



PRELIMINARY COMMUNITY DESIGN

STELLA LINK



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SUMMARY



OVERVIEW

This package of materials focuses on preliminary site design for a 12.11 acre parcel of land located at 10301 ½ Stella Link Road, Houston, TX, known in this memo as the “Stella Link site.” These materials were prepared for the City of Houston Housing and Community Development Department by Asakura Robinson Company, with subconsultants buildingcommunityWORKSHOP, Walter P Moore, and the SLR International Corporation. The package of materials includes this executive summary of the preliminary design recommendations, with the following appendices:

- Appendix A: Preliminary Design Illustrative Site Plan
- Appendix B: Preliminary Floor Plans
- Appendix C: Preliminary Stormwater and Utility Plan
- Appendix D: HUD Site Noise Assessment, STraCAT Analysis, & Calculations
- Appendix E: Opinion of Probable Construction Cost

The intention of this package is to demonstrate the feasibility of meeting the environmental requirements of the U.S. Department of Housing and Urban Development, given the City’s development priorities and the existing conditions at the Stella Link site.

PROJECT DESCRIPTION

The Stella Link site comprises 12.11 acres of undeveloped land. It is located at 10301 ½ Stella Link Road, Houston, TX. U.S. Highway 90 / S. Main St. is a 6-lane highway plus 4-lane frontage road located to the southeast of the project site and is a main corridor that connects to the Medical Center, Hermann Park, and Downtown. Stella Link Road is a 4-lane divided local road located to the west of the project site property line. Harmony School of Ingenuity is located next to the property.

The preliminary site configuration shown in Appendix A includes 194 residential units in a townhome configuration. These homes would increase the housing supply in the neighborhood. Appendix A shows a preliminary site master plan with the layout of circulation, buildings, and open spaces. Appendix B contains preliminary floor plans for each housing unit type shown in the site plan in Appendix A. Appendix C shows preliminary plans for stormwater management and utility connections.

Due to the proximity to U.S. Highway 90/ S. Main St. and the analysis in the preliminary environmental assessment for this site, the traffic noise is a concern. Appendix D shows the results of the efforts of noise attenuation to meet United States Department of Housing and Urban Development (HUD) requirements and provide a pleasant living environment.

Appendix E is a preliminary opinion of probable construction cost for the site development, including civil and landscape estimates.

APPENDICES A AND B: PRELIMINARY DESIGN ILLUSTRATIVE SITE PLAN, PRELIMINARY FLOOR PLANS

Appendix A contains the preliminary site design for the Stella Link site. Ground detentions are located on the western and southern part of the site to provide a buffer for the units and reduce noise effects. Green spaces are evenly distributed for the unit groups. Two bigger green spaces are shared by four bedroom units. The plan proposes approximately 20% 2 bedroom units, 60% 3 bedroom units, and 20% 4 bedroom units. 3% of the total units are ADA accessible units.

Site Access and Circulation: There is one access point on Stella Link Road and one on South Main Street. The roadway connecting two access points is 60’ right-of-way consisting of two 9’ wide parallel parking areas, 28’ wide travel lanes, planting zone, and sidewalk. The right-of-way reduces to 28’ at where southern detention is located. The sidewalk network provides access to the units and good pedestrian connections throughout the site.

Unit Types and Floor Plans: Appendix B shows the preliminary floor plans suggested for the development, which are referenced and located on the site plan. three story, two bedroom 16’x40’ units (A1) are proposed on the west side facing Stella Link Road. 16’x40’ three story 3 bedroom units (A2) are located on the north of Harmony School of Ingenuity. Six accessible units (C1) are provided at the north side which has good access to the Stella Link Road. 20’x40’ four bedroom units (B2) are located in the big green space areas to allow families to gather, play, and enjoy. The rest of the units are 20’x40’ three bedrooms (B1) with two car garages.

Parking: Including garage spaces and street parking, there are 251 total parking spaces provided on the project site. All the units on the site have at least 1 car garage.

Table 1: Unit Type Summary. A summary of the number of each unit type included in the site plan can be found in the table below:

Total Units	194
16’x40’ (2 bedroom, 2 bath, 2 car garage, rear loaded)	43
16’x40’ (3 bedroom, 2 bath, 2 car garage, rear loaded)	15
20’x40’ (3 bedroom, 2.5 bath, 2 car garage, rear loaded)	90
20’x40’ (4 bedroom, 2.5 bath, 2 car garage, rear loaded)	40
36’x40’ (3 bedroom, 2 bath, 1 car garage, front/back loaded)	6

Table 2: Bedroom Count. Total bedroom count by unit is summarized as follows:

Two bedrooms	43
Three bedrooms	111
Four bedrooms	40

Table 3: Parking Arrangements. A summary of the parking arrangements can be found in the table below:

Total parking spaces	251
Total spaces within unit garages	188
Parallel street parking on internal driveways	43

APPENDIX C: PRELIMINARY STORMWATER AND UTILITY PLAN

The following summarized the preliminary feasibility study and civil designs for the development of Stella Link Rd. located between Willowbend Blvd and Stella Link Rd. in Houston, TX.

Pavement Design: Proposed street and sidewalk pavement shall be constructed per the City of Houston’s concrete pavement detail and specifications.

Utility Design and Point of Service Connections:

- Storm line - All proposed storm lines shall be HDPE or RCP. Storm runoff within the site will be collected and conveyed through the proposed underground storm system and detain in the proposed surface detention where the outflow of the runoff will be restricted per the City of Houston and TXDOT requirements prior to discharge into existing channel.
- Water line - The proposed water line shall be AWWA C-900, Class DR18. The water network will be circulated and looped within the development with service connections to the 12” city’s water mains on Stella Link Rd. The proposed water line will be constructed per the city’s standards and specifications. Water valves will be installed at each junction of the water lines and fire hydrants will be installed at spacing not more than 350 feet along the main road.
- Sanitary Sewer - The proposed sanitary sewer shall be PVC SDR-35. The point of service connection for sanitary sewer is located within a sanitary sewer easement within the property. Manholes will be proposed at each junction of the sanitary sewer lines and at maximum spacing of 400 feet per the city’s standards and specifications.
- Floodplain - This property is located outside of the 100-year and 500-year floodplain per FEMA.

- Storm water Quality Management - This development shall comply to the city’s storm water quality management requirements when best management practice features (BMP) will be installed in the storm system to improvement storm water quality prior to discharge into the city’s system.

Floodplain: This property is located outside of the 100 year and 500-year floodplain per FEMA.

Stormwater Quality Management: This development shall comply to the city’s storm water quality management requirements when best management practice features (BMP) will be installed in the storm system to improvement storm water quality prior to discharge into the city’s system.

Disclaimer: While the information furnished herein is from typically reliable sources, the information is subject to change without notice and is subject to the following, all of which could produce substantially different results: changes in assumptions about future circumstances; events outside our control; changes in COH criteria; and changes of price, rental, and other conditions.

APPENDIX D: HUD SITE NOISE ASSESSMENT, STRACAT ANALYSIS, & CALCULATIONS

The parcel of land at the Stella Link Development along Highway 90/ S. Main Street, just east of Stella Link Road, will pose minimal challenges to provide an acoustical environment conducive for a residential development. Although TXDOT traffic counts are expected to nearly double by 2040 resulting in an increase of traffic noise, HUD and 3D modeling indicate that virtually all of the parcel will fall at or below the HUD 65 dBA DNL “Acceptable” level. Calculations and 3D modeling also indicate that only the project buildings in the southeast corner of the parcel will be slightly above the HUD 65 dBA DNL criteria. However, for all the project buildings HUD STraCAT calculations indicate that typical façade elements, including window systems, will meet the required sound level reductions to achieve a 45 dBA DNL interior level. No additional mitigation strategies should need to be implemented for this development to meet HUD criteria, both for interior to the units and for exterior amenity and green spaces.

APPENDIX E: OPINION OF PROBABLE CONSTRUCTION COST

This appendix is a preliminary opinion of probable construction cost for the site development, including civil and landscape estimates.

ACKNOWLEDGMENTS

We would like to acknowledge the staff at the City of Houston who played a key role in evaluating this site plan and its appendices to ensure that these met development goals and maintained compliance with City regulations and procedures.

Table 4: Acknowledgements

Name	Organization
Jeremiah Rivera	City of Houston Housing and Community Development Department
Olivia Bush	City of Houston Housing and Community Development Department
Rupa Sen	City of Houston Housing and Community Development Department
Deidre Vanlangen	City of Houston Public Works
Dipti Mathur	City of Houston Planning Department
Jennifer Ostlind	City of Houston Planning Department
Muxian Fang	City of Houston Planning Department

APPENDIX A: PRELIMINARY DESIGN ILLUSTRATIVE SITE PLAN



ASAKURA
ROBINSON



SAMPLE

- Unit Size (Reference appendix B for detailed floor plans)**
- A1:** 16'x40' (2 bedroom, 2 bath, 2 car garage, rear loaded)
 - A2:** 16'x40' (3 bedroom, 2.5 bath, 2 car garage, rear loaded)
 - B1:** 20'x40' (3 bedroom, 2.5 bath, 2 car garage, rear loaded)
 - B2:** 20'x40' (4 bedroom, 2.5 bath, 2 car garage, rear loaded)
 - C1:** 36'x40' (3 bedroom, 2 bath, front/back loaded 1 car garage)



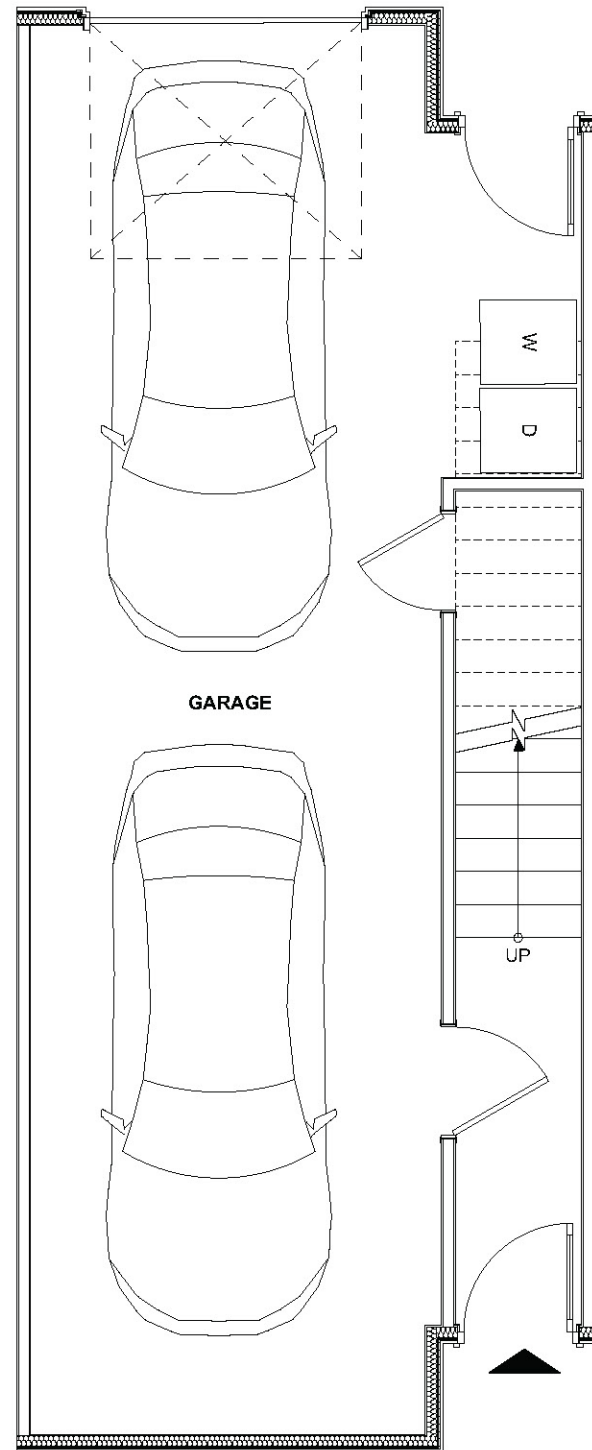
Stella Link Preliminary Community Design

APPENDIX B: PRELIMINARY FLOOR PLANS

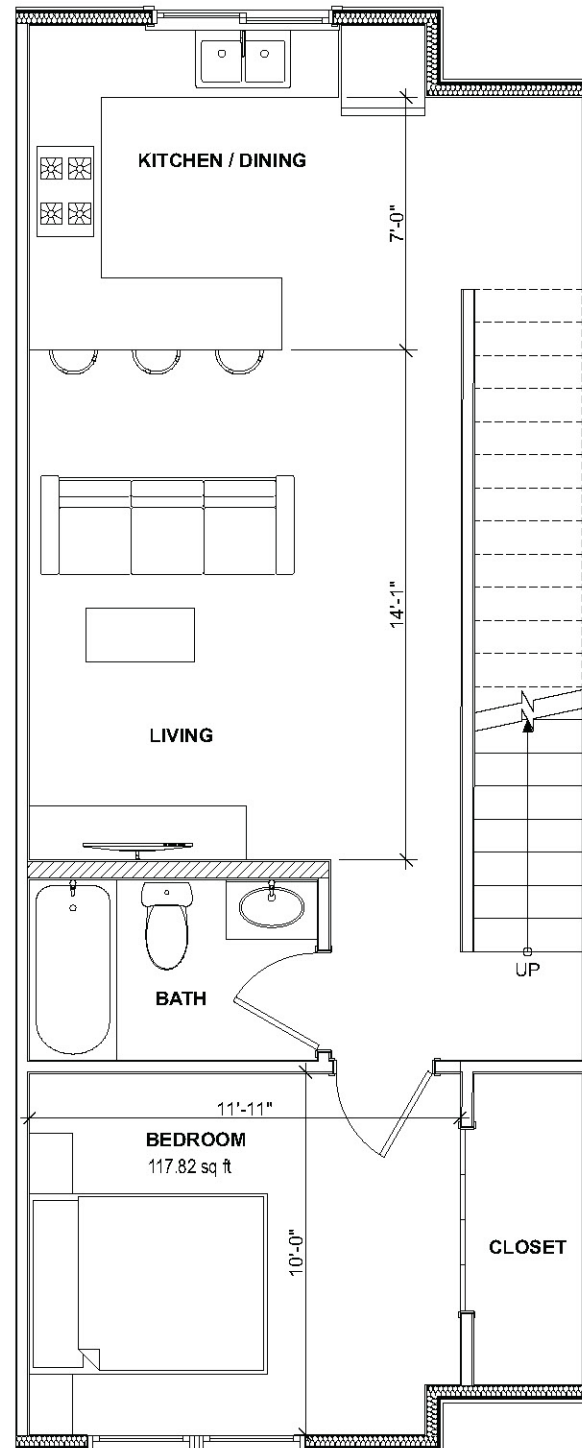
A1

16 x 40
3 STORY
2 BEDROOM

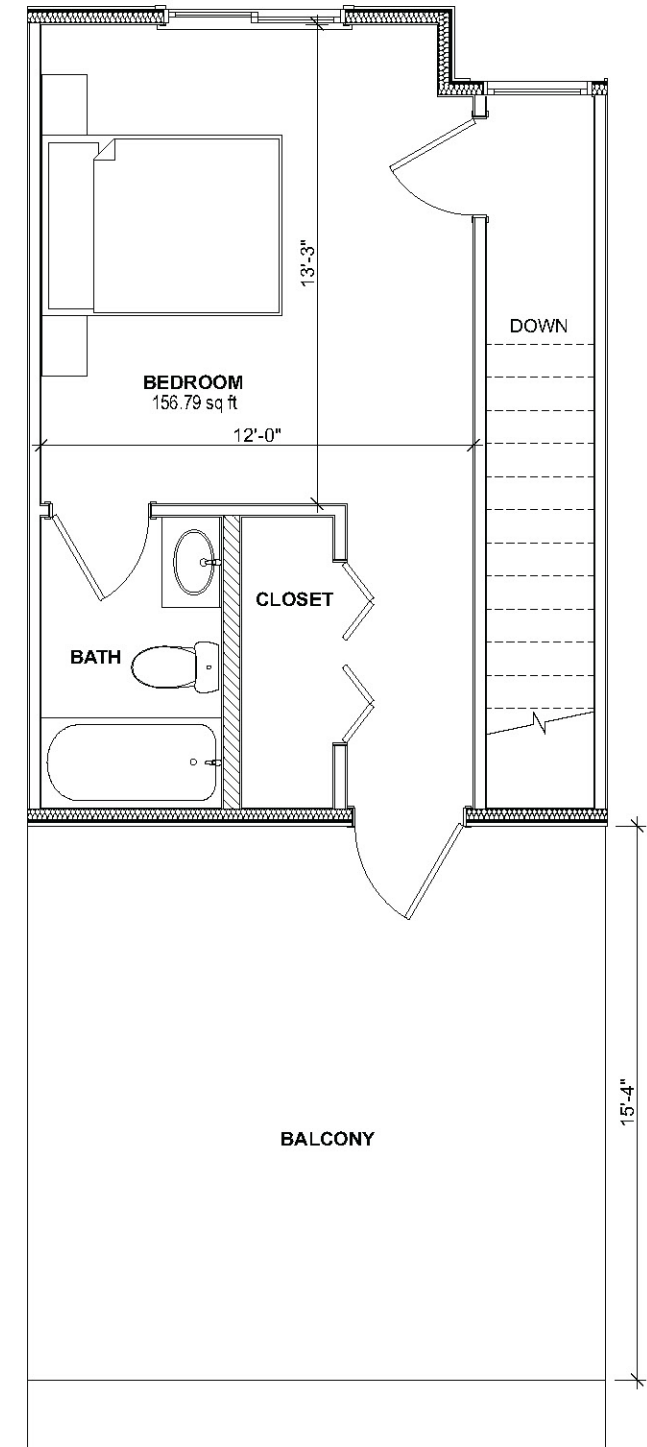
A1: 608 SQFT GARAGE / 245 SQFT BALCONY / 930 SQFT CONDITIONED
2 BED - 2 BATH - 2 CAR TANDEM GARAGE W/ SECOND FLOOR LIVING, DINING, KITCHEN



FIRST FLOOR PLAN
SCALE: 3/16" = 1"



SECOND FLOOR PLAN
SCALE: 3/16" = 1"

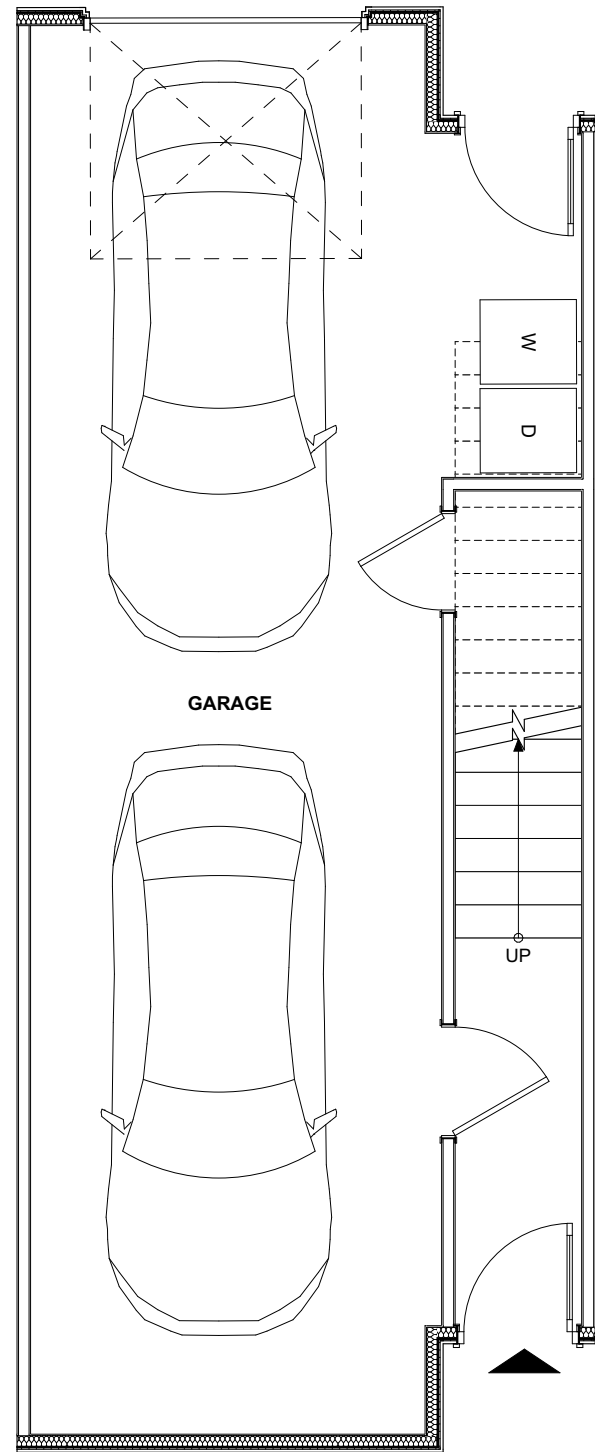


THIRD FLOOR PLAN
SCALE: 3/16" = 1"

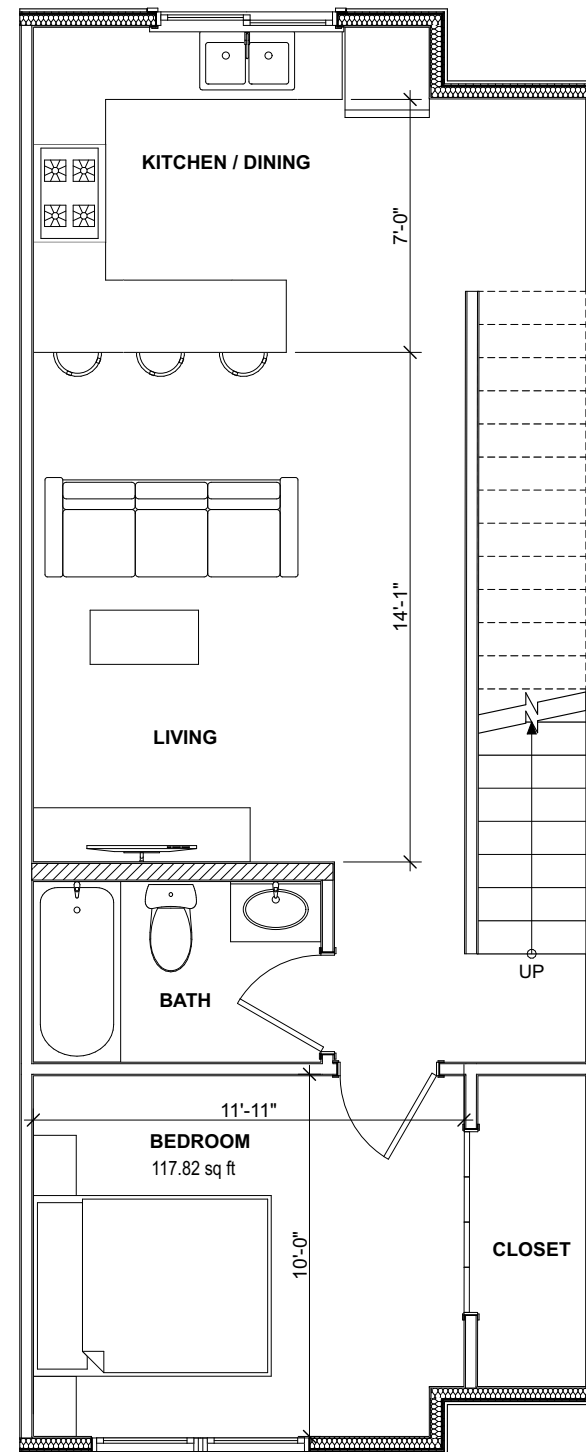
A2

16 x 40
3 STORY
3 BEDROOM

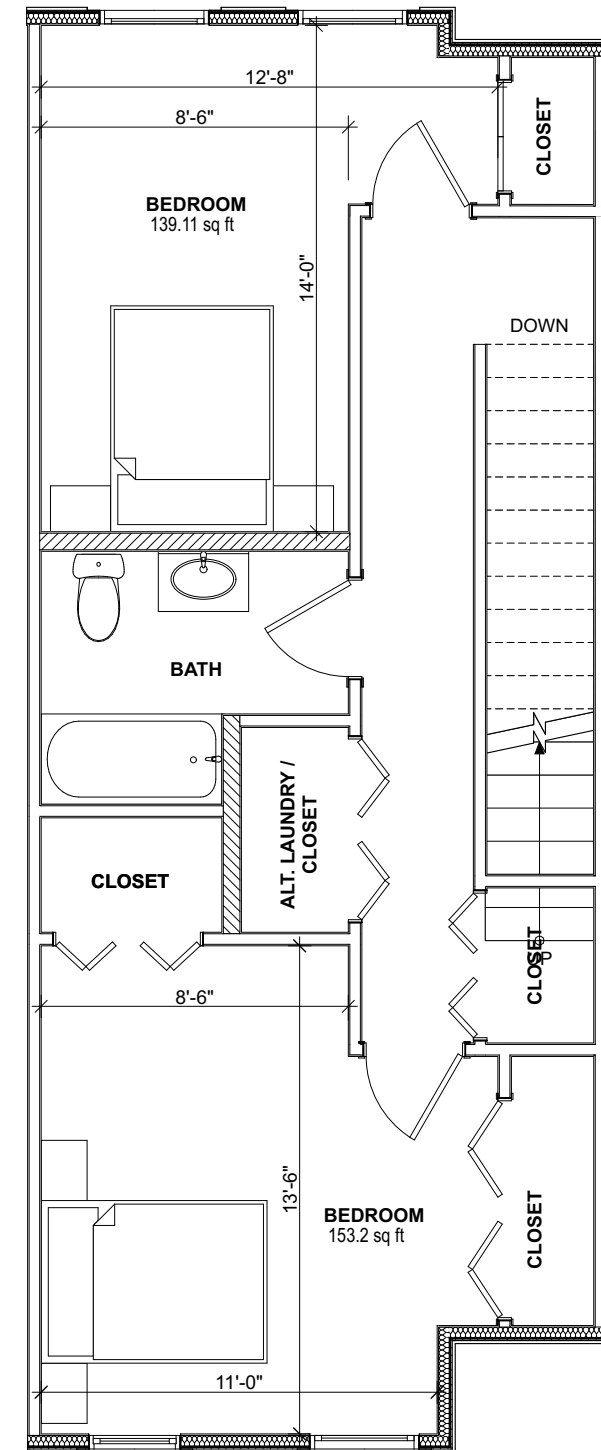
A2: 608 SQFT GARAGE / 1,204 SQFT CONDITIONED
3 BED - 2 BATH - 2 CAR TANDEM GARAGE W/ SECOND FLOOR LIVING, DINING, KITCHEN



FIRST FLOOR PLAN
SCALE: 3/16" = 1"



SECOND FLOOR PLAN
SCALE: 3/16" = 1"

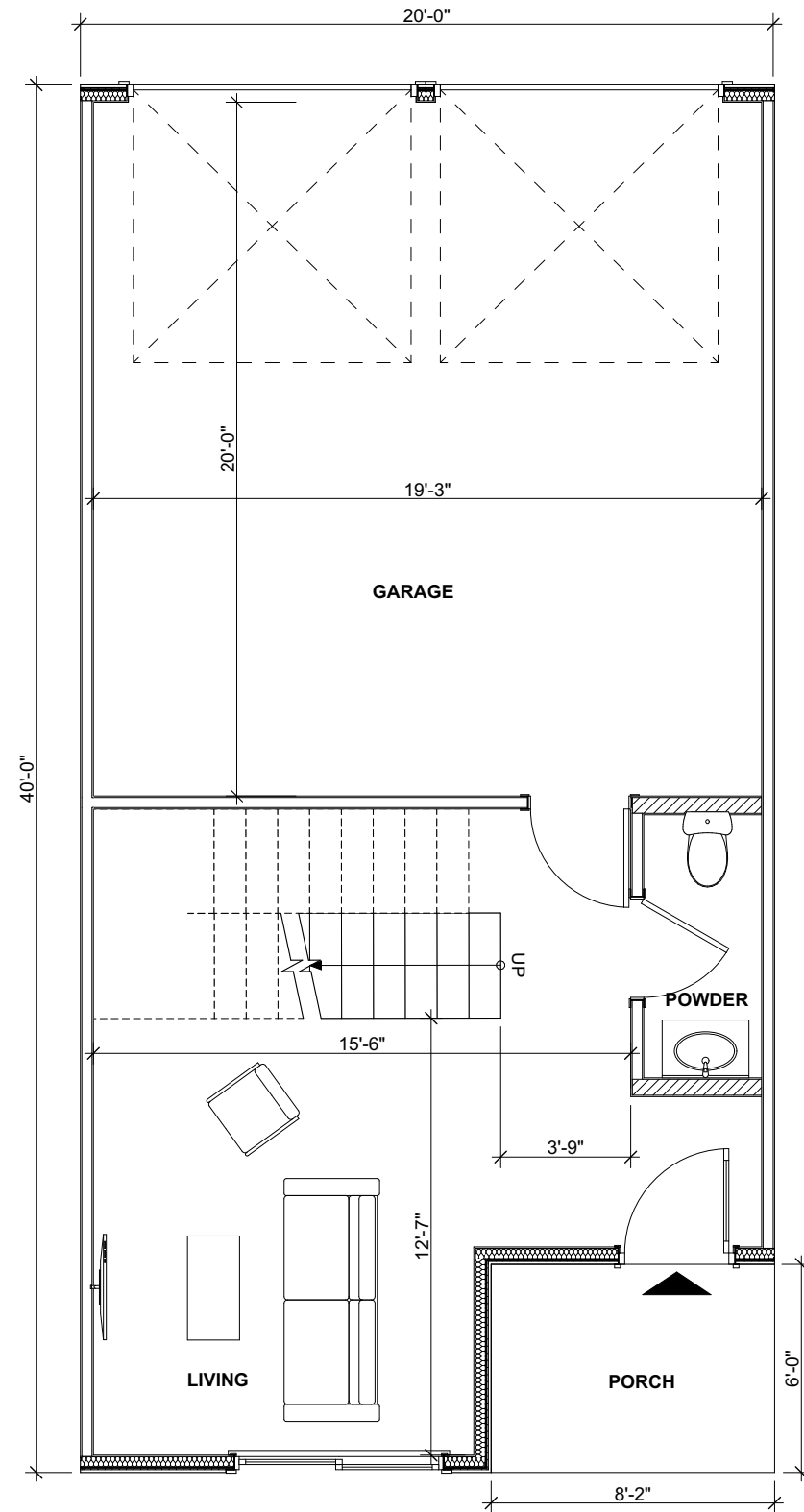


THIRD FLOOR PLAN
SCALE: 3/16" = 1"

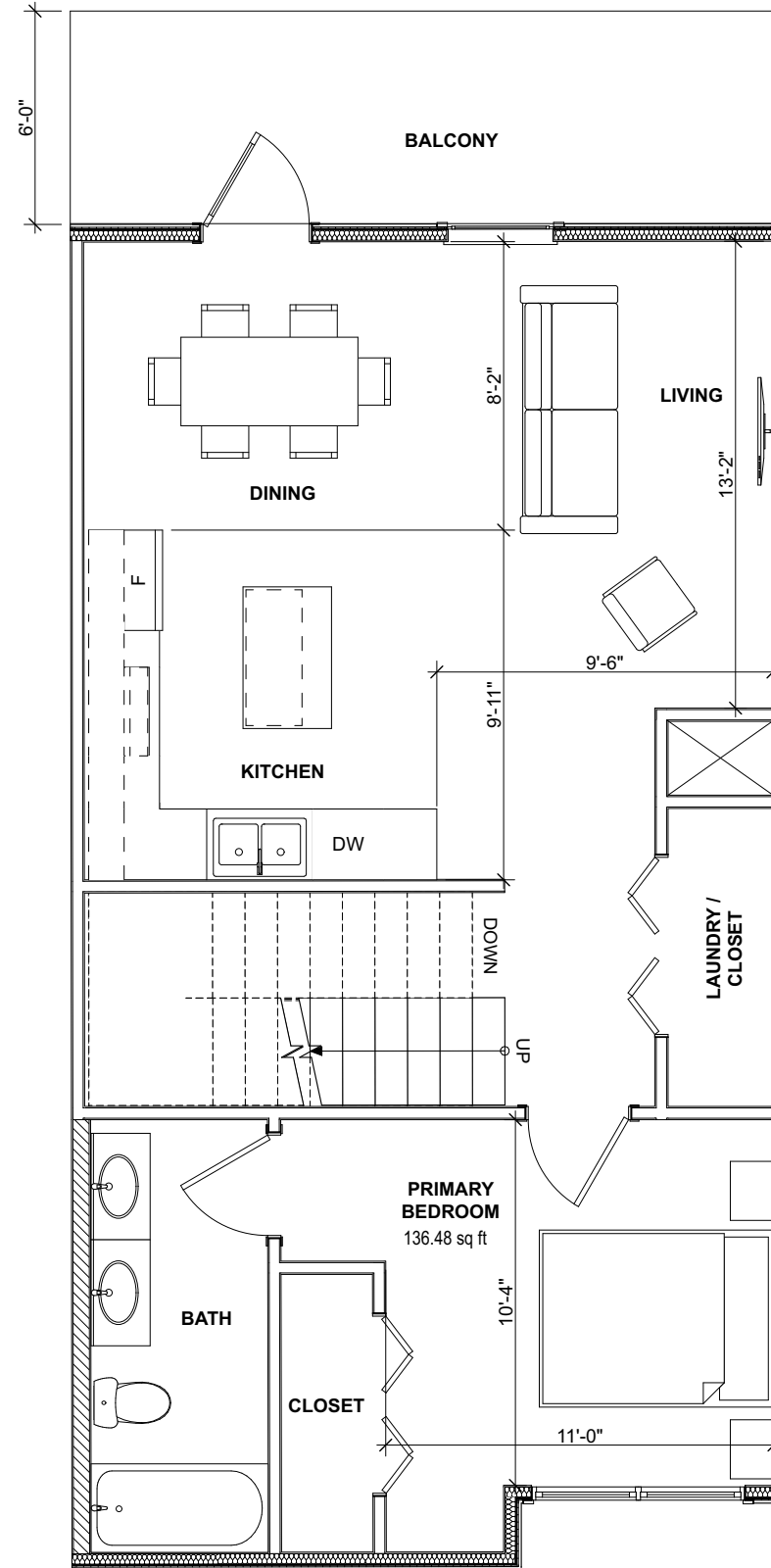
B1

20 x 40
3 STORY
3 BEDROOM

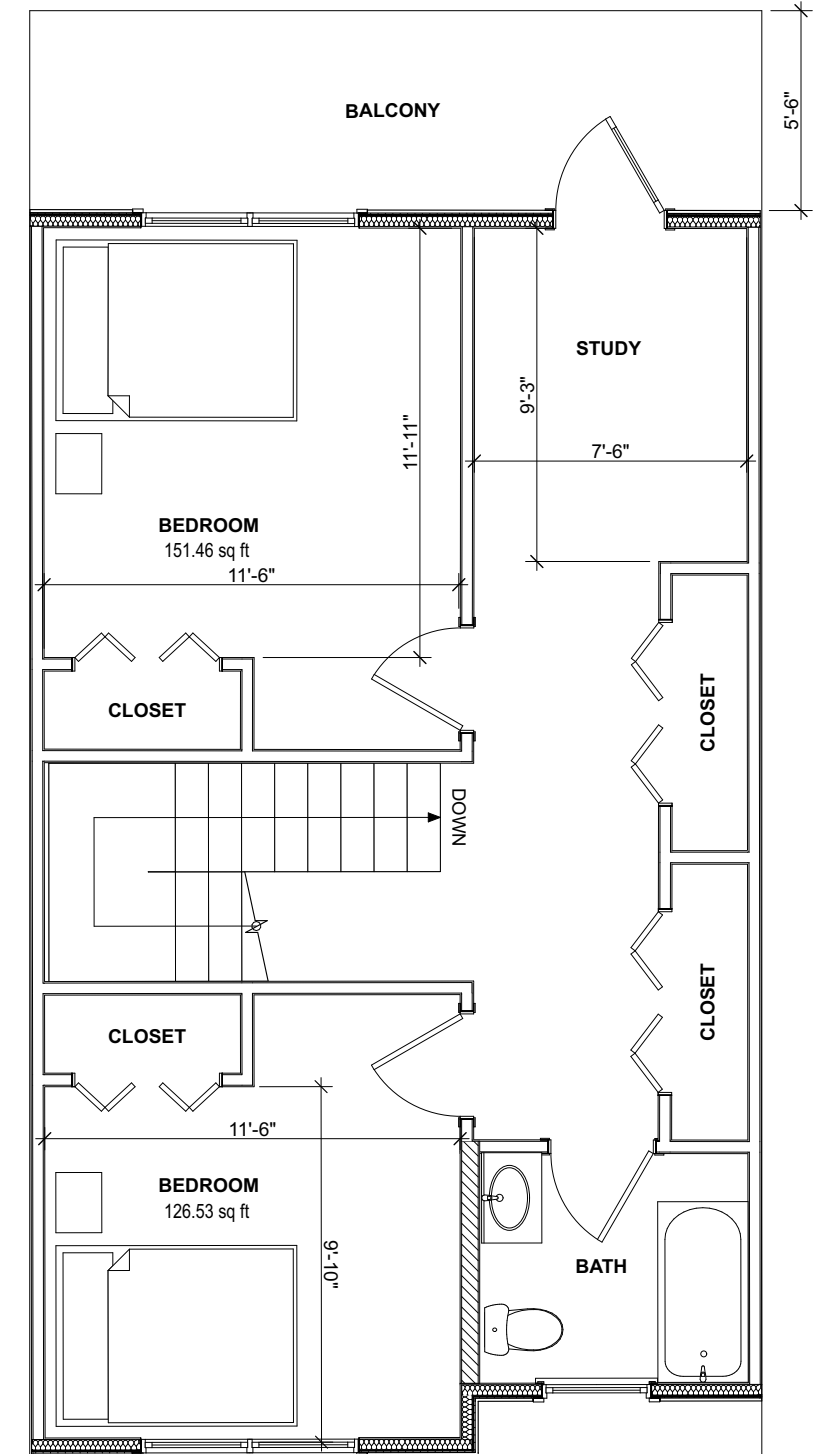
B1: 410 SQFT GARAGE / 284 SQFT BALCONY / 1,603 SQFT CONDITIONED
3 BED - 2.5 BATH - 2 CAR GARAGE W/ FIRST FLOOR FAMILY ROOM & SECOND FLOOR LIVING, DINING, KITCHEN



FIRST FLOOR PLAN
SCALE: 3/16" = 1"



SECOND FLOOR PLAN
SCALE: 3/16" = 1"

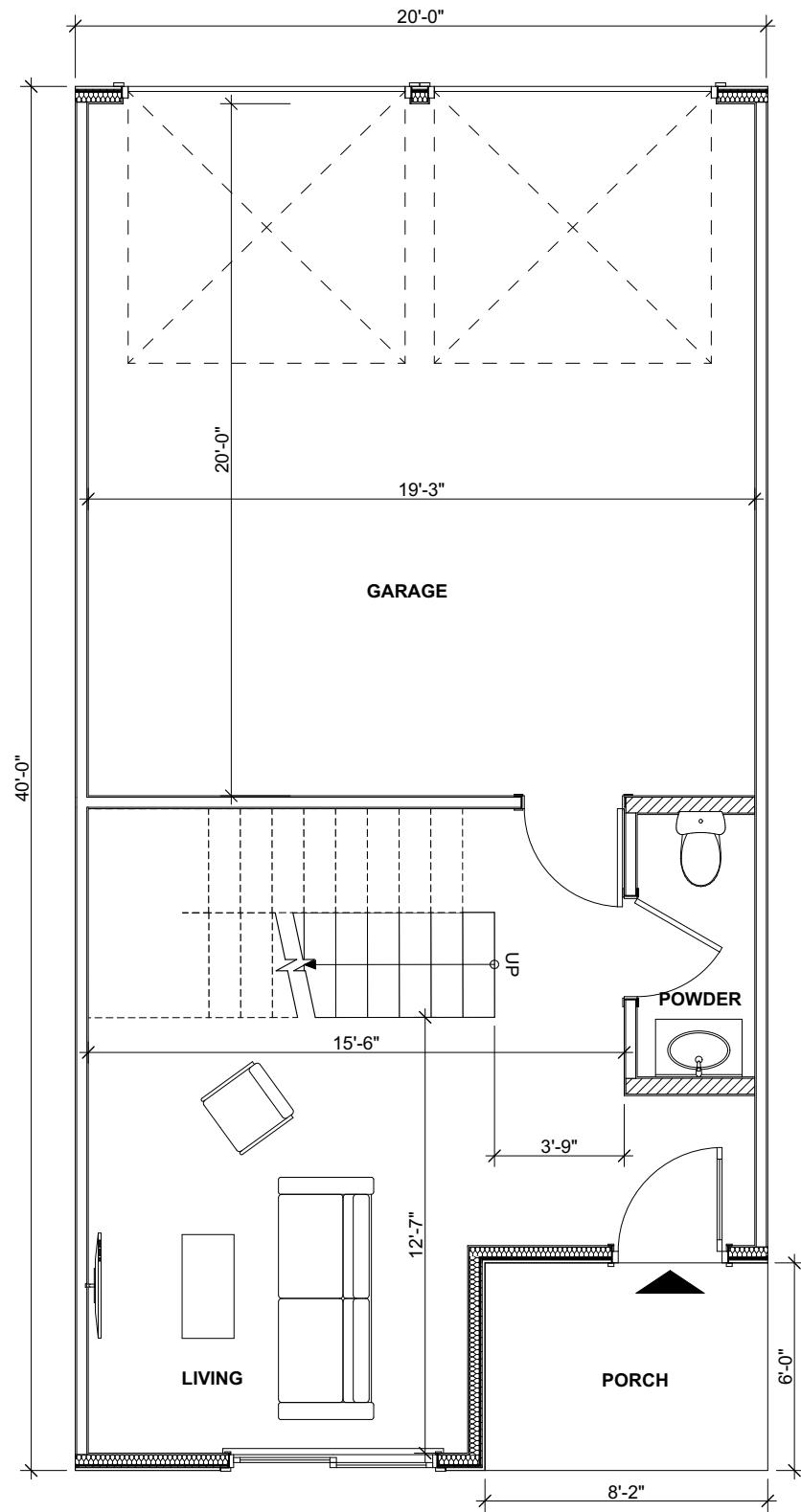


THIRD FLOOR PLAN
SCALE: 3/16" = 1"

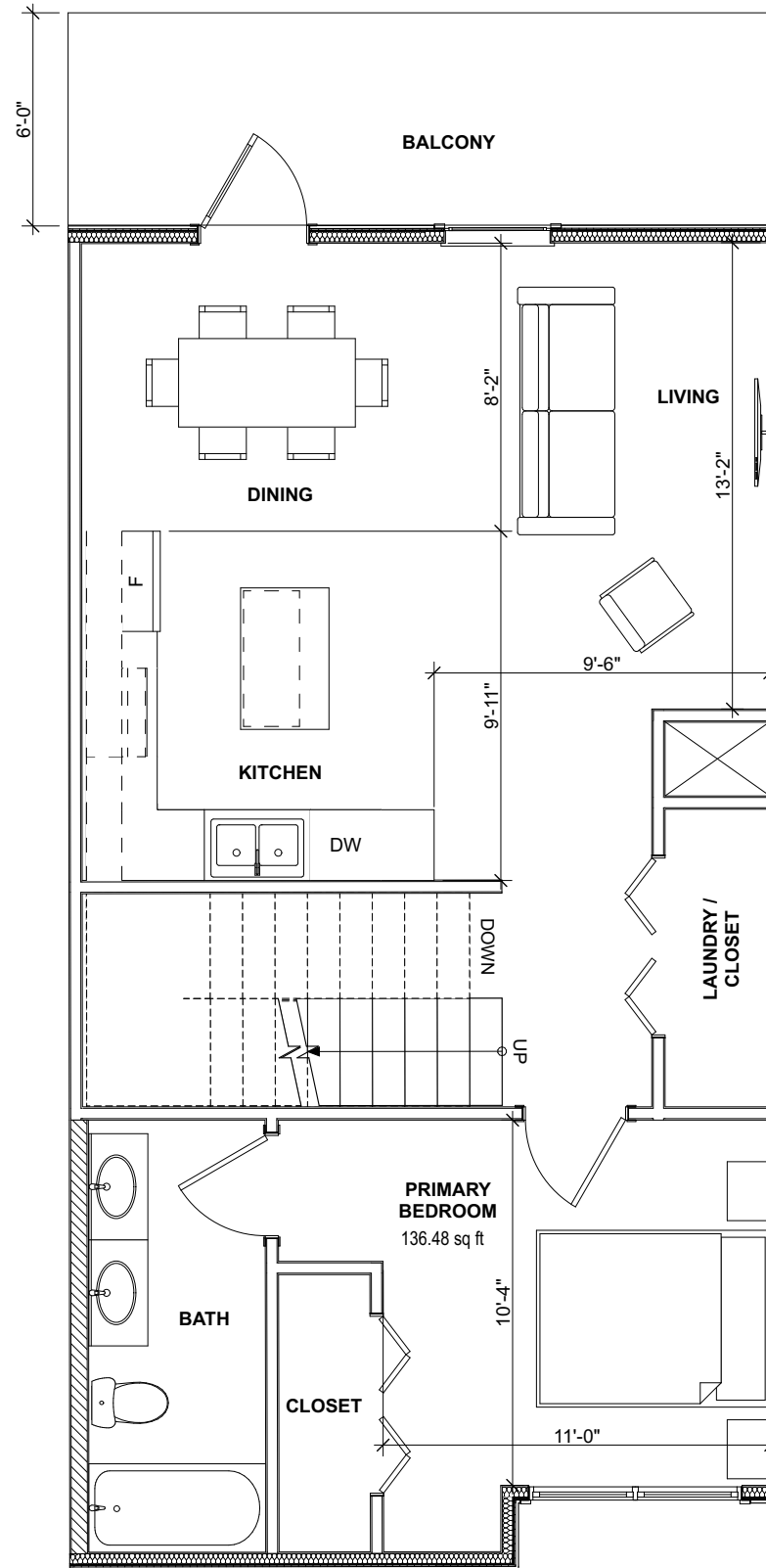
B2

20 x 40
3 STORY
4 BEDROOM

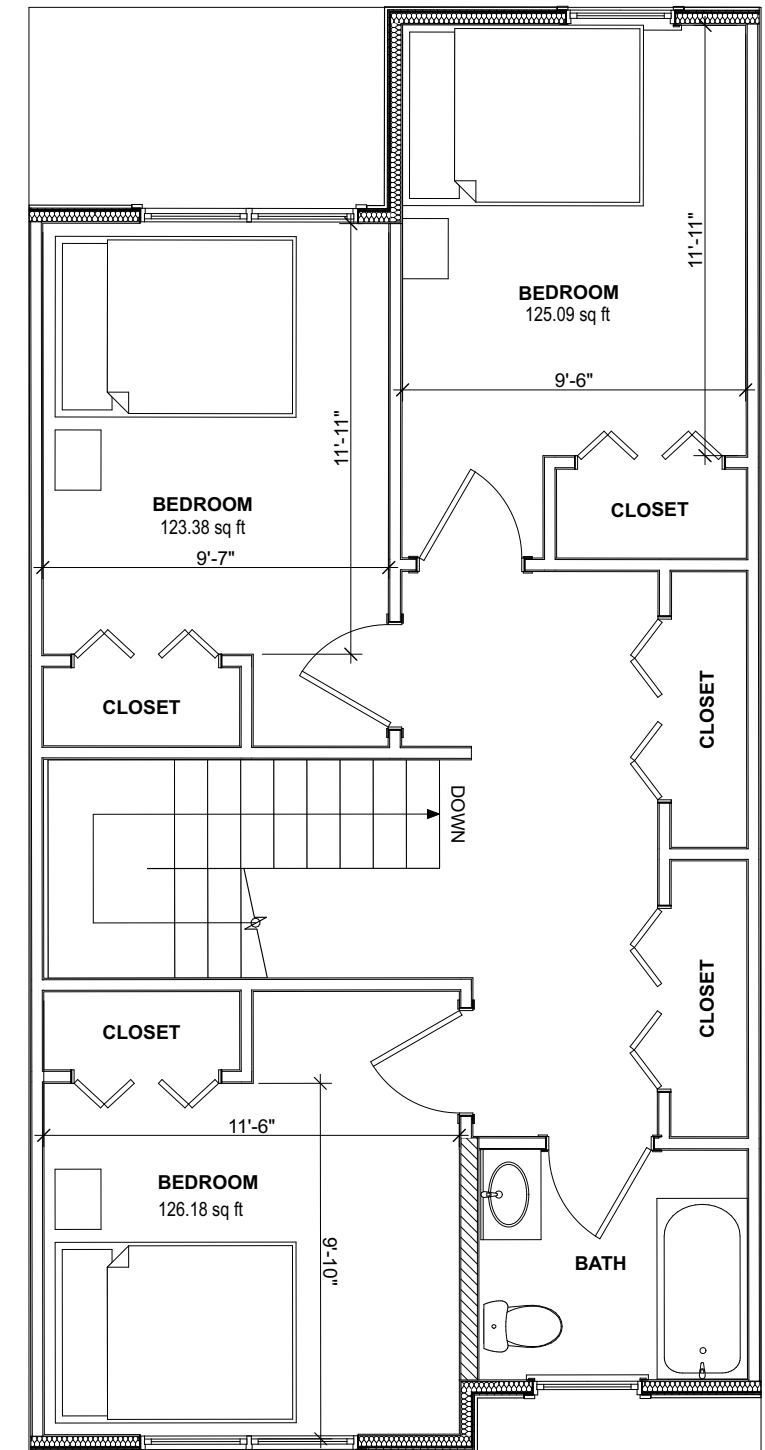
B2: 410 SQFT GARAGE / 172 SQFT BALCONY/ 1,664 SQFT CONDITIONED
4 BED - 2.5 BATH - 2 CAR GARAGE W/ FIRST FLOOR FAMILY ROOM & SECOND FLOOR LIVING, DINING, KITCHEN



FIRST FLOOR PLAN
SCALE: 3/16" = 1"



SECOND FLOOR PLAN
SCALE: 3/16" = 1"

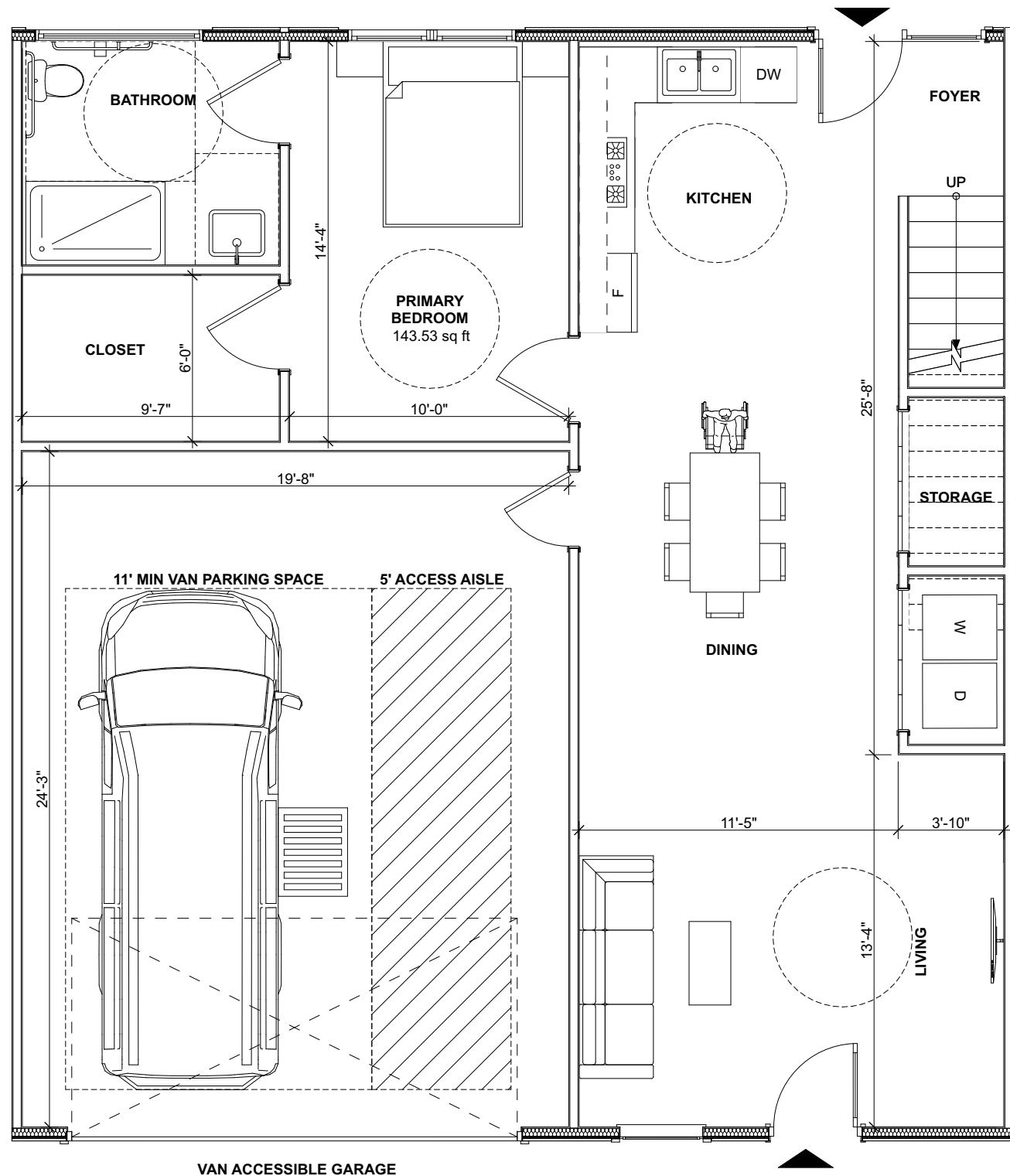


THIRD FLOOR PLAN
SCALE: 3/16" = 1"

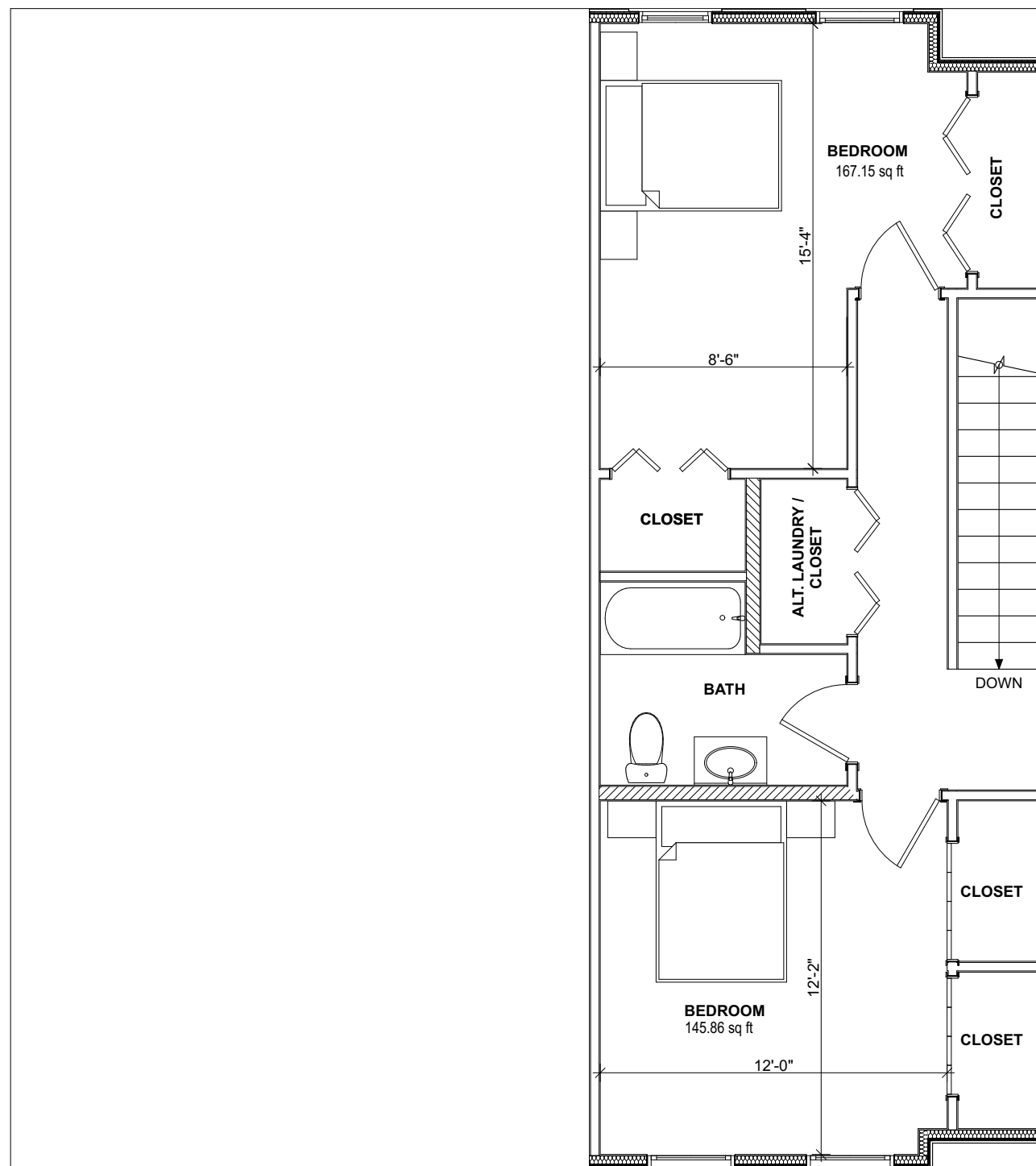
C1

36 x 40
ACCESSIBLE
2 STORY
3 BEDROOM

C1: 300 SQFT GARAGE / 1,535 SQFT CONDITIONED
3 BED - 2 BATH - GARAGE W/ VAN OFFLOADING. FIRST FLOOR LIVING, DINING, KITCHEN



FIRST FLOOR PLAN
SCALE: 3/16" = 1"



SECOND FLOOR PLAN
SCALE: 3/16" = 1"

APPENDIX C: PRELIMINARY STORMWATER AND UTILITY PLAN

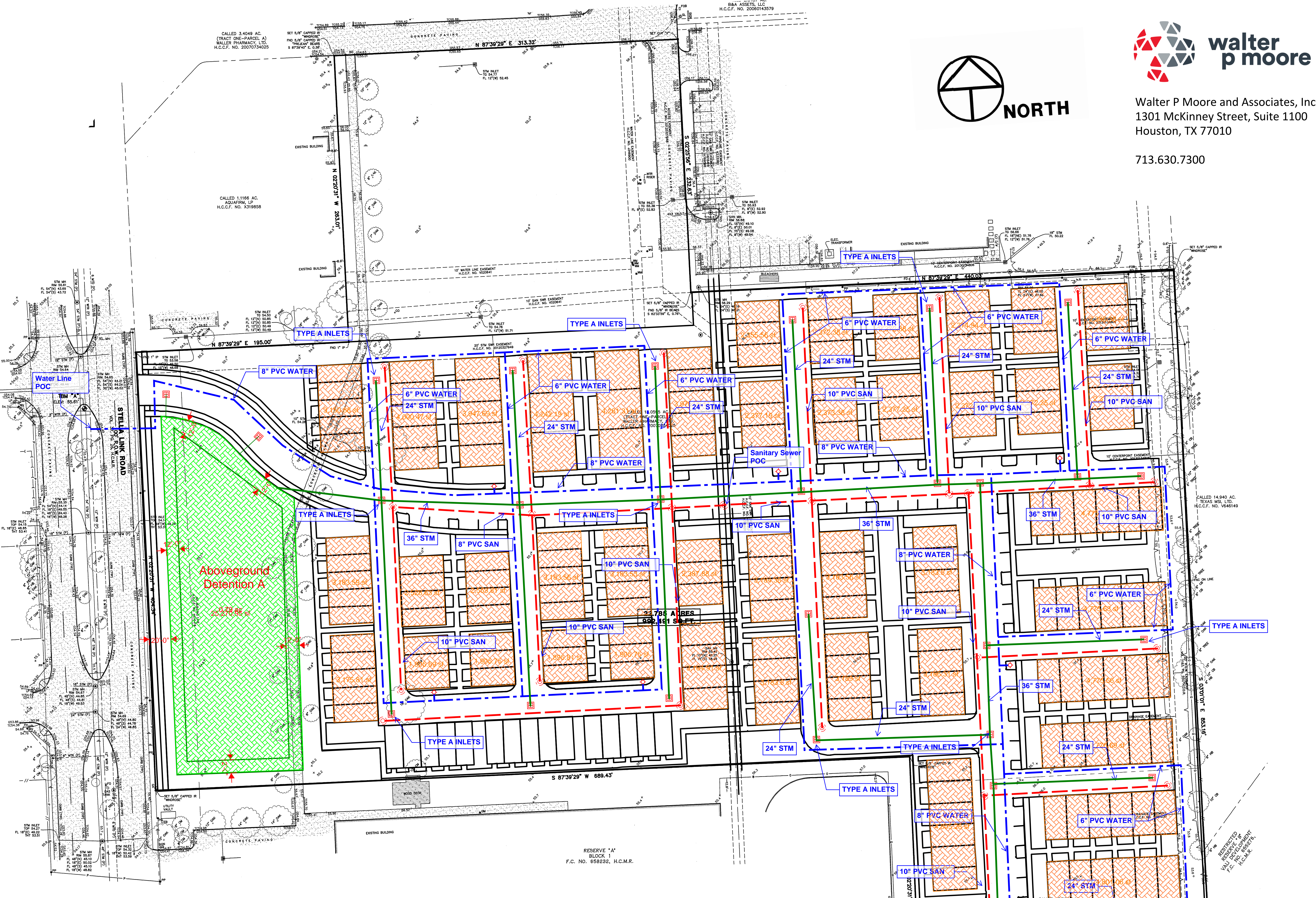
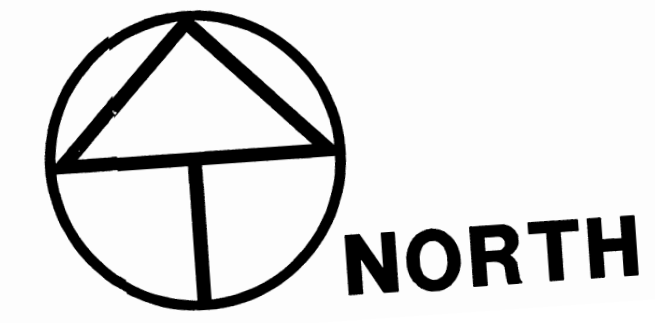
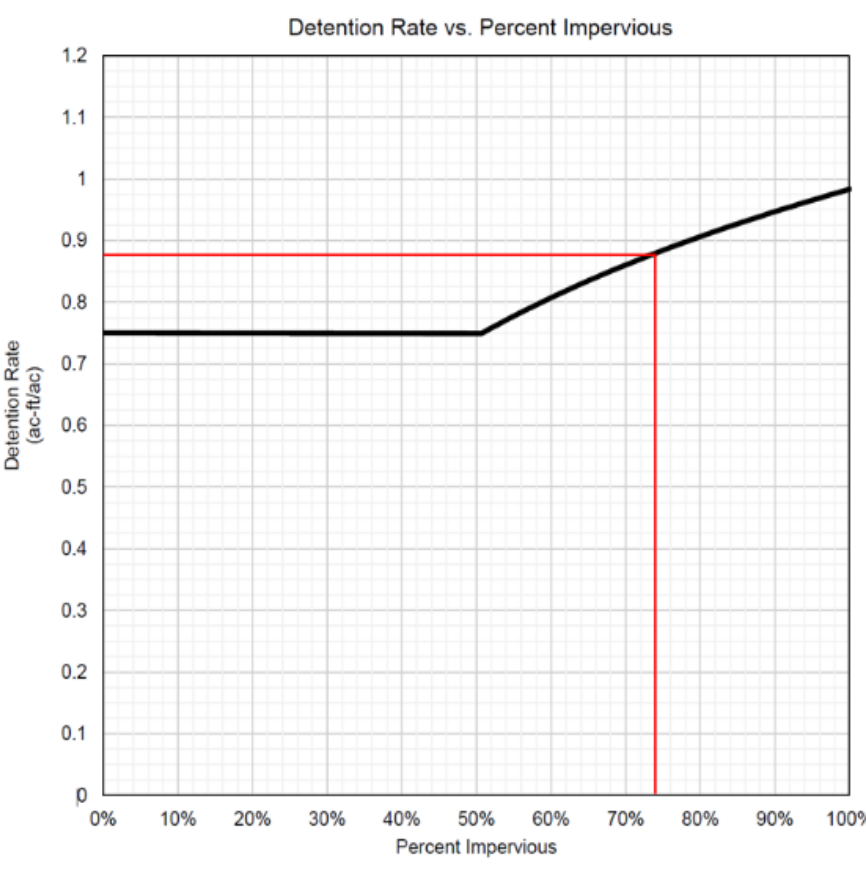


Figure 9.2 - Minimum Detention Rate Chart



Total Site Area = 527,252 sf (12.10 ac)
 Total paved drive area = 121,594 sf
 Total building area = 141,400 sf
 Total side walk area = 41,552 sf
 Surface detention = 85,205 sf
 % Impervious area = 74%

STORM DETENTION VOLUME ESTIMATION

TOTAL SITE AREA = 12.10 ACRE
% IMPERVIOUS AREA = 74%. (Estimate)
 (Use 74% for detention volume calculation)

Total Detention Volume required = 12.10 ac X
 0.88 ac/ft = 10.65 acre/ft (463,826 cu.ft)

The proposed underground detention pond
 footprints as shown on the drawing is based
 on an average of 6.5ft deep.

**Total Detention Volume Provided = 491,363
 cu.ft**



**APPENDIX D:
HUD SITE NOISE ASSESSMENT,
STRACAT ANALYSIS, &
CALCULATIONS**

April 28, 2022

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Re: HUD Site Noise Assessment, STraCAT & 3D Model Analyses & Calculations
Stella Link Development
Houston, TX

TECHNICAL MEMORANDUM

1. INTRODUCTION

This Technical Memorandum presents the results of our HUD Site Noise Assessment, STraCAT Calculations, and 3D Model Analysis for the Stella Link Development project located in Houston, TX. This project is being developed in conjunction with the Houston Land Bank (HLB), who is asking for this analysis for the site.

The approximate 12-acre site is located adjacent to Highway 90 / S. Main Street to the southeast and adjacent to Stella Link Road to the west. There is a Union Pacific railway approximately 2500 ft to the west and southwest of the project site. Houston Hobby Airport (HOU) is approximately 9 miles to the east of the site and should have negligible impact on the site compared to other nearby sources. Future noise levels for the highway and surface street were used in the assessment.

The HUD site noise requirements fall into three categories for an average day-night sound level (DNL) for a given parcel of land; < 65 dBA (DNL) the site is “acceptable”, between 65 & 75 dBA (DNL) the site is “normally unacceptable”, and >75 dBA (DNL) the site is “unacceptable”. For sites that are “acceptable”, no improvements to the site or building façade elements should be required. For sites that are “normally unacceptable”, building façade and / or other site improvements must be shown to reduce sound levels to 65 dBA (DNL) for outside areas and 45 dBA (DNL) for interior spaces.

A HUD STraCAT Analysis was also performed for the worst-case building Noise Assessment Locations (NALs) to determine if the building façade elements will provide sufficient noise reduction to meet a HUD interior level of 45 dBA DNL. STraCAT analyses are not applicable to outdoor NALs and therefore were not performed.

A 3D computer model was also created to assess outdoor levels to determine compliance with the HUD goal of 65 dBA DNL for outdoor community amenity spaces.

Results of our analyses and calculations are given herein.

2. ANALYSES & RESULTS

2.1 HUD Site Noise Assessment Results

A HUD site noise assessment was performed for two Noise Assessment Locations (NALs) at the site using the HUD online tool (<https://www.hudexchange.info/environmental-review/dnl-calculator/>). The southeast corner building of the project site (worst-case) was chosen for this NAL as it will be closest to the major noise sources at the project site; Highway 90 / S. Main St. An additional NAL was placed at a western project building nearest Stella Link Rd.

NAL	HUD Calculated Noise Level (dBA DNL)	HUD Category	Highway / Road Condition
1 (Highway 90 side)	69	Normally Unacceptable	Future AADT (2040)
2 (Stella Link side)	64	Acceptable	Future AADT (2040)

The HUD site noise assessment calculations indicate that the project site will fall in the “Acceptable” and “Normally Unacceptable” categories with predicted levels just above and below 65 dBA (DNL). Please note that the above analysis does not take into account shielding from existing buildings. As such, a 3D computer model was created to determine levels on the façade of the project buildings. The model indicates that all but the top floor of the closest project building to Highway 90 will fall to 65 dBA DNL or lower. Item 2.5, below, discusses the 3D acoustic model used in our analysis.

2.2 Site Analysis Assumptions and Input Data for NALs #1 & #2

Major Roadways within 1000 feet:

Highway 90 / S. Main St. is a 6-lane highway plus 4-lane frontage road located approximately 90 ft to the southeast of the project site property line (center of all lanes of travel) and **240 ft** from the nearest project building. Based on Texas Department of Transportation (TXDoT) information, Annual Average Daily Traffic counts (AADT) for this roadway in 2020 consisted of approximately **64,016** vehicles with a truck percentage of **1.8%**. Future (2040) AADT estimates from TXDoT and the Compound Annual Growth Rate (CAGR) indicate **128,032** vehicles including **1.8%** for medium and heavy trucks. The HUD default of 15% was used for nighttime percentage.

Stella Link Rd. is a 4-lane divided local road located approximately 50 ft to the west of the project site property line (center of all lanes of travel) and **175 ft** from the nearest project building. Based on Texas Department of Transportation (TXDoT) information, Annual Average Daily Traffic counts (AADT) for this roadway in 2016 consisted of approximately **17,159** vehicles with a truck percentage of **3.2%**. Future (2040) AADT estimates from TXDoT and the Compound Annual Growth Rate (CAGR) indicate **24,023** vehicles including **3.2%** for medium and heavy trucks. The HUD default of 15% was used for nighttime percentage.

Railways within 3000 feet:

As stated above, there is one Union Pacific railways located approximately 2500 feet to the west and southwest of the project site. Based on U.S. Department of Transportation Federal Railroad Administration inventory report #758525P, data shows approximately 13 daytime and 13 nighttime events. A speed of 50 mph was utilized in our assessments. The HUD default of 2 diesel engines

and 50 railcars were used in the calculations. This crossing at Willowbend Blvd. indicates that this is a QuietZone crossing where no horns are allowed.

Airports within 15 miles:

HOU is approximately 9 miles to the east of the site and based on a Federal Department of Transportation National Transportation Noise Map, HOU should have negligible impact on the Stella Link project site compared to other local sources.

2.3 STraCAT Analysis Assumptions

An estimation of the anticipated exterior façade elements for the proposed townhomes include a fiber cement (Hardie) façade, as well as windows, and doors. The anticipated exterior façade consists of the following:

1. Hardie Siding with building wrap
2. 15/32" OSB sheathing
3. 2x wood framing, with batt insulation (assumed R-21)
4. 1-layer 5/8" fire code rated gypsum board

Our calculations estimated the sound reduction performance of the façade elements as follows:

1. Typical Facade – STC 45 (with Hardie façade, via Insul v9.0; de-rated from STC 50)
2. Window Glazing – STC 27 (estimated based on Double Hung 1/2" vinyl IGU; STC 27 via Insul v9.0)
3. Doors – STC 26 (estimated based on modern entry doors with glazing inserts and good weather seals; via HUD)

To analyze the performance of the building facades, we determined that a front façade of a home that would include both an entry door and large picture window facing the highways would be the condition most difficult to meet the required sound reduction. Based on the current site layout, the three story 20x40 townhome configurations are the building types that will be located in the southeast corner (NAL #1) and will receive the loudest noise contributions from the adjacent highway. No STraCAT analysis is required for the closest project buildings nearest Stella Link Rd as the site analysis indicates levels below the HUD 65 dBA DNL threshold.

Other locations on the site, facings of the project buildings, or facades with fewer or smaller window or door elements will have an easier time meeting the required noise reduction levels. Amenity outdoor areas have been located on the project site so that residential buildings provide shielding from the highways, streets, and railways.

2.4 STraCAT Results & Construction Discussion

HUD STraCAT sound reduction calculations were performed for the above NAL #1 (SE project building) using the approved calculation site (<https://www.hudexchange.info/stracat/>). The table below shows the results of our calculations.

Building / Location	HUD Assessment Noise Source Level (dB DNL)*	HUD Minimum Required Sound Attenuation (dB)	HUD STraCAT Calculated Attenuation (dB)
20x40 Unit Level 1 Living Room	69	27	32.8
20x40 Unit Level 2 Bedroom	69	27	32.7
20x40 Unit Level 3 Bedroom	69	27	32.4
20x40 Level 3 Bathroom	69	27	34.9

*HUD Assessment Level from above

The results indicate that the anticipated building façade elements will provide the HUD required sound level reductions for highway traffic noise to below 45 dBA DNL within the units of the NAL for future conditions. Calculations indicate that acoustically improved windows, or other façade elements, will not be required to meet the HUD required sound level reductions.

Other general comments regarding window and door elements as the designs progress are as follows:

1. At a 70 dBA DNL exterior noise level, windows at STC 27 and doors at STC 26 cannot compromise any more than 75% of a building’s façade (Hardie at STC 45) to meet the interior criteria. This will allow larger windows for the project buildings if desired.

In terms of interior layouts within the residential buildings, the larger the exposed façade, the larger the windows and doors can be and still meet the interior noise criterion.

2.5 3D Computer Model & Noise Mitigation Recommendations

Due to the complexity of the townhome layouts on the property, and existing surrounding buildings, a 3D computer noise model was created based on the latest layout. Incorporating the site plan, the model was developed using Cadna/A, version 2022, a commercial noise modeling package developed by DataKustik GmbH. The software takes into account spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is based on published engineering standards. The ISO 9613¹ standard was used for air absorption and other noise propagation calculations. The model was “calibrated” using the overall sound level (dBA DNL) as calculated by the HUD Site noise assessment and spectrums from

¹ ISO 9613, “Acoustics – Attenuation of sound during propagation outdoors,” 1996.

previous measurements along roadways with similar traffic types. Reflections from project buildings and structures are also taken into account in the model.

Figure 1, attached, shows DNL noise contours at the site with no site mitigation in place. As you can see, all areas of the project site are expected to have exterior sound levels below the HUD 65 dBA DNL noise threshold, with the exception of the far southeast building. A closer analysis indicates that only the top floor (3rd Floor) of that building will be above the 65 dBA DNL criteria as existing buildings to the southeast will shield noise to the first and second floors. As indicated in the STraCAT analysis above, the typical building façade elements will provide sufficient noise level reduction to meet the interior goal of 45 dBA DNL for all floors, including the third floor.

Furthermore, with the outdoor areas around the project buildings all below the HUD 65 dBA DNL level, outdoor amenity and green spaces should be conducive to outdoor activities. No noise mitigation should be required for the Stella Link Development.

3. CONCLUSION

A HUD site noise assessment analysis was performed for the Stella Link Development project in Houston, Texas. Calculations indicate that all NALs at the site will have noise levels below 65 dBA (DNL) and fall into the “Acceptable” category, with the exception of the furthest project building to the southeast of the parcel. Calculations also indicate that the as-designed building façade elements will meet the required HUD minimum sound level reductions to meet a 45 dBA DNL interior level. No noise extra mitigation strategies should be required to be implemented for either project buildings or outdoor areas to meet the HUD goals.

This concludes our Technical Memorandum. Please contact me if you have any questions.

Sincerely,

SLR International Corporation



Matthew S. Kinch, P.E.
Senior Engineer

MSK/msk

SLR Technical Memo - Asakura Robinson - Stella Link Development - 04-28-2022 v1.docx

Enc HUD NAL Analysis
 HUD STraCAT Analyses
 Figure 1 – No Mitigation Noise Contours
 Anticipated Exterior Wall Performance
 Anticipated Glazing Performance

Home (/) > Programs (/programs/) > Environmental Review (/programs/environmental-review/) > DNL Calculator

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the [Day/Night Noise Level Calculator Electronic Assessment Tool Overview \(/programs/environmental-review/day-night-noise-level-assessment-tool/\)](/resource/3822/day-night-noise-level-assessment-tool-overview/).

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- Note #2:** DNL Calculator assumes roadway data is always entered.

Tools and Guidance

[Day/Night Noise Level Assessment Tool User Guide \(/resource/3822/day-night-noise-level-assessment-tool-user-guide/\)](/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

[Day/Night Noise Level Assessment Tool Flowcharts \(/resource/3823/day-night-noise-level-assessment-tool-flowcharts/\)](/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

DNL Calculator

Site ID	Stella Link Development (SE Building NAL) - 2040 AADT
Record Date	04/28/2022
User's Name	Matthew Kinch, P.E.

Road # 1 Name: Highway 90

Road #1	Cars <input checked="" type="checkbox"/>	Medium Trucks <input checked="" type="checkbox"/>	Heavy Trucks <input checked="" type="checkbox"/>
Effective Distance	240	240	240
Distance to Stop Sign			
Average Speed	50	50	50
Average Daily Trips (ADT)	117308	1075	1075
Night Fraction of ADT	15	15	15
Road Gradient (%)			1
Vehicle DNL	67	57	64
Calculate Road #1 DNL	69	Reset	

Road # 2 Name: Stella Link

Road #2	Cars <input checked="" type="checkbox"/>	Medium Trucks <input checked="" type="checkbox"/>	Heavy Trucks <input checked="" type="checkbox"/>
Effective Distance	850	850	850
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	15920	263	263
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	47	40	49
Calculate Road #2 DNL	51	Reset	

Railroad #1 Track Identifier: Union Pacific	
Rail # 1	
Train Type	Electric <input type="checkbox"/> Diesel <input checked="" type="checkbox"/>
Effective Distance	2500
Average Train Speed	50
Engines per Train	2
Railway cars per Train	50
Average Train Operations (ATO)	26
Night Fraction of ATO	50
Railway whistles or horns?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> Yes: <input type="checkbox"/> No: <input checked="" type="checkbox"/>
Bolted Tracks?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> Yes: <input type="checkbox"/> No: <input checked="" type="checkbox"/>
Train DNL	0 50
Calculate Rail #1 DNL	50 Reset

Add Road Source	Add Rail Source
Airport Noise Level	50
Loud Impulse Sounds?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Combined DNL for all Road and Rail sources	69
Combined DNL including Airport	69
Site DNL with Loud Impulse Sound	
Calculate	Reset

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative:** Cancel the project at this location
- **Other Reasonable Alternatives:** Choose an alternate site
- **Mitigation**
 - Contact your Field or Regional Environmental Officer (</programs/environmental-review/hud-environmental-staff-contacts/>)
 - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
 - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
 - Incorporate natural or man-made barriers. See *The Noise Guidebook* (</resource/313/hud-noise-guidebook/>)
 - Construct noise barrier. See the Barrier Performance Module (</programs/environmental-review/bpm-calculator/>)

Home (/) > Programs (/programs/) > Environmental Review (/programs/environmental-review/) > DNL Calculator

DNL Calculator

The Day/Night Noise Level Calculator is an electronic assessment tool that calculates the Day/Night Noise Level (DNL) from roadway and railway traffic. For more information on using the DNL calculator, view the [Day/Night Noise Level Calculator Electronic Assessment Tool Overview \(/programs/environmental-review/day-night-noise-level-electronic-assessment-tool/\)](/resource/3822/day-night-noise-level-assessment-tool-user-guide/).

Guidelines

- To display the Road and/or Rail DNL calculator(s), click on the "Add Road Source" and/or "Add Rail Source" button(s) below.
- All Road and Rail input values must be positive non-decimal numbers.
- All Road and/or Rail DNL value(s) must be calculated separately before calculating the Site DNL.
- All checkboxes that apply must be checked for vehicles and trains in the tables' headers.
- Note #1:** Tooltips, containing field specific information, have been added in this tool and may be accessed by hovering over all the respective data fields (site identification, roadway and railway assessment, DNL calculation results, roadway and railway input variables) with the mouse.
- Note #2:** DNL Calculator assumes roadway data is always entered.

Tools and Guidance

[Day/Night Noise Level Assessment Tool User Guide \(/resource/3822/day-night-noise-level-assessment-tool-user-guide/\)](/resource/3822/day-night-noise-level-assessment-tool-user-guide/)

[Day/Night Noise Level Assessment Tool Flowcharts \(/resource/3823/day-night-noise-level-assessment-tool-flowcharts/\)](/resource/3823/day-night-noise-level-assessment-tool-flowcharts/)

DNL Calculator

Site ID	Stella Link Development (W Building NAL) - 2040 AADT
Record Date	04/28/2022
User's Name	Matthew Kinch, P.E.

Road # 1 Name: Highway 90

Road #1	Cars <input checked="" type="checkbox"/>	Medium Trucks <input checked="" type="checkbox"/>	Heavy Trucks <input checked="" type="checkbox"/>
Effective Distance	990	990	990
Distance to Stop Sign			
Average Speed	50	50	50
Average Daily Trips (ADT)	117308	1075	1075
Night Fraction of ADT	15	15	15
Road Gradient (%)			1
Vehicle DNL	58	48	55
Calculate Road #1 DNL	60	Reset	

Road # 2 Name: Stella Link

Road #2	Cars <input checked="" type="checkbox"/>	Medium Trucks <input checked="" type="checkbox"/>	Heavy Trucks <input checked="" type="checkbox"/>
Effective Distance	175	175	175
Distance to Stop Sign			
Average Speed	35	35	35
Average Daily Trips (ADT)	15920	263	263
Night Fraction of ADT	15	15	15
Road Gradient (%)			0
Vehicle DNL	58	50	59
Calculate Road #2 DNL	62	Reset	

Railroad #1 Track Identifier:

Rail # 1

Train Type	Electric <input type="checkbox"/>	Diesel <input checked="" type="checkbox"/>
Effective Distance	<input type="text"/>	2500
Average Train Speed	<input type="text"/>	50
Engines per Train	<input type="text"/>	2
Railway cars per Train	<input type="text"/>	50
Average Train Operations (ATO)	<input type="text"/>	26
Night Fraction of ATO	<input type="text"/>	50
Railway whistles or horns?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>	Yes: <input type="checkbox"/> No: <input checked="" type="checkbox"/>
Bolted Tracks?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>	Yes: <input type="checkbox"/> No: <input checked="" type="checkbox"/>
Train DNL	0	50
Calculate Rail #1 DNL	50	Reset

Airport Noise Level	<input type="text" value="50"/>
Loud Impulse Sounds?	<input type="radio"/> Yes <input checked="" type="radio"/> No
Combined DNL for all Road and Rail sources	64
Combined DNL including Airport	64
Site DNL with Loud Impulse Sound	<input type="text"/>
<input type="button" value="Calculate"/> <input type="button" value="Reset"/>	

Mitigation Options

If your site DNL is in Excess of 65 decibels, your options are:

- **No Action Alternative:** Cancel the project at this location
- **Other Reasonable Alternatives:** Choose an alternate site
- **Mitigation**
 - Contact your Field or Regional Environmental Officer (</programs/environmental-review/hud-environmental-staff-contacts/>)
 - Increase mitigation in the building walls (only effective if no outdoor, noise sensitive areas)
 - Reconfigure the site plan to increase the distance between the noise source and noise-sensitive uses
 - Incorporate natural or man-made barriers. See *The Noise Guidebook* (</resource/313/hud-noise-guidebook/>)
 - Construct noise barrier. See the Barrier Performance Module (</programs/environmental-review/bpm-calculator/>)

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Sound Transmission Classification Assessment Tool (STraCAT)

Overview

The Sound Transmission Classification Assessment Tool (STraCAT) is an electronic version of Figures 17 and 19 in The HUD Noise Guidebook. The purpose of this tool is to document sound attenuation performance of wall systems. Based on wall, window, and door Sound Transmission Classification (STC) values, the STraCAT generates a composite STC value for the wall assembly as a whole. Users can enter the calculated noise level related to a specific Noise Assessment Location in front of a building façade and STraCAT will generate a target required attenuation value for the wall assembly in STC. Based on wall materials, the tool will state whether the composite wall assembly STC meets the required attenuation value.

How to Use This Tool

Location, Noise Level and Wall Configuration to Be Analyzed

STraCAT is designed to calculate the attenuation provided by the wall assembly for one wall of one unit. If unit exterior square footage and window/door configuration is identical around the structure, a single STraCAT may be sufficient. If units vary, at least one STraCAT should be completed for each different exterior unit wall configuration to document that all will achieve the required attenuation. Additionally, if attenuation is not based on a single worst-case NAL, but there are multiple NALs which require different levels of attenuation around the structure, a STraCAT should be completed for each differing exterior wall configuration associated with each NAL.

Exterior wall configurations associated with an NAL include those with parallel (facing) or near-parallel exposure as well as those with perpendicular exposure. When a façade has parallel or perpendicular exposure to two or more NALs, you should base the required attenuation on the NAL with the highest calculated noise level. For corner units where the unit interior receives exterior noise through two façades, the STraCAT calculation should incorporate the area of wall, window and door materials pertaining to the corner unit's total exterior wall area (i.e., from both walls).


Information to Be Entered

Users first enter basic project information and the NAL noise level that will be used as the basis for required attenuation. This noise level must be entered in whole numbers. STraCAT users then enter information on wall, window and door component type and area. Again, as noted above, the wall, window and door entries are based on one unit, and one wall (except for corner units as discussed above). The tool sums total wall square footage based on the combined area of walls, doors and windows for the façade being evaluated.

Users may input STC values for materials in one of two ways. The tool includes a dropdown menu of common construction materials with STC values pre-filled. If selected construction materials are not included in this dropdown menu, the user may also enter the STC for a given component manually. Verification of the component STC must be included in the ERR. Documentation includes the architect or construction manager's project plans showing wall material specifications. For new construction or for components that will be newly installed in an existing wall, documentation also includes the manufacturer's product specification sheet (cut sheet) documenting the STC rating of selected doors and windows.

Required STC Rating and Determination of Compliance

Finally, based on project information entered the tool will indicate the required STC rating for the wall assembly being evaluated and whether or not the materials specified will produce a combined rating that meets this requirement. Note that for noise levels above 75 dB DNL, either HUD (for 24 CFR Part 50 reviews) or the Responsible Entity (for 24 CFR Part 58 reviews) must approve the level and type of attenuation, among other processing requirements. Required attenuation values generated by STraCAT for NALs above 75 dB DNL should therefore be considered tentative pending approval by HUD or the RE.

Part I - Description			
Project	Stella Link Development		Sponsor/Developer
			Asakura Robinson
Location	SE Building NAL - 1st Floor Living Room		Prepared by
			Matthew Kinch, P.E.
Noise Level	Date		Primary Source(s)
69	4/28/2022		Highway 90

Part II - Wall Components			
Wall Construction Detail	Area	STC	
Hardie, 2x studs, batts, 5/8" gypsum (derated 5 STC for typical on-site construction)	225	45	
Add new wall			
	225 Sq. Feet	45	
Window Construction Detail	Quantity	Sq Ft/Unit	STC
DH Vinyl with 1/2" IGU	1	30	27
Add new window			
Door Construction Detail	Quantity	Sq Ft/Unit	STC
Typical Entry Door	1	21	26
Add new door			

Part III - Results			
Wall Statistics			
Stat	Value		
Area:	225 ft ²		
Wall STC:	45		
Aperture Statistics			
Aperture	Count	Area	% of wall
Windows:	1	30 ft ²	13.33%
Doors:	1	21 ft ²	9.33%
Evaluation Criteria			
Criteria	Value		
Noise source sound level (dB):	69		
Combined STC for wall assembly:	32.8		
Required STC rating:	27		
Does wall assembly meet requirements?	<input checked="" type="checkbox"/> Yes		
	<input type="button" value="Print"/>		

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Exterior wall configurations associated with an NAL include those with parallel (facing) or near-parallel exposure as well as those with perpendicular exposure. When a façade has parallel or perpendicular exposure to two or more NALs, you should base the required attenuation on the NAL with the highest calculated noise level. For corner units where the unit interior receives exterior noise through two façades, the STraCAT calculation should incorporate the area of wall, window and door materials pertaining to the corner unit's total exterior wall area (i.e., from both walls).

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Required STC Rating and Determination of Compliance

Finally, based on project information entered the tool will indicate the required STC rating for the wall assembly being evaluated and whether or not the materials specified will produce a combined rating that meets this requirement. Note that for noise levels above 75 dB DNL, either HUD (for 24 CFR Part 50 reviews) or the Responsible Entity (for 24 CFR Part 58 reviews) must approve the level and type of attenuation, among other processing requirements. Required attenuation values generated by STraCAT for NALs above 75 dB DNL should therefore be considered tentative pending approval by HUD or the RE.

Part I - Description			
Project	Stella Link Development		Sponsor/Developer
			Asakura Robinson
Location	SE Building NAL - 2nd Floor Bedroom		Prepared by
			Matthew Kinch, P.E.
Noise Level	Date		Primary Source(s)
69	4/28/2022		Highway 90

Part II - Wall Components			
Wall Construction Detail	Area	STC	
Hardie, 2x studs, batts, 5/8" gypsum (derated 5 STC for typical on-site construction)	117	45	
Add new wall			
	117 Sq. Feet	45	
Window Construction Detail	Quantity	Sq Ft/Unit	STC
DH Vinyl with 1/2" IGU	1	30	27
Add new window			
Door Construction Detail	Quantity	Sq Ft/Unit	STC
Add new door			

Part III - Results			
Wall Statistics			
Stat	Value		
Area:	117 ft ²		
Wall STC:	45		
Aperture Statistics			
Aperture	Count	Area	% of wall
Windows:	1	30 ft ²	25.64%
Doors:	0	0 ft ²	0%
Evaluation Criteria			
Criteria	Value		
Noise source sound level (dB):	69		
Combined STC for wall assembly:	32.72		
Required STC rating:	27		
Does wall assembly meet requirements?	<input checked="" type="checkbox"/> Yes		
	<input type="button" value="Print"/>		

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Exterior wall configurations associated with an NAL include those with parallel (facing) or near-parallel exposure as well as those with perpendicular exposure. When a façade has parallel or perpendicular exposure to two or more NALs, you should base the required attenuation on the NAL with the highest calculated noise level. For corner units where the unit interior receives exterior noise through two façades, the STraCAT calculation should incorporate the area of wall, window and door materials pertaining to the corner unit's total exterior wall area (i.e., from both walls).

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Users first enter basic project information and the NAL noise level that will be used as the basis for required attenuation. This noise level must be entered in whole numbers. STraCAT users then enter information on wall, window and door component type and area. Again, as noted above, the wall, window and door entries are based on one unit, and one wall (except for corner units as discussed above). The tool sums total wall square footage based on the combined area of walls, doors and windows for the façade being evaluated.

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Required STC Rating and Determination of Compliance

Finally, based on project information entered the tool will indicate the required STC rating for the wall assembly being evaluated and whether or not the materials specified will produce a combined rating that meets this requirement. Note that for noise levels above 75 dB DNL, either HUD (for 24 CFR Part 50 reviews) or the Responsible Entity (for 24 CFR Part 58 reviews) must approve the level and type of attenuation, among other processing requirements. Required attenuation values generated by STraCAT for NALs above 75 dB DNL should therefore be considered tentative pending approval by HUD or the RE.

Part I - Description			
Project		Sponsor/Developer	
Stella Link Development		Asakura Robinson	
Location		Prepared by	
SE Building NAL - 3rd Floor Bedroom		Matthew Kinch, P.E.	
Noise Level	Date	Primary Source(s)	
69	4/28/2022	Highway 90	

Part II - Wall Components			
Wall Construction Detail			
	Area	STC	
Hardie, 2x studs, batts, 5/8" gypsum (derated 5 STC for typical on-site construction)	108	45	
Add new wall			
108 Sq. Feet		45	
Window Construction Detail			
	Quantity	Sq Ft/Unit	STC
DH Vinyl with 1/2" IGU	1	30	27
Add new window			
Door Construction Detail			
	Quantity	Sq Ft/Unit	STC
Add new door			

Part III - Results			
Wall Statistics			
Stat	Value		
Area:	108 ft ²		
Wall STC:	45		
Aperture Statistics			
Aperture	Count	Area	% of wall
Windows:	1	30 ft ²	27.78%
Doors:	0	0 ft ²	0%
Evaluation Criteria			
Criteria	Value		
Noise source sound level (dB):	69		
Combined STC for wall assembly:	32.39		
Required STC rating:	27		
Does wall assembly meet requirements?	Yes		
Print			

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STraCAT is designed to calculate the attenuation provided by the wall assembly for one wall of one unit. If unit exterior square footage and window/door configuration is identical around the structure, a single STraCAT may be sufficient. If units vary, at least one STraCAT should be completed for each different exterior unit wall configuration to document that all will achieve the required attenuation. Additionally, if attenuation is not based on a single worst-case NAL, but there are multiple NALs which require different levels of attenuation around the structure, a STraCAT should be completed for each differing exterior wall configuration associated with each NAL.

Exterior wall configurations associated with an NAL include those with parallel (facing) or near-parallel exposure as well as those with perpendicular exposure. When a façade has parallel or perpendicular exposure to two or more NALs, you should base the required attenuation on the NAL with the highest calculated noise level. For corner units where the unit interior receives exterior noise through two façades, the STraCAT calculation should incorporate the area of wall, window and door materials pertaining to the corner unit's total exterior wall area (i.e., from both walls).

Information to Be Entered

Users first enter basic project information and the NAL noise level that will be used as the basis for required attenuation. This noise level must be entered in whole numbers. STraCAT users then enter information on wall, window and door component type and area. Again, as noted above, the wall, window and door entries are based on one unit, and one wall (except for corner units as discussed above). The tool sums total wall square footage based on the combined area of walls, doors and windows for the façade being evaluated.

Users may input STC values for materials in one of two ways. The tool includes a dropdown menu of common construction materials with STC values pre-filled. If selected construction materials are not included in this dropdown menu, the user may also enter the STC for a given component manually. Verification of the component STC must be included in the ERR. Documentation includes the architect or construction manager's project plans showing wall material specifications. For new construction or for components that will be newly installed in an existing wall, documentation also includes the manufacturer's product specification sheet (cut sheet) documenting the STC rating of selected doors and windows.

Required STC Rating and Determination of Compliance

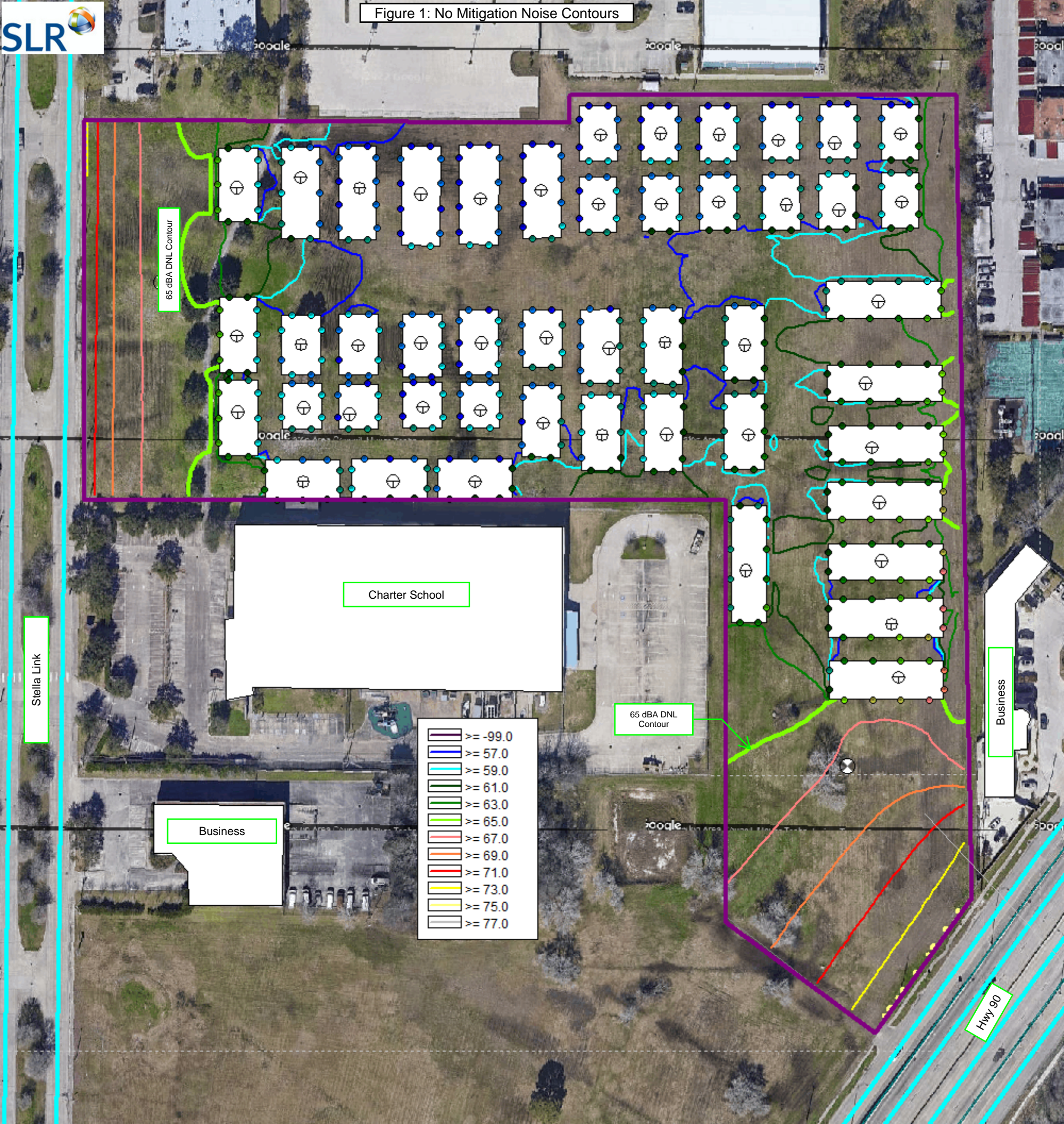
Finally, based on project information entered the tool will indicate the required STC rating for the wall assembly being evaluated and whether or not the materials specified will produce a combined rating that meets this requirement. Note that for noise levels above 75 dB DNL, either HUD (for 24 CFR Part 50 reviews) or the Responsible Entity (for 24 CFR Part 58 reviews) must approve the level and type of attenuation, among other processing requirements. Required attenuation values generated by STraCAT for NALs above 75 dB DNL should therefore be considered tentative pending approval by HUD or the RE.

Part I - Description			
Project	Stella Link Development		Sponsor/Developer
Location	SE Building NAL - 3rd Floor Bath		Prepared by
Noise Level	Date		Primary Source(s)
69	4/28/2022		Highway 90

Part II - Wall Components			
Wall Construction Detail	Area	STC	
Hardie, 2x studs, batts, 5/8" gypsum (derated 5 STC for typical on-site construction)	60	45	
Add new wall			
	60 Sq. Feet	45	
Window Construction Detail	Quantity	Sq Ft/Unit	STC
DH Vinyl with 1/2" IGU	1	9	27
Add new window			
Door Construction Detail	Quantity	Sq Ft/Unit	STC
Add new door			

Part III - Results			
Wall Statistics			
Stat	Value		
Area:	60 ft ²		
Wall STC:	45		
Aperture Statistics			
Aperture	Count	Area	% of wall
Windows:	1	9 ft ²	15%
Doors:	0	0 ft ²	0%
Evaluation Criteria			
Criteria	Value		
Noise source sound level (dB):	69		
Combined STC for wall assembly:	34.87		
Required STC rating:	27		
Does wall assembly meet requirements?	<input checked="" type="checkbox"/> Yes		
	<input type="button" value="Print"/>		

Figure 1: No Mitigation Noise Contours



Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017

Margin of error is generally within STC ± 3 dB

- Key No. 1841

Job Name: Stella Link Development

Job No.:

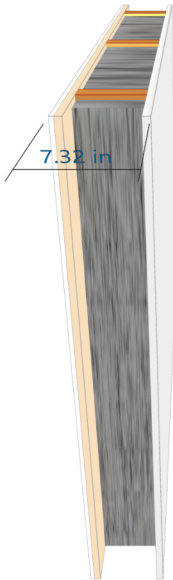
Initials: Matt Kinch, P.E.

Date: 4/27/2022

File Name:



Notes: Anticipated Exterior Wall



STC 50
OITC 32

Mass-air-mass resonant frequency = -48 Hz

Panel Size = 8.9 ft x 13.1 ft

Partition surface mass = 8.75 lb/ft²

System description

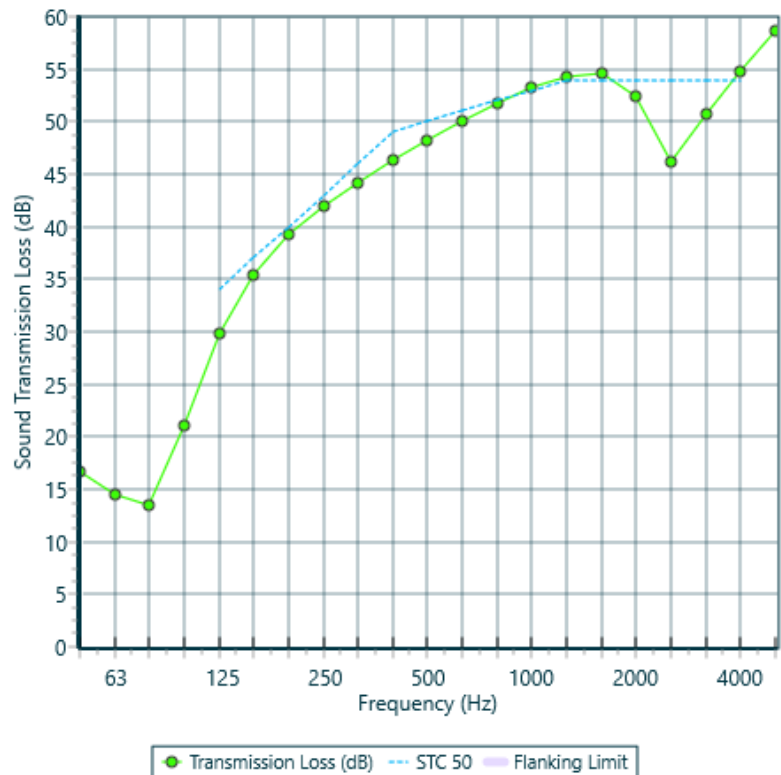
Panel 1 : 1 x 0.374 in Compressed Fibre Cement

+ 1 x 0.594 in OSB (Oriented Strand Board)

Frame: Timber stud (5.7 in x 1.8 in), Stud spacing 24 in; Cavity Width 5.73 in, 1 x fiberglass (1.4 lb/ft³) Thickness 6.0 in

Panel 2 : 1 x 0.626 in Type X Gypsum Board

freq.(Hz)	TL(dB)	TL(dB)
50	17	
63	15	15
80	13	
100	21	
125	30	25
160	35	
200	39	
250	42	41
315	44	
400	46	
500	48	48
630	50	
800	52	
1000	53	53
1250	54	
1600	55	
2000	52	50
2500	46	
3150	51	
4000	55	54
5000	59	



Sound Insulation Prediction (v9.0.23)

Program copyright Marshall Day Acoustics 2017

Margin of error is generally within STC ± 3 dB

- Key No. 1841

Job Name: Stella Link Development

Job No.:

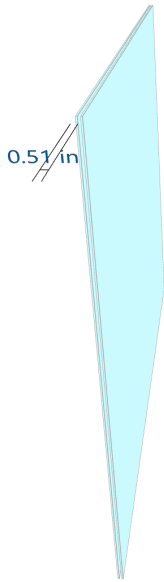
Initials: Matt Kinch, P.E.

Date: 4/27/2022

File Name:



Notes: Anticipated Glazing System



STC 27
OITC 25

Mass-air-mass resonant frequency = 371 Hz

Panel Size = 6.6 ft x 4.9 ft

Partition surface mass = 3.44 lb/ft²

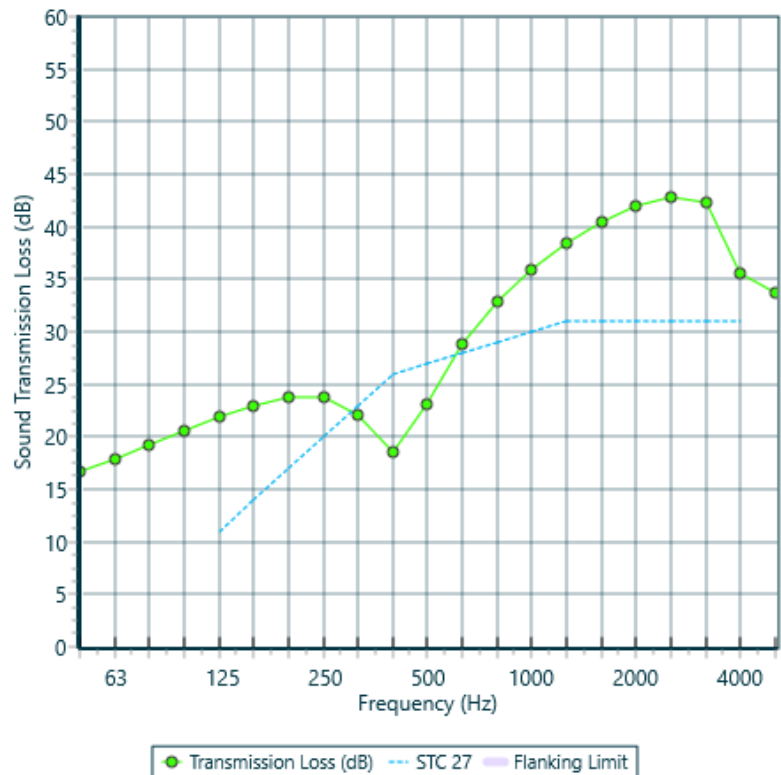
System description

Pane 1 : 1 x 0.13 in Glass

air: 0.25 in

Pane 2 : 1 x 0.13 in Glass

freq.(Hz)	TL(dB)	TL(dB)
50	17	
63	18	18
80	19	
100	21	
125	22	22
160	23	
200	24	
250	24	23
315	22	
400	18	
500	23	22
630	29	
800	33	
1000	36	35
1250	38	
1600	40	
2000	42	42
2500	43	
3150	42	
4000	36	36
5000	34	





**APPENDIX E:
OPINION OF PROBABLE
CONSTRUCTION COST**



Stella Link Community Design

Estimated Cost Summary

Opinion of Probable Construction Cost
4.29.2022

Item	Cost Estimate	Comments
Preliminary Landscape Sub-Total	\$ 1,437,874.83	includes 5% Contingency
Preliminary Civil Sub-Total	\$ 6,838,322.00	includes 5% Contingency
TOTAL	\$ 8,276,196.83	

DISCLAIMER ON THE OPINION OF PROBABLE CONSTRUCTION COST

This opinion of probable construction cost is made on the basis of Asakura Robinson's experience and qualifications and represents Asakura Robinson's best judgment as an experienced and qualified professional generally familiar with the industry. However, since Asakura Robinson has no control over the cost of labor, materials, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Asakura Robinson cannot and does not guarantee that proposals, bids, or actual construction cost will not vary from opinions of probable construction cost as prepared by Asakura Robinson.



Stella Link Community Design

Estimated Cost Summary

Opinion of Probable Construction Cost
4.29.2022

Item	Cost Estimate	Comments
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Preliminary Civil Sub-Total	\$ 6,838,322.00	includes 5% Contingency
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Stella Link Community Design
Preliminary Opinion of Probable Construction Cost - LANDSCAPE ITEMS
4.29.2022

Item	Quantity	Unit	Unit Cost	Extension	Comments
Hardscape					
Entry Monumentation Signage	2	EA	\$ 25,000.00	\$ 62,000.00	signage at each entrance
Hardscape Sub-Total				\$ 62,000.00	
Planting					
Street Tree	63	EA	\$ 650.00	\$ 50,778.00	100 Gal.
Shade Tree	43	EA	\$ 650.00	\$ 34,658.00	100 Gal.
Ornamental Tree	61	EA	\$ 450.00	\$ 34,038.00	30 Gal.
Hydromulch at Detention Pond	98,691	SF	\$ 0.18	\$ 22,027.83	
Planting Beds	13,285	SF	\$ 8.75	\$ 144,142.25	includes bed prep and planting material - 10% of total open space, excluding detention, plus parking islands/end caps
Hydromulch at Open Lawn Areas	93,791	SF	\$ 0.78	\$ 90,714.66	includes top soil and seeding; lawn area represents 90% of total open space, excluding detention
Irrigation Sleeves	225	LF	\$ 5.50	\$ 1,534.50	
Irrigation Meter	1	EA	\$ 3,000.00	\$ 3,720.00	
Irrigation	205,767	SF	\$ 2.00	\$ 510,302.16	includes open space, detentiouon and planting bed area
Subtotal Planting				\$ 891,915.40	
Lighting/Electrical					
Street Lights	28	EA	\$ 3,520.00	\$ 122,214.40	Placed at intersections, alley dead ends, and every 200' along internal circulation; COH - single arm on 25' pole, does not include structural footings
Pedestrian Pole Light	60	EA	\$ 1,900.00	\$ 141,360.00	50" O.C. along internal greenspace foot paths, and paths that run along unit sides (lighting to at entry walks to be provided by fixtures moutned to each unit)
Subtotal Lighting				\$ 263,574.40	
Site Furnishings					
Street Signage	14	EA	\$ 2,300.00	\$ 39,928.00	regulatory signage - street signs, stop signs at all intersections and concrete footings
Bench	8	EA	\$ 1,900.00	\$ 18,848.00	includes concrete footing
Litter Receptacles	4	EA	\$ 1,800.00	\$ 8,928.00	includes concrete footing
Recycling Receptacles	4	EA	\$ 1,800.00	\$ 8,928.00	includes concrete footing
Table	5	EA	\$ 2,800.00	\$ 17,360.00	includes concrete footing
Mail Kiosk	13	EA	\$ 2,875.00	\$ 46,345.00	194 units, 16 boxes per mail kiosk unit; includes concrete footings
Subtotal Site Furnishings				\$ 140,337.00	
Tax			8.25%	\$ 11,577.80	
Total Furnishings				\$ 151,914.80	
Combined Subtotal					
				\$ 1,369,404.60	
Contingency (5%)				\$ 68,470.23	5% contingency used at conceptual design stages; contingency reduced as design is progressed and refined
Project Sub-total				\$ 1,437,874.83	

*Freight cost not included

DISCLAIMER ON THE OPINION OF PROBABLE CONSTRUCTION COST

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Stella Link Community Design
 Preliminary Opinion of Probable Construction Cost - LANDSCAPE ITEMS
 4.29.2022

Item	Quantity	Unit	Unit Cost	Extension	Comments
Hardscape					
Entry Monumentation Signage	2	EA	\$ 25,000.00	\$ 62,000.00	signage at each entrance
Hardscape Sub-Total				\$ 62,000.00	
Planting					
Street Tree	63	EA	\$ 650.00	\$ 50,778.00	100 Gal.
Shade Tree	43	EA	\$ 650.00	\$ 34,658.00	100 Gal.
Ornamental Tree	61	EA	\$ 450.00	\$ 34,038.00	30 Gal.
Hydromulch at Detention Pond	98,691	SF	\$ 0.18	\$ 22,027.83	
Planting Beds	13,285	SF	\$ 8.75	\$ 144,142.25	includes bed prep and planting material - 10% of total open space, excluding detention, plus parking islands/end caps
Hydromulch at Open Lawn Areas	93,791	SF	\$ 0.78	\$ 90,714.66	includes top soil and seeding; lawn area represents 90% of total open space, excluding detention
Irrigation Sleeves	225	LF	\$ 5.50	\$ 1,534.50	
Irrigation Meter	1	EA	\$ 3,000.00	\$ 3,720.00	
Irrigation	205,767	SF	\$ 2.00	\$ 510,302.16	includes open space, detentiouon and planting bed area
Subtotal Planting				\$ 891,915.40	
Lighting/Electrical					
Street Lights	28	EA	\$ 3,520.00	\$ 122,214.40	Placed at intersections, alley dead ends, and every 200' along internal circulation; COH - single arm on 25' pole, does not include structural footings
Pedestrian Pole Light	60	EA	\$ 1,900.00	\$ 141,360.00	50" O.C. along internal greenspace foot paths, and paths that run along unit sides (lighting to at entry walks to be provided by fixtures moutned to each unit)
Subtotal Lighting				\$ 263,574.40	
Site Furnishings					
Street Signage	14	EA	\$ 2,300.00	\$ 39,928.00	regulatory signage - street signs, stop signs at all intersections and concrete footings
Bench	8	EA	\$ 1,900.00	\$ 18,848.00	includes concrete footing
Litter Receptacles	4	EA	\$ 1,800.00	\$ 8,928.00	includes concrete footing
Recycling Receptacles	4	EA	\$ 1,800.00	\$ 8,928.00	includes concrete footing
Table	5	EA	\$ 2,800.00	\$ 17,360.00	includes concrete footing
Mail Kiosk	13	EA	\$ 2,875.00	\$ 46,345.00	194 units, 16 boxes per mail kiosk unit; includes concrete footings
Subtotal Site Furnishings				\$ 140,337.00	
Tax			8.25%	\$ 11,577.80	
Total Furnishings				\$ 151,914.80	
Combined Subtotal					
				\$ 1,369,404.60	
Contingency (5%)				\$ 68,470.23	5% contingency used at conceptual design stages; contingency reduced as design is progressed and refined
Project Sub-total				\$ 1,437,874.83	

*Freight cost not included

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Engineer Opinion of Probable Cost

Stella Link Preliminary Study - Civil Site Work Engineer Opinion of Probable Cost (04/29/2022)

UNIT PRICES FOR - Mobilization & Earthwork					
ITEM	DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	QUANTITY	TOTAL
1.00	Cut to Haul offsite	CY	\$ 19.55	19,521	\$ 381,636
1.01	Import Select Material	CY	\$ 25.30	9,760	\$ 246,928
1.02	Rough Grade	SF	\$ 0.81	527,076	\$ 424,296
1.03	Fine Grade	SF	\$ 1.15	510,876	\$ 587,507
1.04	Construction Fence	LS	\$ 10,350.00	1	\$ 10,350
1.05	Mobilization/Demobilization	LS	\$ 460,000.00	1	\$ 460,000
1.06	Traffic Control	LS	\$ 17,250.00	1	\$ 17,250
Total					\$ 2,127,967

UNIT PRICES FOR - Pavement					
ITEM	DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	QUANTITY	TOTAL
1.10	4.5" Concrete Sidewalk (Per COH standard)	SF	\$ 8.05	41,552	\$ 334,494
1.11	Handicap Ramp	EA	\$ 747.50	28	\$ 20,930
1.12	7" Concrete Pavement	SF	\$ 10.93	121,594	\$ 1,328,414
1.13	6" Base Course - Cement Stabilized Sand	CY	\$ 74.75	2,252	\$ 168,337
1.14	Paver at Crosswalk	SF	\$ 49.45	1,949	\$ 96,378
1.15	Pavement Marking (Parking striping and 9 stop bars)	LS	\$ 21,620.00	1	\$ 21,620
1.16	Signage (Stop sign & ADA parking sign & No parking sign)	LS	\$ 6,900.00	1	\$ 6,900
1.17	6" concrete curb	LF	\$ 20.70	4,244	\$ 87,851
1.18	Driveway Apron	EA	\$ 11,500.00	1	\$ 11,500
					\$ -
TOTAL					\$ 2,076,424

UNIT PRICES FOR - Utility					
ITEM	DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	QUANTITY	TOTAL
Storm					
1.20	Type A Inlets	EA	\$ 6,325.00	32	\$ 202,400
1.21	Install 24" PVC Storm Sewer Pipe	LF	\$ 33.35	2193.38	\$ 73,149
1.22	Install 36" PVC Storm Sewer Pipe	LF	\$ 40.25	1,361	\$ 54,793
1.23	Detention Pond restrictor	EA	\$ 345.00	1	\$ 345
1.24	Above Ground Detention Pond	CF	\$ 5.18	491,363	\$ 2,542,804
1.25	Storm pipe connection in ROW	EA	\$ 10,925.00	1	\$ 10,925
1.26	Storm water quality feature allowance	EA	\$ 28,750.00	1	\$ 28,750
1.27	Trench Safety	LS	\$ 40,250.00	1	\$ 40,250
Water					
1.28	6" Water Line	LF	\$ 40.25	3,458	\$ 139,164

1.29	8" Water Line	LF	\$ 46.00	1,258	\$ 57,884
1.30	Fire Hydrant Assembly	EA	\$ 2,875.00	7	\$ 20,125
1.31	Check valves	EA	\$ 517.50	32	\$ 16,560
1.32	1.5" meter and meter box	EA	\$ 632.50	193	\$ 122,073
1.33	Tapping sleeves and valves	EA	\$ 3,000.00	1	\$ 3,000
1.34	Water Impact Fee	EA	\$ 359,139.51	1	\$ 359,140
Sanitary Sewer					
1.35	10" Sanitary Sewer Line	LF	\$ 28.75	3,515	\$ 101,056
1.36	Sanitary Sewer Manhole	EA	\$ 5,175.00	25	\$ 129,375
1.37	Sanitary sewer service stack	EA	\$ 138.00	193	\$ 26,634
1.38	Trench Safety	LS	\$ 40,250.00	1	\$ 40,250
1.39	Wastewater Impact Fee	EA	\$ 359,920.78	1	\$ 359,921
TOTAL					\$ 4,328,597

Electric					
1.40	Power Pole Replaced (Timber Pole)	EA	\$ 3,450.00	18	\$ 62,100
1.41	New Power Line	LF	\$ 46.00	1,000	\$ 46,000
1.42	New Underground Ductbank	LF	\$ 460.00	1,400	\$ 644,000
Telephone					
1.43	Fiber Optic Cable	LF	\$ 13.80	1,000	\$ 13,800
1.44	Handhole/Pull box	EA	\$ 1,150.00	10	\$ 11,500
Gas Line					
1.45	2" Gas line	LF	\$ 23.00	4,700	\$ 108,100

Cost typically covered by franchise utility companies. Not included in the construction cost estimate

UNIT PRICES FOR - Erosion Control					
ITEM	DESCRIPTION	UNIT OF MEASURE	UNIT PRICE	QUANTITY	TOTAL
1.50	Silt Fence	LF	\$ 6.33	3,746	\$ 23,693
1.51	Inlet Protection	EA	\$ 345.00	32	\$ 11,040
1.52	Concrete Wash Out	EA	\$ 690.00	1	\$ 690
1.53	Construction Access	EA	\$ 9,200.00	1	\$ 9,200
1.54	Sediment Basin	EA	\$ 11,500.00	1	\$ 11,500
Total					\$ 56,123

Total \$ 6,512,688
5% Contingency \$ 325,634
Grand Total \$ **6,838,322**

Disclaimer: This cost estimate is based on the preliminary feasibility study exhibit dated 04/29/2022 for Stella Link Rd. The preliminary design for site related items have not been permitted and subject to change. This cost estimate will be changed as a result of design adjustments, materials and code requirements