EXHIBIT JJ

REPLINGER & ASSOCIATES LLC
TRANSPORTATION ENGINEERING

October 6, 2021

Mr. Kelly O'Neill
City of Sandy
39250 Pioneer Blvd.
Sandy, OR 97055

SUBJECT: REVIEW OF TRANSPORTATION IMPACT STUDY – DEER MEADOWS SUBDIVISION

Dear Kelly:

In response to your request, I have reviewed materials submitted in support of the Deer Meadows Subdivision on Dubarko Road in the east part of Sandy. The Transportation Impact Study (TIS), dated September 27, 2021, was prepared under the direction of Michael Ard, PE of Ard Engineering. A future street plan and preliminary plat, dated 7/26/2018, were also provided.

The site, with approximately 16 acres, is on the southwest side of US 26 and is bisected by Dubarko Road, a planned minor arterial road specified in the Sandy Transportation System Plan (TSP). TIS describes a proposal to subdivide the property; extend Dubarko Road from its present east terminus into the site; and create lots for low density dwellings and some apartments. A portion of the development is zoned for commercial uses but is not proposed to be developed at this time.

A significant feature of the development plan is that the applicant ignores the TSP and does not propose extending Dubarko Road, currently a stub street, to connect with US 26 opposite SE Vista Loop (West) as specified in the TSP. Instead, the TIS proposes "a new north/south collector roadway" as the eastern terminus of Dubarko Road.

It is also important to note that the analysis includes no development of the commercially zoned land, which is approximately 3 acres. The TIS indicates a need for further analysis when development of that commercial land is proposed.

Overall

TIS addresses most of the city's requirements and provides information useful in assessing many impacts of the proposed development. A key issue with the development proposal is a failure to provide for the extension of Dubarko Road to

connect with US 26 as specified in the TSP. Another conflict with the TSP is a proposal to construct a new north-south collector beginning at the proposed easterly terminus of Dubarko Road within the proposed subdivision.

Comments

1. ***Study Area.*** The study includes analyses of:

   - US 26 at SE Ten Eyck Road;
   - US 26 at SE Langensand Road;
   - Highway 211 at Dubarko Road; and
   - Dubarko Road at SE Langensand Road.

   Since the applicant assumes that Dubarko Road will not connect to US 26, the TIS does not include an analysis of this intersection.

2. ***Traffic Counts.*** The AM and PM peak hour traffic counts were conducted on September 21, 2021 or on June 9, 2021, depending on location. The engineer adjusted the traffic counts to account for seasonal variations. The engineer used a combination approach to account for seasonal variation of recreational traffic and separately for commuter traffic on US 26. Volumes on Highway 211 were adjusted to develop 30th highest hour traffic volume. The methodology appears consistent with the procedures defined by the Oregon Department of Transportation (ODOT).

   The engineer's also made adjustment to account for lower traffic volumes caused by COVID-19 impact. He increased US 26 volumes by 5.0 percent and others by 5.6 percent to account for the pandemic. The new counts and adjustments appear reasonable.

3. ***Trip Generation.*** The TIS uses trip generation for single-family dwellings and multi-family dwellings (land use code 210 and 220, respectively) from the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*. The engineer calculates that 32 single-family homes plus 120 apartments would produce 79 total AM peak hour trips; 99 total PM peak hour trips; and 1180 total daily trips. The calculation of trips generated by the residential development appears reasonable.

   This calculation does not include potential trips associated with the future development of the commercially zoned land within the development area. The TIS states that "the nature of this future use has not yet been determined. Accordingly,

a future traffic study will be required as part of the design review application for the future commercial site use."

By failing to account for any development of the commercially zoned land, the applicant has not shown the impact of the proposed removal of a key element of the TSP – namely Dubarko Road, which is shown connecting with US 26 at Vista Loop Drive (West).

4. ***Trip Distribution.*** The TIS provided information about trip distribution from the site. The engineer assumed 65 percent of the traffic would travel to and from the northwest on US 26; 20 percent would travel to and from the southeast on US 26; and 15 percent would travel to and from the west on Dubarko Road. On a city-wide scale, the trip distribution seems reasonable. However, the long-range impact from the proposed elimination of Dubarko Road will likely result in different travel patterns and different traffic volumes at key intersections than anticipated in the TSP.

5. ***Traffic Growth.*** The TIS uses a 1.96 percent annual increase for Highway 26 based on projected volumes at the west boundary of Sandy. For other facilities it uses a 2.0 percent annual growth rate to account for background traffic growth. The following in-process developments were included in the background traffic: the Clackamas County Health Clinic, Mt. Hood Senior Living, The Pad, The Views, Shaylee Meadows, Mt. View Ridge, Marshall Ridge, Jacoby Heights, Trimble PD, and Bornstedt Views. These assumptions account for future traffic and appear reasonable.

6. ***Analysis.*** Traffic volumes were calculated for the intersections cited in #1, above. Intersection level-of-service (LOS) and the volume-to-capacity (v/c) ratio were provided. The intersection of US 26 with SE Ten Eyck Road is signalized; the other intersections are stop-controlled. The analyses were conducted for existing 2021 conditions, 2023 background conditions, and 2023 with the development.

   The engineer calculates that the signalized intersection of US 26 with Ten Eyck meets the v/c standards specified by ODOT under all scenarios. At the intersection of US 26 with Langensand Road, the v/c for both the mainline and minor street approaches are calculated to meet ODOT's v/c standard. However, long delays (the basis for LOS) are calculated to occur on the minor street approach under existing and future conditions.

The intersection of Dubarko Road and Langensand Road is predicted to operate acceptably under all scenarios. The intersection will operate at LOS "B" or better, meeting city operational standards.

The engineer makes the following statement about the intersection of Highway 211 with Dubarko Road:

> *The intersection of Oregon Highway 211 at Dubarko Road was previously under the jurisdiction of the Oregon Department of Transportation and subject to a volume-to-capacity ratio standard rather than level of service. The intersection would have met ODOT's volume-to-capacity based standards for operation, but with conversion to a city intersection it is subject to the city's level-of-service standards. This intersection is projected to operate at level of service "F" under year 2023 background conditions during the evening peak hour.*
>
> *Upon completion of the proposed development, the intersection is projected to continue to operate at level of service F during the evening peak hour, with average delays for the highest-delay movement increasing from 51.0 seconds to 56.3 seconds if no mitigation is provided. However, if the intersection is converted to all-way stop control (as recommended in the Traffic Signal and All-Way Stop Control Analysis section of this report on page 20), the intersection is projected to operate at level of service E, with average delays for the highest-delay movement reduced to 36.3 seconds. Since intersection operation is better than under background conditions, this proposed mitigation is sufficient to fully offset the transportation impacts of the Deer Meadows Subdivision site trips. As such, any requirement for additional mitigation would be disproportionate to the impact of the proposed development.*

I think further explanation and comment about the engineer's statement is in order. The predicted LOS "F" at the intersection relates to the delay encountered by the motorists on the westbound minor street (Dubarko Road) approach during the PM peak hour with the existing traffic control (two-way stop control on the Dubarko Road approaches). Under current traffic control, the northbound and southbound approaches (Highway 211) encounter minimal delay and experience LOS A conditions.

As mitigation for the long delays and poor LOS for the Dubarko Road approaches, the engineer proposes conversion to all-way stop control. Under this traffic control

scenario, all traffic is required to stop at the intersection. Because northbound and southbound traffic volumes are higher, they will be the ones experiencing longer delays if all-way stop control is implemented. Because delays will be encountered on all approaches and the total delay will increase, it is somewhat misleading to describe the intersection as operating "better than under background conditions." Under all-way stop control, the total delay encountered by motorists using the intersection will increase substantially. The delays encountered by motorists on the poorest performing approach with all-way stop control will be lower than the delays encountered by the motorists on the poorest performing approach with the current two-way stop control. The poorest performing approach changes between scenarios.

The proposed conversion to all-way stop control does offer some advantages, including the potential for improving safety. I leave it to others to assess the engineer's contention that "any requirement for additional mitigation would be disproportionate to the impact of the proposed development."

The engineer concluded that "All other intersections are projected to operate acceptably per the appropriate jurisdictional standards."

7. ***Analysis of Local Street Impacts.*** The TIS also assessed traffic volumes on local streets to assure compliance with Section 17.10.30 of the Sandy Development Code. The proposed street network includes an extension of Fawn Street, which provides connections to Meadow Avenue, Antler Avenue, and Therese Street. The TIS provided estimates of current traffic volumes on these streets with the highest (600 vehicles per day) on Therese Street just east of Langensand Road. He calculates that no more than 210 daily trips would be added to these local streets by the dwellings in the proposed development. He concludes that all impacted local streets will continue to operate with volumes below 1,000 vehicles per day. I concur with his calculations and conclusion.

8. ***Crash Information.*** The TIA provides information on crashes for the most recent available five-year period covering 2015 through 2019.

   At the intersection of US 26 and SE Ten Eyck Road, there were eight reported and a relatively low crash rate. At the intersection of US 26 and Langensand Road, there were seven reported crashes and a low crash rate. At the intersection of Dubarko Road and Langensand Road, there was one reported crash.

The intersection of Highway 211 and Dubarko Road has been a safety concern for years and has undergone safety improvements. During the five-year period, 27 crashes were reported. The crash rate is substantially above the 90th percentile crash rate for similar intersections. Crashes remain a problem following implementation of safety improvements that included realigning the Dubarko Road approaches and added striping on Highway 211. The engineer notes that the crash history indicates warrants are met for all-way stop control. He recommends consideration of the installation of all-way stop control to address safety issues. I concur.

9. ***Site Plan and Access.*** The site plan provides for the extension of Dubarko Road, but only to a "new north/south collector roadway." Until such time as other development occurs to the south, Dubarko Road will serve as the principal access to the development. The only other access proposed at this time is Fawn Street, which would connect to Meadow Avenue just west of the subdivision.

   Neither the TIS nor the site plan describes how the new north/south collector would be integrated with the rest of the street system or would impact the TSP.

10. ***Sight Distance.*** The engineer did not analyze sight distance at the proposed intersections within the development. Given the terrain, sight distance is unlikely to be a problem and can be dealt with during design of the streets.

11. ***Traffic Signal Warrants.*** The engineer conducted a preliminary traffic signal warrant analysis at several locations based on ODOT procedures. He concluded that traffic signal warrants were not met at any location.

    He concluded that all-way stop-control was warranted at the intersection of Highway 211 and Dubarko Road based on the intersection crash history.

12. ***Left-Turn Lane Warrants.*** The TIS indicates that left-turn lanes are provided on eastbound US 26 at Langensand Road.

    According to the engineer, the intersection of Highway 211 at Dubarko Road currently meets warrants for a northbound left-turn lane and a northbound right-turn lane. However, he states that the need for these turn lanes is not materially related to the proposed development. He further states that turn lane may not be needed if all-way stop control is installed at the intersection as recommended based on his safety analysis.

According to the TIS, turn lanes are not warranted at the intersection of Dubarko Road and Langensand Road.

13. ***Conclusions and Recommendations.*** The engineer concludes that with conversion to all-way stop control, the intersection of Highway 211 at Dubarko Road would operate better under year 2023 traffic conditions with construction of the proposed development than without the development and the all-way stop control conversion. Further, he opines that installation of all-way stop control is sufficient to offset the impacts of the proposed development and any additional mitigation would be disproportionate to the actual impact of the proposed development.

    He concludes that all other study intersections are projected to operate acceptably through year 2023 either with or without the addition of site trips from the proposed development.

    While most study area intersections are operating relatively safely, the intersection of Highway 211 and Dubarko Road suffers from a high number of crashes and a high crash rate. It is substantially higher than the 90th percentile crash rate for comparable intersections. Recent safety improvements to not appear to have altered this trend. The proposed development is among those that are be expected to increase the traffic using the intersection of Highway 211 and Dubarko Road. The engineer recommends consideration be given to converting the intersection of Highway 211 and Dubarko Road to all-way stop control for safety reasons based on the historical data. He recommends no other mitigation to address safety issues.

Conclusion and Recommendations

As noted repeatedly above, the applicant is proposing to eliminate the planned connection of Dubarko Road with US 26 at Vista Loop Drive (West). Instead, he proposes to terminate Dubarko Road at a "new north/south collector roadway" near his property's west boundary. The TIS provides no justification for this change to the planned street system. There is no analysis showing the impacts on other portions of the street system caused by his proposed elimination of the minor arterial connection represented by Dubarko Road.

The proposal to eliminate a portion of Dubarko Road as a minor arterial street and to develop the new north/south collector roadway may or may not be actions requiring amendment of the TSP.

The intersection of Highway 211 and Dubarko Road is a known problem both because of a high crash rate and a poor LOS, especially for the westbound Dubarko Road approach. The engineer's proposed mitigation (conversion to all-way stop control) has some benefits or potential benefits, but there are also disadvantages particularly with regard to the overall delay at the intersection. The engineer contends that the proposed conversion to all-way stop control is sufficient to offset the impact from the proposed development. Further, he opines that additional mitigation would be disproportionate to the impacts of the development. I leave it to others to assess those opinions.

My highest concern relates to the applicant's proposal to eliminate the Dubarko Road connection to US 26 as specified in the TSP. My second concern is with the operation of Highway 211 and Dubarko Road. I think the proposal to convert it to all-way stop control has some potential benefits. I am not, however, convinced that the developer has no responsibility to participate in additional mitigation to improve the operational performance of the intersection given the additional trips his development will add to the intersection.

If you have any questions or need any further information concerning this review, please contact me at replinger-associates@comcast.net.

Sincerely,

John Replinger, PE
Principal

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