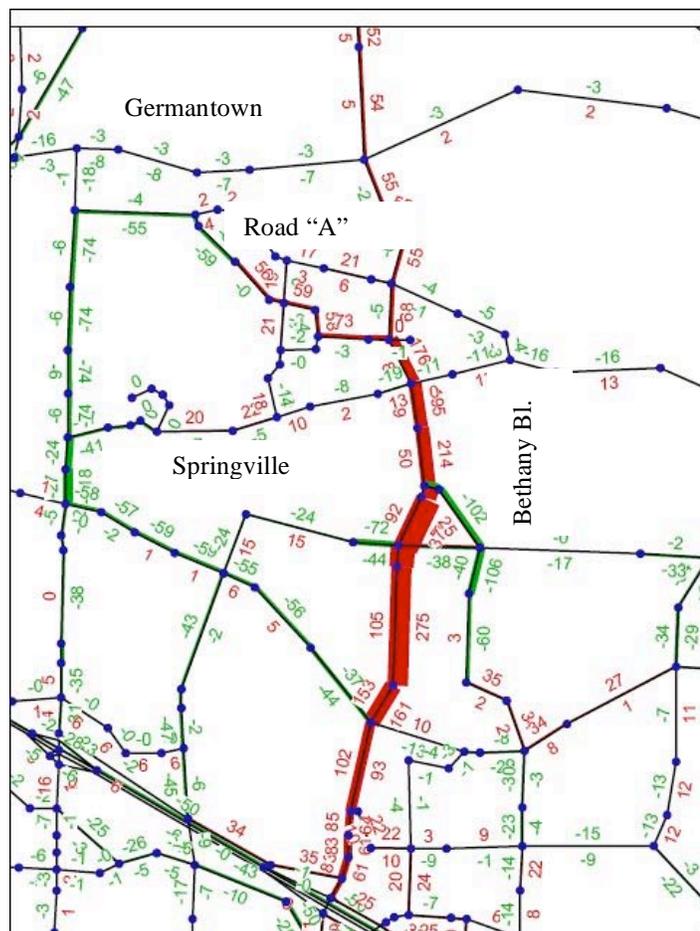
A series of new forecasts were prepared for combinations of street improvements identified in 18 Sept 07 letter from K & R Holdings, related to street circulation, as listed at the bottom of page 5. These suggestions included changes in the off-site assumptions on Bethany Boulevard, West Union Road, and Springville Road. The apparent intent of these suggestions was to reduce the off-site infrastructure requirements noted for the North Bethany Concept Plan area, as summarized in Table 6 on page 17 in the 5 July 2007 memorandum.

The findings for each suggestion are discussed in order below.

Suggestion 1: Increase the Capacity of Bethany/Kaiser from Springville Road to West Union Road to 5-Lanes

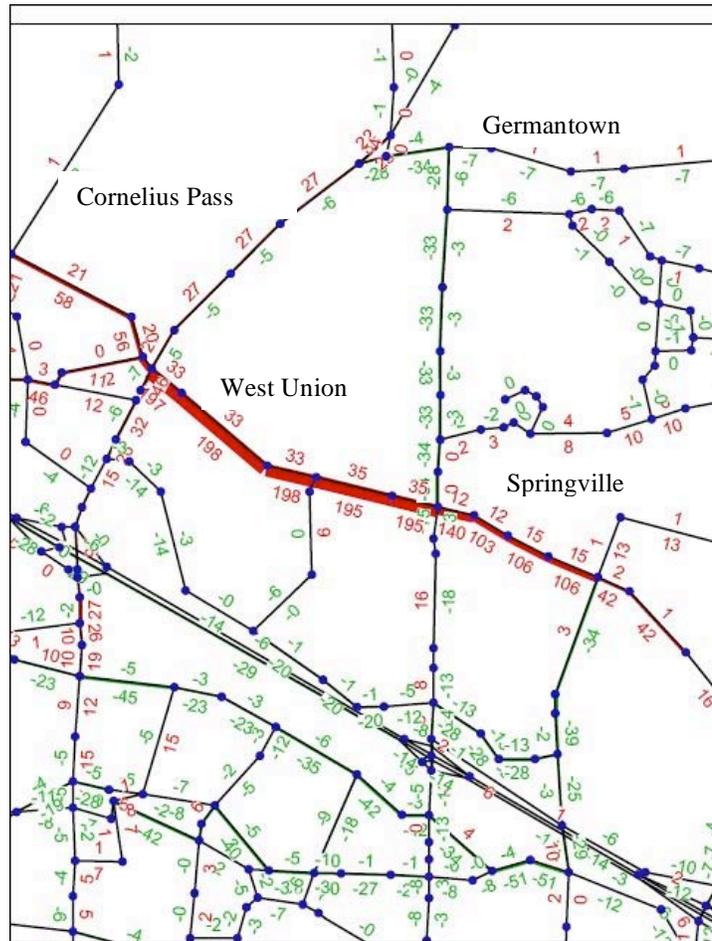
This section of Bethany Boulevard has been constructed to a 3-lane standard, but there is an indication in the current county Transportation System Plan to provide for a 5-lane facility. The net changes associated with upsizing this portion of Bethany Boulevard is illustrated at right, which shows an increase of 100 to 300 vph per direction. This is a substantial change. However, the net reductions on other parallel facilities are more modest, and are expected to have negligible effects on the initial recommendations.

As discussed in the Concept Plan, constructing a 5-lane roadway in this section would create impacts. Most of the landscape strips on Bethany Boulevard between Laidlaw and West Union would be removed, and an additional 10 to 20 feet of right-of-way would be required on Kaiser, south of Springville Road to Bethany Boulevard. In this case, the net benefit appears to not overcome the cost of this project related specifically to North Bethany; therefore, this suggestion is not advanced.



Suggestion 2: Increase the Capacity of West Union Road from 185th Avenue to Cornelius Pass Road

Adding capacity to West Union Road draws modest amounts of traffic from alternative routes, roughly 200 vph in the peak direction. This is a significant added volume to West Union Road, but the associated reductions from Cornelius Pass Road, Springville Road and 185th Avenue are not substantial enough to modify our previous recommendations. Therefore, Suggestion 2 is not advanced.



Suggestion 3: Extend 5-Lane Capacity of Springville Road from Road "F" to Kaiser Road

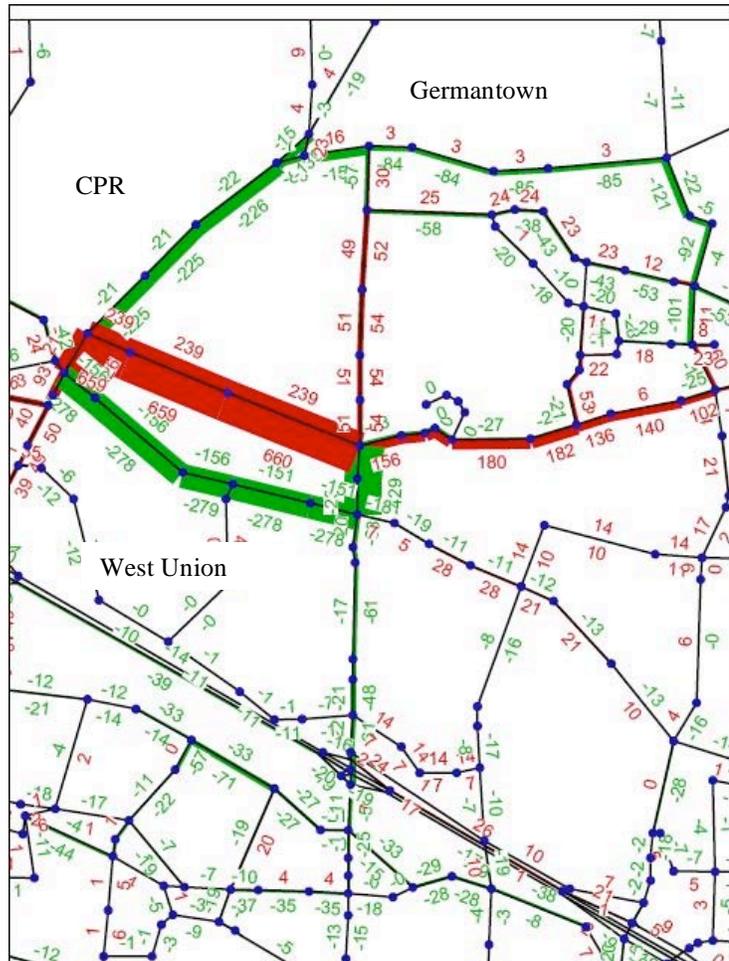
The net volume change associated with this modest suggestion was minimal. The utility of the added capacity would not offset the additional cost. No change is significant enough to modify the previous recommendations. This suggestion has no merit to advance.

Suggestion 4: Extend Springville Road Due West to Cornelius Pass Road

This concept would create a new arterial facility parallel to West Union Road. The spacing shown in the illustration to the right is conceptual, and could well be shifted further north to provide more logical spacing.

The net change in traffic volumes shows about 800 to 900 vehicles on this new facility during peak hours, and decreases of 300 to 400 vph on West Union Road and Cornelius Pass Road. These volume reductions would defer the need for widening either facility to 5-lanes.

However, all of the new facility lies outside of the present urban growth boundary, and would require exceptions to land use regulations in advance of further urbanization. Furthermore, there are substantial environmental obstacles, including crossing Rock Creek. Finally, introducing a new arterial this close to West Union Road would not be as valuable, from a system standpoint to support long-range urbanization, as an east-west arterial extension of Road "A".



Other Suggestions

Other suggestions from the K & R Holdings letter have either already been reviewed (see Option 3, page 4 of this memo) or had minimal effects.

Major Findings

Based on the foregoing analysis, there are several findings that should be considered in the next iterations of the Concept Plan.

Transportation Issues / Alternatives Evaluated in the Refinement Analysis	Effect on Previous Recommended Plan
<p>The street system configuration, functional class and road sizing appears to be unchanged, whether the residential development totals 4,000 DU or 5,000 DU.</p>	<p>There are no changes recommended to the basic structure of the Illustrative Plan.</p>
<p>The larger question of when to construct the Road “A” segment from Road “B” to 185th Avenue was examined in three circulation combinations. It appears from our preliminary evaluation that this segment could be deferred to future stages of urbanization.</p> <p>By doing so, the shift of traffic activity would fall most heavily onto Road “F” and Springville Road. The build out volume on Road “F” would be high, similar to Hart Road in Beaverton. This may require a change to its design and Functional Classification.</p> <p>To manage the increased demand onto Springville Road, the extension westerly to West Union Road should be further studied (Option 2), but initially it seems to provide favorable design options.</p>	<p>Together, these three elements of the plan could be deferred until further urbanization occurs:</p> <ul style="list-style-type: none"> ▪ 5-lane Cornelius Pass Road north of West Union Road ▪ Improvements on 185th Avenue north of Springville Road ▪ The Road “A” segment noted above (i.e., from Road “B” to 185th Ave.) <p>These deferred elements represent about \$85 million in construction improvements. Further study is recommended for the westerly extension of Springville to West Union Road.</p> <p>The higher volumes on Road “F” may require an alternative design and functional class to better handle high traffic volumes.</p> <p>Similarly, higher volumes in front of two schools sites (Brugger Road, and Road “F”) may require further analysis of appropriate safety crossing designs.</p>
<p>The list of off-site improvements on Springville Road, Bethany Boulevard, and West Union Road suggested by K & R Holdings appear to not change the findings from the Concept Plan report.</p>	<p>None of these elements, by themselves, shift enough travel demand to change the recommendations that were originally presented in the Concept Plan.</p> <p>No change.</p>

Areas for Further Study

A few issues were uncovered during the refinement analysis that may merit further discussion and possibly further study. These items include:

- The combinations of suggestions made by K & R Holding were not specifically explored. It may be possible that the cumulative changes in demand on these improved routes would reduce or negate the need for system improvements further away. Examples would include the interchanges at US 26. However, since these improvements re-route, and do not reduce the demand, we do not expect that our initial findings would be changed.
- All of the foregoing analysis only addressed growth through the buildout of the North Bethany Concept Plan area. The merits of some of the tested new facilities, particularly the Springville Road extension and the timing of the Road “A” completion is less apparent without of larger area study that would include, what was formerly referred to as Greater Bethany.