



November 20, 2020

Mr. James Spehalski
Marathon Land Company
9750 W. Cambridge Place
Littleton, CO 80127

Dear Mr. Spehalski:

In response to your request, LSC Transportation Consultants, Inc. has completed a traffic impact analysis for the proposed Harmony Phase 4 development. The site is located south of E. Alameda Avenue and east of Powhatan Road.

REPORT CONTENTS

The report contains the following: the existing roadway conditions; the site including the lane geometries, traffic control, and existing daily weekday peak-hour traffic volumes; the existing daily weekday site-generated traffic volume projections for the site; the projected 2024 traffic volumes to the area roadways; the projected 2024 total traffic volumes on the area roadways; the site's recommended roadway improvements to mitigate the site's impacts.

RECENT TRAFFIC STUDIES

LSC prepared a traffic impact study (TIS) for the entire Harmony Master Plan dated March 9, 2017. LSC also prepared site-specific traffic reports for the ASP Harmony Ridge P-8 School dated October 12, 2018 and Harmony Phase 3 dated November 4, 2020.

LAND USE AND ACCESS

Table 1 shows a comparison of the land uses assumed in the 2017 Master TIS and the existing, approved, currently proposed, and currently anticipated future land uses. Since completion of the Master TIS, Harmony Phases 1 and 2, which were included in the Master TIS as Planning Areas 1 and 2, have been approved and a majority of the homes within Phase 1 have been constructed. APS Harmony Ridge P-8 school, which was included in the Master TIS as Planning Area 17, and the Harmony Community Center, which was included in the Master TIS as Planning area 19, have also been constructed. Harmony Phase 3, which was included in the Master TIA as a portion of Planning Areas 3 and 4, has recently been approved.

Comments: 01/29/2021

By: Kyle Morris (BHI)

Checked By: Brianna Medema

1. Provide CDOT Auxiliary lane warrant analysis. The auxiliary lane analysis is included in Table 3.
2. Show recommended improvements in a different color (Figures 9 & 10). Figures 9 and 10 have been updated as requested.
3. Per COA grid spacing requirements, a local street connection is required onto E. Alameda Ave, between Powhatan Rd and the proposed North-South collector. If this connection is impossible to provide due to site constraints, provide a discussion section on mitigating measures. Figure 2b has been updated to show a future connection through the parcel on the southeast corner of Powhatan Road/E. Alameda Avenue that is not a part of the Harmony development to a future access point to Alameda Avenue.
4. Provide additional justification for omission of a COVID adjustment, Provide earlier count than May 2020. The text has been modified to include the additional information as requested and data and correspondence.
5. Include Sky Ranch traffic in in the 2024 background scenario. This site has already started building homes. The text has been modified to indicate that the 2024 background traffic volumes include traffic projected to be generated by Sky Ranch although no roadway connections are proposed directly between Sky Ranch and Harmony by 2024.
6. See comments throughout the report. See response below.

Summary of Comments on TIS_rev1 redlines LSC Reponse.pdf

Page: 1

Number: 1 Author: kdmorris Subject: Text Box Date: 4/2/2021 9:32:14 AM

Comments: 01/29/2021

By: Kyle Morris (BHI)

Checked By: Brianna Medema

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2. Show recommended improvements in a different color (Figures 9 & 10). Figures 9 and 10 have been updated as requested.
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6. See comments throughout the report. See response below.

South and the south half of the cross-section will be constructed between Waterloo Street South and Monaghan Road.

- **E. Exposition Avenue** is an east-west, two-lane collector roadway south of the site. The north half of the final E. Exposition Avenue cross-section will be constructed between Powhaton Road and Monaghan Road with two travel lanes as part of the currently proposed Harmony Phase 4.
- **Trussville Road** is north-south, two-lane collector roadway from E. Alameda Avenue to E. 1st Avenue. Trussville Road will be extended to E. Exposition Avenue as part of Harmony Phase 4. The intersections with E. Exposition Avenue are planned as modern roundabouts.

Figure 2b shows the proposed roadway classifications.

Existing Traffic Conditions

Figure 3 shows the existing traffic volumes, lane geometries, and traffic conditions in the site's vicinity on a typical weekday. The daily traffic volumes are based on the attached traffic counts conducted by Counter Measures in November, 2020. These traffic counts may have been impacted by the ongoing pandemic, however, based on the attached counts conducted at the intersection of Powhaton Road and E. 6th Avenue in May 2020 and again in November 2020 it appears that traffic patterns in the vicinity of the site have returned closer to the pre-pandemic condition.

2024 and 2040 Background Traffic

Figure 4 shows the estimated 2024 background traffic based on no connections northeast or southeast and general buildout of Harmony Phases 1 through 3 located north of the currently proposed Phase 4. Figure 5 shows the estimated 2040 background traffic based on recent NEATS modeling updates and the Master Traffic Studies for Harmony and Sky Ranch. Figures 4 and 5 also show the estimated 2024 and 2040 lane geometries and traffic controls in the vicinity of the site.

2024 and 2040 Background Levels of Service

Call out growth rate in this section. Growth rates were not used. The projections were based on NEATS and the master traffic studies for Harmony and Sky Ranch.

Level of Service (LOS) is a quantitative measure of the level of service. LOS is indicated on a scale from "A" to "F". LOS A and LOS F is indicative of a high level of service. LOS definitions for signalized and unsignalized intersections are attached.

Figures 4 and 5 were analyzed to determine the 2024 and 2040 background traffic using Synchro. Table 2 shows the level of service analysis results. The results are attached.

Intersection of E. Alameda Avenue: This intersection is projected to operate at LOS "C" or better for all movements through 2024 as a two-stage, stop-sign controlled "T" intersection. By 2040 it was assumed that Powhaton Road would be constructed to its final

Both of these counts were conducted during the pandemic. Provide another reference count that occurred prior to the pandemic. Check 1st and Powhaton from CSP-1. See response on Page 1 Item 4.

Include Sky Ranch traffic in 2024 background traffic. See response on Page 1 Item 5.

Page: 3





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-  Number: 1 Author: kdmorris Subject: Callout Date: 3/31/2021 3:26:27 PM
Both of these counts were conducted during the pandemic. Provide another reference count that occurred prior to the pandemic. Check 1st and Powhatan from CSP-1. See response on Page 1 Item 4.
-
-  Number: 2 Author: kdmorris Subject: Line Date: 1/27/2021 3:52:14 PM -07'00'
-
-  Number: 3 Author: kdmorris Subject: Callout Date: 3/31/2021 3:27:05 PM
Include Sky Ranch traffic in 2024 background traffic. See response on Page 1 Item 5.
-
-  Number: 4 Author: kdmorris Subject: Callout Date: 4/2/2021 9:33:34 AM
Call out growth rate in this section. Growth rates were not used. The projections were based on NEATS and the master traffic studies for Harmony and Sky Ranch.

Figure 10 shows the estimated 2040 total traffic which is the sum of the 2040 background traffic volumes (from Figure 5) and the 2040 site-generated traffic volumes (from Figure 8). Figure 10 also shows the recommended 2040 lane geometry and traffic control.


PROJECTED LEVELS OF SERVICE


The intersections in Figures 9 and 10 were analyzed to determine the 2024 and 2040 total levels of service. Table 2 shows the level of service analysis results. The level of service reports are attached.

1. **Powhaton Road/E. Alameda Avenue:** This intersection is projected to operate at LOS “C” or better for all movements through 2024 as a two-stage, stop-sign controlled “T” intersection. By 2040 it was assumed that Powhaton Road would be constructed to its final four-lane cross-section and that the intersection with E. Alameda Avenue would be converted to traffic signal control. E. Alameda Avenue/Powhaton Road is projected to operate at an overall LOS “C” as a signalized intersection during both morning and afternoon peak-hours through 2040.
2. **E. Alameda Avenue/Trussville Road:** This roundabout controlled intersection is expected to operate at an overall LOS “A” during both morning and afternoon peak-hours through 2040.
3. **E. Alameda Avenue/Waterloo Street:** All movements at this stop-sign controlled, right-in/right-out intersection are expected to operate at LOS “B” or better during both morning and afternoon peak-hours through 2040.
4. **Monaghan Road/E. Alameda Avenue:** This future signalized intersection is expected to operate at an overall LOS “B” during both morning and afternoon peak-hours through 2040.
5. **Trussville Road/PA-11 North Access:** All movements at this stop-sign controlled intersection are expected to operate at LOS “A” during both morning and afternoon peak-hours through 2040.
6. **Powhaton Road/PA-6 Access:** This intersection is projected to operate at LOS “B” or better for all movements through 2024 as a two-stage, stop-sign controlled “T” intersection. By 2040 it was assumed that Powhaton Road would be constructed to its final four-lane cross-section. Based on the projected 2040 total traffic volumes the eastbound left-turn movement is projected to operate at LOS “E” during the morning peak-hour and LOS “F” during the afternoon peak-hour if this intersection remains stop-sign controlled. If converted to traffic signal control or a modern roundabout this intersection is projected to operate at an overall LOS “B” or better through 2040. LSC recommends the traffic control at this intersection be reevaluated when plans are submitted for the development of the 20-acre commercial parcel located on the ¹ northeast corner that is not part of the Harmony development.

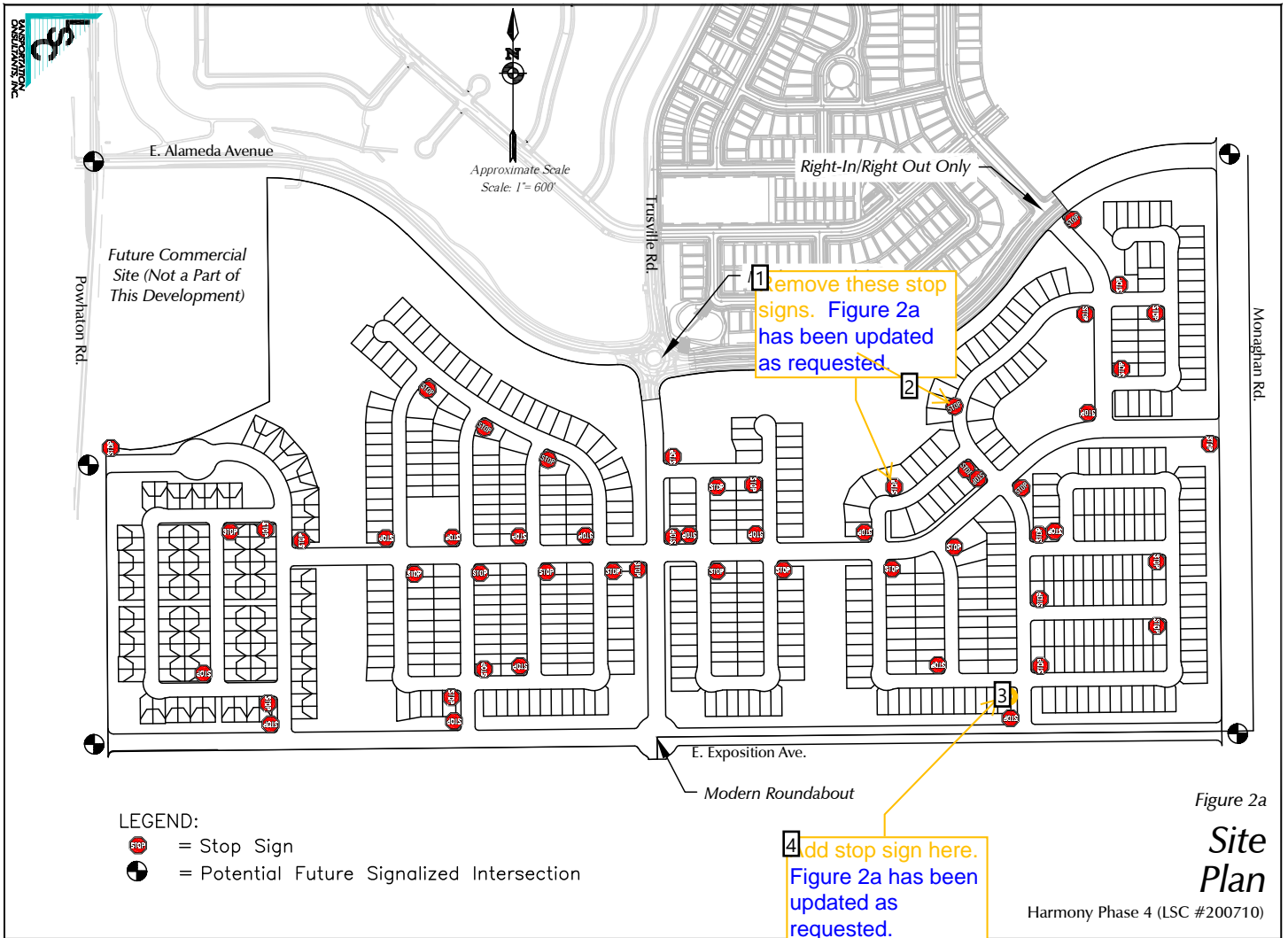
Comment on the minor street movement's ability to access and alternative route. The additional information has been added as requested.


²

 Number: 1 Author: kdmorris Subject: Line Date: 1/27/2021 10:50:19 AM -07'00'

 Number: 2 Author: kdmorris Subject: Callout Date: 3/31/2021 3:31:49 PM


Comment on the minor street movement's ability to access and alternative route. The additional information has been added as requested.




 Number: 1 Author: kdmorris Subject: Callout Date: 3/31/2021 3:32:53 PM

Remove these stop signs. Figure 2a has been updated as requested.

 Number: 2 Author: kdmorris Subject: Line Date: 1/29/2021 1:34:32 PM -07'00'

 Number: 3 Author: kdmorris Subject: Oval Date: 1/27/2021 10:59:16 AM -07'00'

 Number: 4 Author: kdmorris Subject: Callout Date: 3/31/2021 3:33:46 PM

Add stop sign here. Figure 2a has been updated as requested.

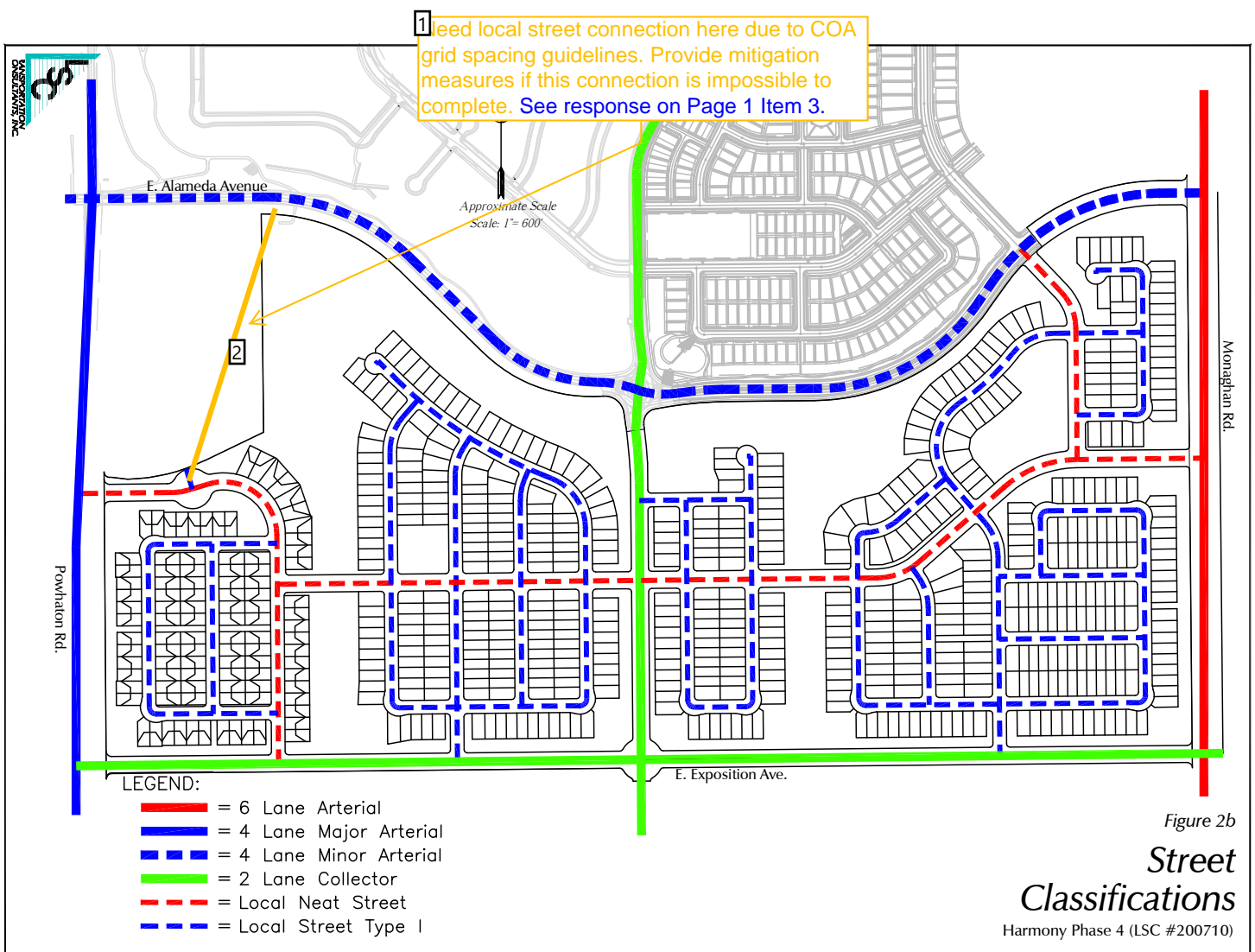



Figure 2b

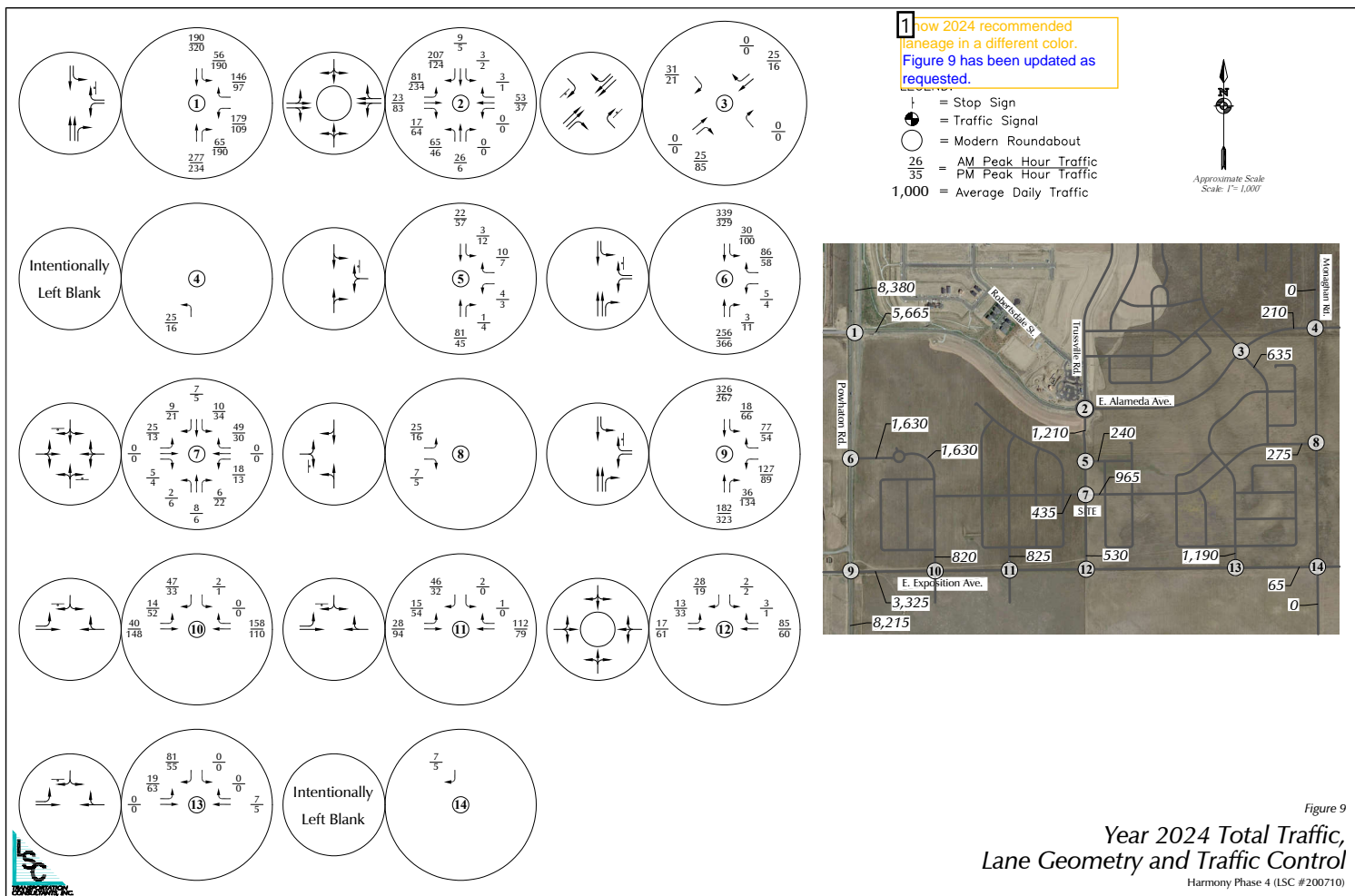
Street Classifications

Harmony Phase 4 (LSC #200710)

 Number: 1 Author: kdmorris Subject: Callout Date: 3/31/2021 3:35:08 PM









Need local street connection here due to COA grid spacing guidelines. Provide mitigation measures if this connection is impossible to complete. [See response on Page 1 Item 3.](#)

 Number: 2 Author: kdmorris Subject: Line Date: 2/1/2021 4:47:11 PM -07'00'





Show 2024 recommended laneage in a different color. Figure 9 has been updated as requested.

	Number: 1	Author: kdmorris	Subject: Text Box	Date: 3/31/2021 3:36:36 PM
Show 2040 recommended laneage in a different collar. Figure 10 has been updated as requested.				
	Number: 2	Author: kdmorris	Subject: Line	Date: 1/27/2021 10:41:43 AM -07'00'
	Number: 3	Author: kdmorris	Subject: Line	Date: 1/27/2021 10:42:26 AM -07'00'
	Number: 4	Author: kdmorris	Subject: Line	Date: 1/27/2021 3:39:37 PM -07'00'
	Number: 5	Author: kdmorris	Subject: Line	Date: 1/27/2021 10:41:29 AM -07'00'
	Number: 6	Author: kdmorris	Subject: Line	Date: 1/27/2021 10:41:22 AM -07'00'
	Number: 7	Author: kdmorris	Subject: Line	Date: 1/27/2021 10:42:29 AM -07'00'
	Number: 8	Author: kdmorris	Subject: Callout	Date: 3/31/2021 3:37:10 PM
Show anticipated 2040 connections (TYP). Figure 10 has been updated as requested.				