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2nd Floor
Reno, NV 89501
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CityClerk@reno.gov

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MAR 25 2024

CITY CLERK

City of Reno Notice of Appeal Form

Please complete this form to appeal a decision made by a City official, a hearing examiner, or the Planning Commission.

To be considered complete, the appeal must: (1) be in writing; (2) provide information addressing all of the items below; (3) be accompanied by the required appeal fee adopted by the City Council; and, (4) submitted to the City Clerk's Office or emailed to cityclerk@reno.gov.

An incomplete form will be returned to you, and may result in a delay in scheduling your appeal.

In addition, all appeals must be filed within the applicable period of limitations. For example, an appeal of a Planning Commission decision must be submitted to the City Clerk's Office within ten business days after the date of filing of notice of the decision with the City Clerk. (The City Clerk's Office maintains a list of common periods of limitations available upon request.)

Untimely appeals will be rejected by the City Clerk, and any appeal fees paid will be returned.

1. Type of Appeal (please select only one)

RMC: Title 18 Code

- ☐ Planning Commission Decision
- ☐ Hearing Examiner Decision
- ☐ Minor Deviation
- ☒ Minor Conditional Use Permit
- ☐ Site Plan Review
- ☐ Administrative Interpretation

RMC: Administrative Code

- ☐ Code Enforcement Citation
- ☐ Business License
- ☐ Building Permit
- ☐ Sign Permit
- ☐ Other:

2. Appellant Information:

Appellant Name: Mary Harger- President Damonte Ridge HOA

Authorized Representative: Gayle Kern- General Counsel

Address: 2655 Colmar Ct, Reno, NV 89521

Telephone No.: 214-280-7834

Email Address: marycjharger@gmail.com

3. Brief description of the action, decision, or order being appealed. (Please reference the project name, address, case number, citation number, or permit number, as applicable. Attach additional sheets, as necessary.)

Life Church Primary School
Minor Conditional Use Permit
Case No. MUP24-00012
APN: 145-020-17
Ward: 2

4. Describe in detail how the action, decision, or order being appealed impacts you or your property, as applicable. (Attach additional sheets, as necessary.)

Prior to the decision for approval of Life Church's Primary School, Damonte Ridge HOA Board Members met with the City of Reno Planning Department to express our concerns.

The Board expressed our extreme concern regarding excessive noise along Rio Wrangler (between Yeehaw Way and Steamboat Parkway) that would be generated by additional traffic from Life Church Primary School, and we asked for consideration that Life Church contribute to the installation of a sound barrier wall.

Post-meeting, the Board had conversations with contacts provided by the Planning Department (as well as contacts not on the list), to determine if the sound barrier wall was the correct remediation request or if other options should be considered.

Although noise was the main focus of our initial conversations, discussions revealed additional concerns, with experts sharing issues they saw with the current roadway.

Upon completion of our conversations (see "Attachment 1"), we revised not only our thoughts on the proper remediations to address noise, but added additional measures to address the newly discovered safety and logistical concerns.

CONCERNS

1. Added noise from Life Church Primary school's 1,480 extra passes of vehicles per day, as reported in the traffic study.
2. Excessive speeds of current vehicles, and how having 360 additional students in the area creates a safety risk for the children.
3. How the roundabout to be installed in 2025 at Rio Wrangler/Steamboat will affect our homeowners' ability to exit our community during the two hour staggered release time of the schools.

5. Describe in detail the reason(s) why the action, decision, or order being appealed should be reversed, modified or set aside. (Attach additional sheets, as necessary.)

Although Damonte Ridge HOA would prefer Life Church Primary School not be approved, we realize this is not a realistic option. Instead, we are asking the decision be modified, specifically to add conditions for Life Church to pay for remediation of their impact to the traffic within the community.

RATIONALE TO REQUIRE REMEDIATION FROM LIFE CHURCH

1. NEW TRAFFIC-Life Church Primary School will add 1480 new daily trips on Rio Wrangler (per the traffic study). The total daily trips in 2022 (most current published data BY NDOT) was 4,456 (see "Attachment 2"). The traffic from the Primary School will be 25% of total future daily trips, and a 33% increase in daily trips.
2. EXISTING TRAFFIC- Life Church currently runs a Child Care Center for 120 children. Extrapolating the traffic study data from the Primary School, this results in 493 current daily trips. Calculating this into the total daily trips from 2022 (4,456), Life Church Child Care Center contributed to 11% of existing daily trips in 2022. -This data does not take into account the 12+ daily group activities (e.g., bible study). Most of these are in the evening, and contribute to traffic outside of normal business/rush hours, when homeowners are enjoying their backyard.
3. COMBINED TRAFFIC (EXISTING AND NEW)- Combining the existing 493 daily trips with the future 1480 daily trips, Life Church traffic will account for 44% of future daily trips.
4. SUNDAY TRAFFIC ALONE- Life Church has three services on Sundays (8:30AM, 9:45AM, 11:15AM). On Sundays 8AM-1PM in 2013 there were 999 total daily trips, while in 2016 there were 1,680 daily trips (see "Attachment 3" and "Attachment 4"). Life Church Sunday services account for 40% of daily trips on Sundays*. -It can be argued this percentage has gone up in recent years as Life Church's congregation has grown.

*2013 data shows daily trips before Life Church, 2016 data shows daily trips after Life Church but before Palisades II and III were built in 2017 (isolating the data to show Life Church's sole impact).

CONCLUSION

The combined issues of noise, speed and traffic flow, create substantial safety and logistical issues for our community. Although the increased 1480 new daily trips generated from the Primary School alone justify approval of the conditions, additional consideration should be given to the existing increased traffic due to Life Church since its inception. No conditions were put on Life Church at their initial approval to mitigate noise/speed/traffic flow issues. However, since this is open to a new entitlement, we would like the significance of their OVERALL impact to noise/speed/traffic flow be considered. As such, we ask the above requested conditions be paid by Life church to assist in slowing traffic and reducing sound. We thank you for your consideration.

6. Please identify and attach all documentation/evidence that you would like considered supporting your appeal. (Attach additional sheets, as necessary.)

RUBBERIZED ASPHALT STUDY/ DOCUMENT DATA (SEE ATTACHMENTS 5-8)

1. Rubberized asphalt has shown significant decreases in noise reduction between 65-85% when compared to standard asphalt.
2. Rubberized asphalt lasts much longer- often 50 percent longer than standard asphalt.

7. Relief or action sought. (Attach additional sheets, as necessary.)

REQUESTED CONDITIONS:

1. A permanent reduction in the speed limit to between 15-25mph, as has already been done in other parts of town.
2. Two hard traffic calming diversion islands (~\$30k-\$40k each) or chicanes be installed on Rio Wrangler at 1/3 intervals between Yeehaw Way and Steamboat Parkway, paid for by Life Church. -In addition to addressing the speed/safety concerns, diversion islands will create gaps in traffic flow to allow breaks for our homeowners to enter the roundabout at Rio Wrangler/Steamboat during school release times.
3. Life Church to pay cost to upgrade standard asphalt to rubberized asphalt, to be used when Rio Wrangler (Yeehaw Way to Steamboat Parkway) is repaved in 2025 (~\$32k-\$48k).

Appellant or Authorized Representative

Signature (Print Name):

Mary Harger

☒ By checking this box, I agree information is complete and I have authority to sign this form.

For Office Use:

Hearing Date: 04/24/2024

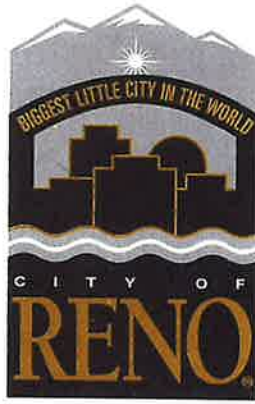
Hearing Time: 6:00pm

Hearing Location: Reno City Council

☐ Via Zoom (Link emailed to information indicated above at least 5 business days prior to hearing)

Received by: CA

Mike Railey, AICP
Planning Manager
Development Services Department
P. O. Box 1900
Reno, NV 89505
(775) 393-1047



March 15, 2024

FILED THIS DATE
3/15/2024
BY: BA
CITY CLERK

LifeChurch
Scott Rhoda
P.O. Box 18711
Reno, NV 89511

Re: Minor Conditional Use Permit Case No. MUP24-00012 (LifeChurch Primary School)
APN: 145-020-17
Ward: 2

Dear Mr. Rhoda:

The Development Services Department has completed the review of your request for a minor conditional use permit to allow for development of 1) a $\pm 44,351$ square foot primary school in the Single-Family Residential 3 units per acre (SF-3) zone, and 2) a primary school adjacent to residentially zoned property. The ± 10.2 acre project site is located on the eastern side of Rio Wrangler Parkway $\pm 1,725$ feet south of its intersection with Steamboat Parkway. The subject site has a Master Plan land use designation of Single-Family Neighborhood (SF). Based on the materials you have submitted, as modified in the conditions of approval, the project conforms to the findings as required by the Reno Municipal Code (RMC) 18.08.304(e) and 18.08.604(e) and is not expected to have an adverse impact on the area. The Administrator hereby approves the requested minor conditional use permit (MUP), Case No. MUP24-00012, subject to the following conditions (all conditions shall be met to the satisfaction of Development Services staff, unless otherwise noted):

1. The project shall comply with all applicable City codes, plans, reports, materials, etc., as submitted, in addition to previous conditions of approval from Case No. LDC15-00034. In the event of a conflict between said plans, reports, materials and City codes, City codes in effect at the time the application is submitted shall prevail.
2. The applicant shall apply for a building permit for the first phase of the project within 36 months of the date of approval of the minor conditional use permit application and maintain validity of that permit, or the minor conditional use permit approval shall be null and void.

3. Prior to issuance of each building permit or business license, the applicant shall attach a copy of this approval letter. The approval letter shall accompany a narrative that describes how the requested permit or license addresses each of the conditions of approval herein.
4. The applicant, developer, property owner, or business proprietor, as applicable, shall continuously maintain a copy of this approval letter on the project site during the construction/operation of the project/business. The approval letter shall be posted or made readily available upon demand by City staff.
5. Prior to issuance of a building permit associated with this project, the applicant shall apply for a minor modification to LDC15-00034 to remove the ±58,470 square foot worship center from the approval along with the office/meeting room building revision to the site plan approved under Minor Modification #2.
6. Signage shall be consistent with LDC15-00034 Condition 7 (as modified by Minor Modification #1) with the addition of one (1) additional 20 square foot indirectly illuminated wall sign on the west or south elevation.
7. Hours of construction, including grading, shall be limited to between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday. There shall be no construction on Sundays. This condition shall not apply to dust control or storm water management operations. A note to this effect shall be placed on the title sheet of all building permit plan sets. A sign with the approved construction hours shall be posted on site for the full duration of construction activities. If the construction hours need to be varied for the pouring of concrete slabs, interior construction hours or other modifications, a plan detailing the construction operations and provisions to minimize impacts on nearby residences shall be submitted to the satisfaction of the Administrator.
8. Each year the school shall ensure that start and end bell times are separated by a minimum of one (1) hour from bell times for Damonte Ranch High School.
9. The school shall notify parents of the intended onsite drop-off/pick-up during enrollment and through regular reminders. The enrollment process shall include an onsite drop-off/pick-up agreement.
10. Prior to issuance of a business license for the school, the applicant shall relocate the existing school zone flashing structure located on Rio Wrangler Parkway north of Damonte Ranch High School to a new location north of Yee Haw Way, to the satisfaction of City of Reno Public Works.

Summary: The subject ±10.2 acre site is located on the east side of Rio Wrangler Parkway between Yee Haw Way on the north and McCauley Ranch Boulevard on the south (**Exhibit A**). The site currently contains a church (comprised of child development center and gymnasium buildings), parking lot, lawn and playground, and a small structure remaining from the previous commercial dog kennel operation (to be demolished). The proposed minor conditional use permit would allow for development of a primary school in the SF-3 zone and adjacent to residentially zoned property. Key project issues include: 1) project design/code compliance, 2) compatibility with surrounding uses, and 3) traffic/access. With the recommended conditions of approval, the proposed project appears to meet code standards, addresses the applicable findings, and enhances educational opportunities in the community. Staff recommends approval, subject to all conditions listed in this decision letter.

Background: LifeChurch was established in 2006 and began meeting at Damonte Ranch High School in 2008. The church acquired the front ±2.9 acre property on Rio Wrangler Parkway in 2007 and the remaining ±7.3 acres (three parcels to the east) several years later. The eastern three parcels, which previously had commercial dog kennels, were zoned Large-Lot Residential - 2.5 acres (LLR-2.5). In July 2014, a zone change to Single-Family Residential - 15,000 square feet (SF-15) for these parcels was approved by the City Council (LDC14-00035).¹

A special use permit (SUP) for the church campus was approved by the Planning Commission in February 2015 (LDC15-00034).² The 2015 SUP allowed for a ±104,339 square foot church campus constructed in phases over 15 years, consisting of four major buildings around a “great” lawn – a Kids Life child development center building (a child care center for up to 120 children, which also provides Sunday school rooms), a gymnasium/administrative office building (a dual auditorium and gymnasium facility for church services and community functions), a youth building (middle and high school students), and a 1,500 seat worship center (with ancillary meeting and music rooms). To date, two buildings have been completed (child development center and gymnasium buildings) along with the great lawn and playground. The church has six years to apply for building permits to complete the remaining elements from the SUP approval.

Discussion: Per RMC 18.03.206 Table 3-1 (Table of Allowed Uses), a primary school is allowed in the SF-3 zone with approval of a MUP, subject to the use-specific standards listed in RMC 18.03.303(b)(3).³ Per RMC 18.08.602(b)(2)(d), a site plan review (SPR) is triggered for a

¹ SF-15 changed to SF-3 in the recent zoning code update.

² Two minor modifications to the SUP have been approved. Minor Modification #1 (August 28, 2020) clarified the allowable directions a wall sign could face under Condition 7. Minor Modification #2 (April 19, 2021) amended the approved site plan to allow for the southeastern portion of the property to be used as an office and meeting room space for the church in place of the choir building on the original site plan. Specifically, an addition was proposed to an existing building from the previous kennel operation; the proposed square footage was less than half of the choir building, and the total building square footage would not exceed the ±104,339 square feet approved for the entire church complex.

³ Assembly Bill 87 required consistent development standards for building heights, setbacks, landscaping, and parking for all schools in Washoe County. To ensure design consistency between jurisdictions, local government staff agreed that school development should be processed administratively and without discretionary review to

primary school adjacent to residentially zoned properties. MUPs are required to determine the appropriateness of certain land uses and SPRs determine the appropriateness of certain site designs. Both entitlements are administrative decisions and, based on ADM23-00032 (Combination of Site Plan Review and Minor Conditional Use Permit Applications), the two applications may be bundled into one MUP since the required findings of the MUP comprehensively address both land use and design components.

Analysis:

Project Design/Code Compliance: The project involves demolition of a small building remaining from the previous commercial dog kennel operation in the southeast portion of the site. A new ±44,351 square foot, two story primary school building and parking lot are proposed on approximately four acres of the undeveloped eastern portion of the parcel (**Exhibit B**). The proposed school would serve grades kindergarten through 8th grade, with two classrooms for each grade. The building is planned to be constructed in two phases depending on funding; the intent is to have the school enrollment increase as the facility itself grows.⁴ At buildout, the facility would serve up to 360 students with up to 18 classrooms, art and music rooms, cafeteria and kitchen, and two fenced playgrounds (**Exhibit C**).⁵

The proposed school is located in the same general location as the previously approved worship center, which is significantly larger. The footprint and total floor area of the school are ±23,360 square feet and ±44,351 square feet, respectively, as compared to a ±40,180 square foot footprint and ±58,470 square foot total floor area for the worship center. **Condition 5** is included to require removal of the worship center from the SUP approval (along with the office/meeting room building under Minor Modification #2) if the applicant moves forward with construction of the school.

establish a school use in certain zones or for residential adjacency. Subsequently, TXT14-00003 (School Zoning) was approved by the City Council on March 26, 2014.

⁴ **Phase 1A:** Utilizes the upstairs of the existing Kids Life building for grades K-3 in the first few years while the Phase 1 school building is under construction. It is anticipated that this initial phase will have ~80 students.

Phase 1B: Contains the first phase of construction of the school building, which includes six (6) classrooms, temporary cafeteria, and offices. Depending on enrollment, the upstairs classrooms in the existing Kids Life building may continue to be used. It is anticipated that this phase can accommodate ~140 students. A fenced playground area will be constructed with this phase. The first phase school building totals ±20,520 square feet.

Phase 2: Expands the school to formalize a cafeteria and kitchen, 12 additional classrooms, art and music rooms. An additional fenced playground will be constructed. At buildout, this phase will accommodate up to 360 students total. The second phase of the school building totals ±23,831 square feet.

⁵ The building floorplans and elevations are the ultimate goal of the church to build. Due to rising construction costs and the church's reliance on fundraising, they may utilize mobile classrooms in lieu of the building, either temporarily or permanently. Per RMC 18.03.303(b)(3), the architectural elements of mobile classrooms shall complement existing building(s). A maximum of three mobile classrooms are allowed without a site plan review for residential adjacency provided they are removed within five years of placement. Alternatively, continued use of mobile classrooms beyond five years can be reviewed through a site plan review process (TXT12-00013).

The applicant requested project signage to be held to RMC signage standards in residential zoning districts (RMC 18.05.113). Specifically, code would allow a six foot monument sign (likely located at the east driveway on McCauley Ranch Boulevard) and a 20 square foot wall sign (either located on the west or south elevation), both of which could have indirect illumination only. Monument and wall signage was approved under the SUP/Minor Modification #1 and some of the allotted monument signs have not been installed. **Condition 6** is included to require signage consistent with LDC15-00034 Condition 7 (as modified by Minor Modification #1) with the addition of one (1) additional 20 square foot indirectly illuminated wall sign on the west or south elevation, as allowed by code.

Specific design considerations regarding site layout, building design, access, and other improvements were reviewed against development standards for the SF-3 zoning district. As presented in the application materials, the proposed development generally complies with zoning code standards for: streets, utilities, and services (RMC Chapter 18.04 Article 5); access, connectivity, and circulation (RMC Chapter 18.04 Article 6); off-street parking and loading (RMC Chapter 18.04 Article 7); landscaping, buffering, screening, and fencing (RMC Chapter 18.04 Article 8); site and building standards for residential districts (RMC Chapter 18.04 Article 9); exterior lighting (RMC Chapter 18.04 Article 13); residential adjacency (RMC Chapter 18.04 Article 14); and the use-specific standards [RMC 18.03.303(b)(3)]. Final compliance with specific code requirements in RMC Chapter 18.04 and LDC15-00034 conditions of approval will be verified by City staff at the time of building permit review (**Condition 1**).

Compatibility with Surrounding Uses: Immediate surrounding land uses include single-family residences, a public high school, and open space. The land uses surrounding the site are summarized in the table below.

Adjacent Properties		
	Zoning	Use
North	PUD, LLR-2.5	Single-family detached
East	SF-3	Single-family detached
South	PUD	Damonte Ranch High School
West	PUD	Open space

Since the church use is established, this compatibility analysis is based on the potential impacts of replacing the approved worship center component with the proposed primary school and associated design elements, including the height and massing of the proposed building.

Primary schools are typically located in residential neighborhoods as they are considered complementary uses. The hours of operation of a primary school are generally less impactful than other nonresidential uses adjacent to residentially zoned property. The school is not allowed to operate between the hours of 11:00 p.m. and 6:00 a.m. Permissible noise levels shall not exceed the nighttime and daytime limits specified in RMC 18.04.1408 when the site is in

operation. Due to the proximity of this site to residential uses, construction hours will be limited to reduce potential noise impacts on residents (**Condition 7**).

On the north and east sides of the parcel, RMC 18.04.808(b) requires a six-foot high solid masonry wall with five feet of landscaping adjacent to it with a minimum of one evergreen tree planted every 30 linear feet and a minimum three shrubs planted per tree. LDC15-00034 Condition 6 requires a larger 15 foot wide landscape buffer in these areas. The existing walls and landscape buffers that were installed with development of the church use will remain.

Per RMC 18.03.303(b)(3), school building heights are non-restricted provided that one foot of setback is provided for every foot of building height adjacent to residentially zoned property. The building will be separated from the adjacent residential property line to the east with a ± 160 foot setback with parking, drive aisles, and the existing landscape buffer.

Per RMC 18.04.101(c)(2), structures that exceed 35 feet in height shall not cast a shadow on residentially zoned property between the hours of 10:00 am and 2:00 pm on December 21st. The proposed 35-foot building height will not create shadowing concerns on adjacent single-family properties to the east given the separation distance and elevation difference.

Per RMC 18.04.1407(a), lighting from a nonresidential property shall not create greater than 0.5-foot candle of spillover light at a property line of any single-family zoned property like the parcels to the east. This will be achieved by lighting location and fixture shielding. Light standards will comply with the 18 foot height limit adjacent to residentially zoned properties.

Given all the above, the proposed use is generally compatible with existing land uses in the area.

Parking: Parking and access are provided consistent with the SUP, with modifications to address necessary loading and circulation for school drop-off/pick-up. Parking is provided east of the school building, which will serve both the school and future church growth. While code provides required minimums for the various uses proposed, the church has found that, due to having multiple services on Sundays that overlap, their parking demand is significantly higher than code minimums. As such, parking has been maximized to allow for future church growth. The church campus has 179 parking spaces currently and 234 spaces are proposed for a total of 413 spaces, which exceeds the required amount for the church use based on code, Institute of Transportation Engineers, and church observations. Since the church use is the highest parking generator and the school parking demands are not on the same schedule as the church, sufficient onsite parking for all uses is provided.

Traffic, Access and Circulation: A traffic impact study was prepared for the project. The project is projected to generate 364 AM peak hour trips (PHT), 216 PM PHT, and 1,480 daily trips. In the existing year analysis scenarios with and without the project, all the study intersections, including the site access intersections, McCauley Ranch Boulevard/Rio Wrangler Parkway, Yee Haw Way/Rio Wrangler Parkway, and Yee Haw Way/Desert Way would operate within policy

levels of service (LOS) with no improvements required. To minimize traffic impacts during existing peak hours, start and dismissal times for the school will be separated by a minimum of one hour from Damonte Ranch High School start and end bell times (**Condition 8**).

A roundabout is programmed to be constructed by the Regional Transportation Commission (RTC) at the McCauley Ranch Boulevard/Rio Wrangler Parkway intersection in the next five years. In the future year analysis scenarios with the roundabout in place, all the study intersections, including the site access intersections, McCauley Ranch Boulevard/Rio Wrangler Parkway, Yee Haw Way/Rio Wrangler Parkway, and Yee Haw Way/Desert Way would operate within overall policy LOS. The individual left turn movement at the Yee Haw Way approach to the Rio Wrangler Parkway intersection in the future plus project AM peak hour would deteriorate to LOS E, however the overall intersection would still function at LOS A (within policy standards). The McCauley Ranch Boulevard roundabout would provide modest operational improvement to this movement at the Yee Haw Way/Rio Wrangler Parkway intersection by creating longer gaps in traffic along Rio Wrangler Parkway (per RTC's South Meadows Multimodal Study).

Access for the school drop-off/pick-up is designed to enter the site at the eastern driveway (full access) on McCauley Ranch Boulevard and exit via the western driveway (exit only) on McCauley Ranch Boulevard (**Exhibit D**). Vehicles will queue through the parking lot, leading to the loading zones provided along the drive aisle east of the church and school buildings, as well as on the south side of the school. The onsite circulation route includes $\pm 1,500$ linear feet of stacking/circulation and ± 460 linear feet of dedicated drop-off/pick-up curb. Additionally, a walkway has been provided through the parking lot leading to the school entrance to allow parents to park and walk their students to the entrance. If offsite drop-off/pick-up parking on adjacent streets becomes an issue during operation of phase 1 of the school, the City may notify the school to address the issue and if not addressed before construction of phase 2, then signs regulating parking on adjacent streets may be required to be installed with phase 2 development. **Condition 9** requires the school to inform parents about onsite drop-off/pick-up with an enrollment agreement.

The existing school zone flashing structure located on Rio Wrangler Parkway north of Damonte Ranch High School will be relocated to the north of Yee Haw Way so that the existing school zone would be expanded to include the proposed school (**Condition 10**).

Master Plan Conformance: The subject site has a Master Plan land use designation of Single-Family Neighborhood (SF) and is located within an Outer Neighborhood per the Structure Plan Framework of the Reno Master Plan. As proposed and with the recommended conditions, the project is in conformance with the following applicable Master Plan goals and policies:

- GP 1.2C: Existing Businesses
- GP 1.5D: Education
- GP 5.2J: Safe Routes to School

- GP 6.7D: Lifelong Learning
- N-G.18: School Sites

Public and Stakeholder Engagement: The proposed project was reviewed by various City divisions and partner agencies. Comments received were incorporated into this report as necessary (**Exhibit E**). A public notice was sent out to all property owners within 750 feet of the project and public notice signs were posted on the property. One support letter and over 20 comments in opposition were received (**Exhibit F**). While some concerns addressed zoning and potential blocking of views, the near universal concerns expressed in these comments are about traffic and traffic-related issues, which are addressed through project design, operational parameters, and conditions of approval.

Legal Requirements:

RMC 18.08.304(e)	Approval Criteria Applicable to all Applications
RMC 18.08.604(e)	Minor Conditional Use Permit - Findings

General Review Criteria and Considerations:

General Review Criteria: The decision-making body shall review all development applications for compliance with the applicable general review criteria stated below.

- 1) Consistency with the Reno Master Plan. The proposed development shall be consistent with the Reno Master Plan. The decision-making authority:
 - a. Shall weigh competing plan goals, policies, and strategies; and
 - b. May approve an application that provides a public benefit even if the development is contrary to some of the goals, policies, or strategies in the Reno Master Plan.
- 2) Compliance with Title 18. The proposed development shall comply with all applicable standards in this Title, unless the standard is lawfully modified or varied. Compliance with these standards is applied at the level of detail required for the subject submittal.
- 3) Mitigates Traffic Impacts. The project mitigates traffic impacts based on applicable standards of the City of Reno and the Regional Transportation Commission.
- 4) Provides Safe Environment. The project provides a safe environment for pedestrians and people on bicycles.
- 5) Rational Phasing Plan. If the application involves phases, each phase of the proposed development contains all of the required streets, utilities, landscaping, open space, and other improvements that are required to serve or otherwise accompany the completed phases of the project, and shall not depend on subsequent phases for those improvements.

Minor Conditional Use Permit: In addition to meeting the criteria in Section 18.08.304(e), *Approval Criteria Applicable to all Applications*, the following findings shall be made prior to granting a minor conditional use permit:

- 1) The proposed location of the use is in accordance with the objectives of this Title and the purpose of the zoning district in which the site is located;
- 2) The proposed land use and project design is compatible with surrounding development;

- 3) The proposed land use and project design is consistent with applicable development standards;
- 4) Public services and facilities are available to serve the project, or will be provided with development;
- 5) The characteristics of the use as proposed and as may be conditioned are reasonably compatible with the types of use permitted in the surrounding area; and
- 6) The granting of the minor conditional use permit will not be materially detrimental to the public health, safety, or welfare. The factors to be considered in evaluating this application shall include:
 - a. Property damage or nuisance resulting from noise, smoke, odor, dust, vibration, or illumination; and
 - b. Any hazard to persons and property.

Appeal of Administrative Decision: This administrative decision may be appealed to the City Council by the applicant, the Mayor or a City Council Member, or any person who is "aggrieved" by the action or inaction. An appeal (together with fees) must be filed with the City Clerk within 10 business days starting on the day after written notice of the action is filed with the City Clerk. The City Clerk's Office is located on the 2nd floor of Reno City Hall located at One East First Street, Reno, Nevada.

This approval letter has not been issued in lieu of a permit. You are responsible for obtaining the appropriate permit(s) associated with this project and a copy of this letter must be attached to any such application.

Sincerely,



Mike Railey, AICP, Planning Manager
Development Services Department

MUP24-00012 (LifeChurch Primary School) – JAF


xc: Wood Rodgers
Andy Durling
1361 Corporate Boulevard
Reno, NV 89502

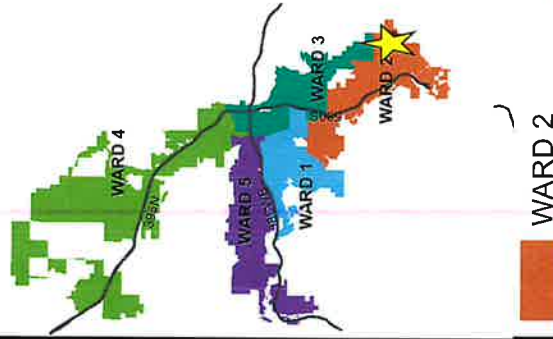
Mikki Huntsman, City Clerk
Bob Flores, Building and Safety Manager
Michael Mischel, P.E., Engineering Manager

AREA MAP

MUP24-00012

(LifeChurch
Primary School)

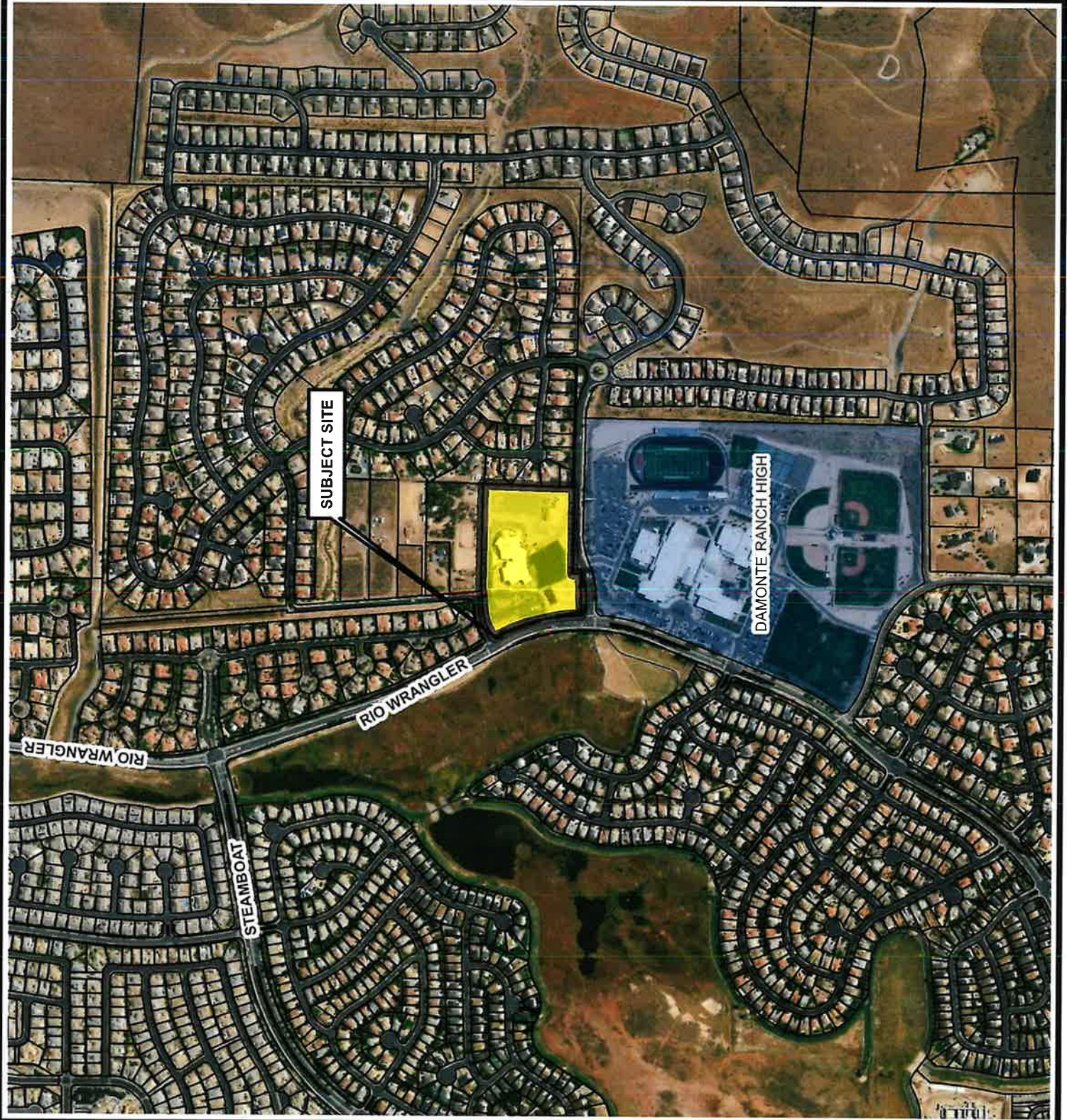
Subject Site ► 



Developer
Services
Department




The information here
is approximate and
is intended for display
purposes only.
Date: December 2023
Scale: 1 inch = 800 feet

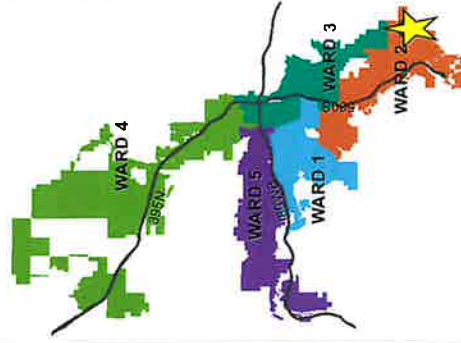


VICINITY MAP

MUP24-00012

(LifeChurch
Primary School)

Subject Site ► 



WARD 2

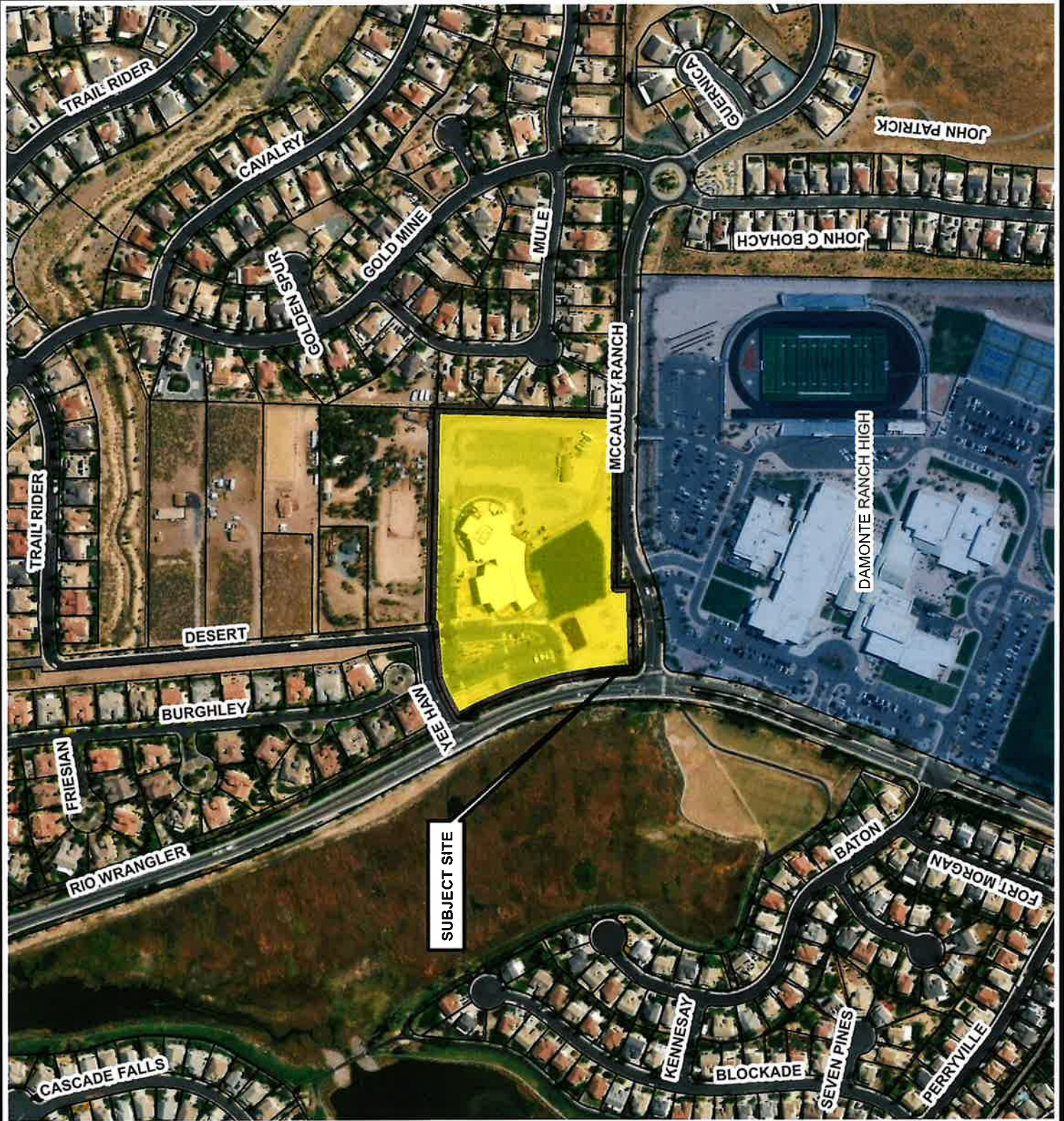


Development
Services
Department



The information herein
is approximate and
is intended for display
purposes only.

Date: December 2023
Scale: 1 inch = 400 feet



ZONING MAP




MUP24-00012

(LifeChurch
Primary School)

ZONING = SF-3

Subject Site ▶ 

Zoning Designations

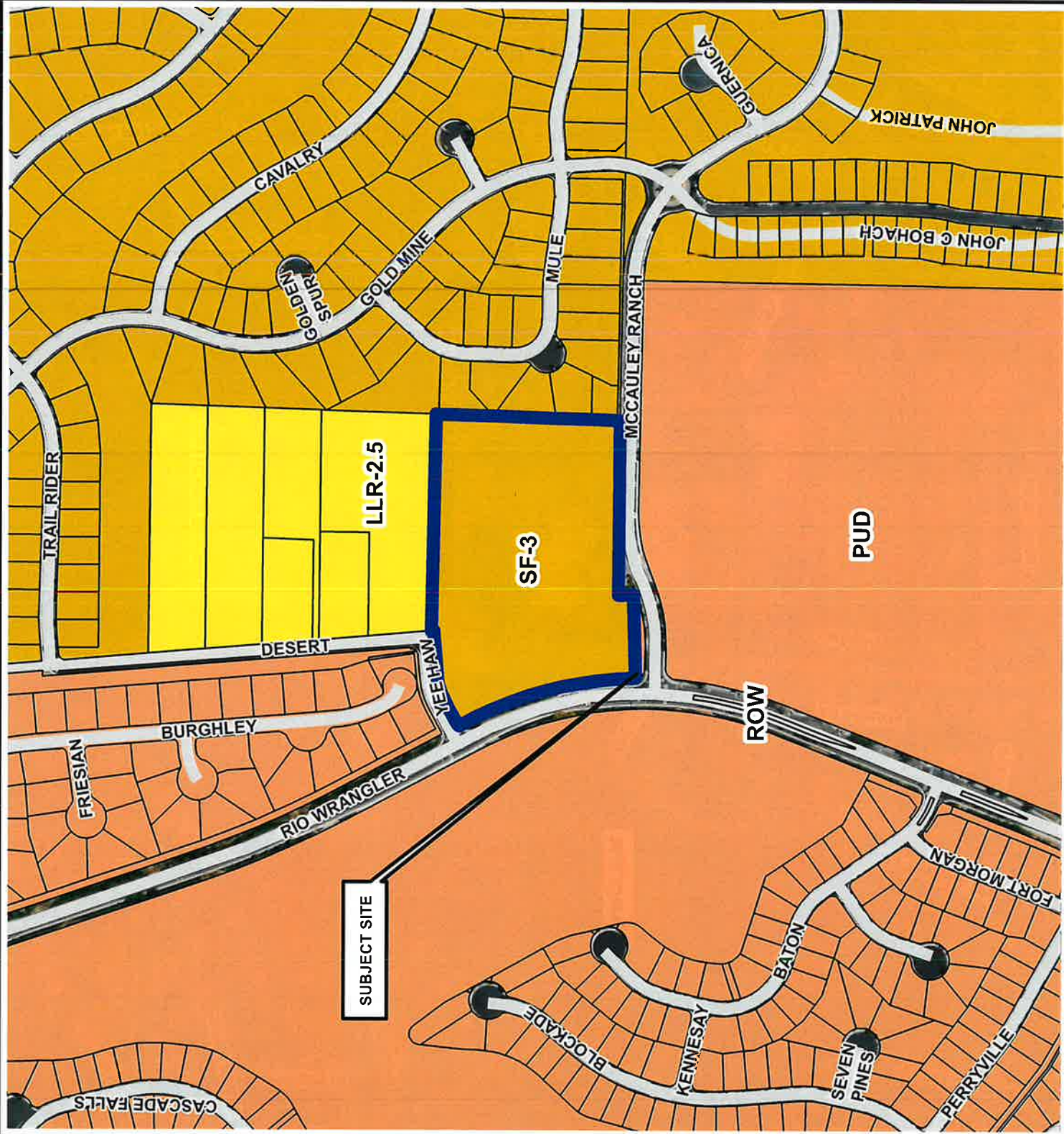
-  PUD
-  SF-3
-  LLR-2.5



Development
Services
Department

The information herein
is approximate and
is intended for display
purposes only.


DATE: December 2023:
SCALE: 1 inch = 400 feet

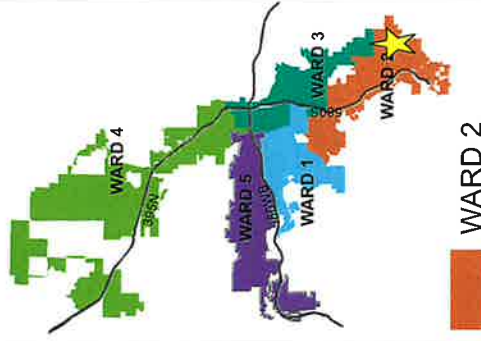


MASTER PLAN MAP

MUP24-00012

(LifeChurch
Primary School)

Subject Site ▶ 

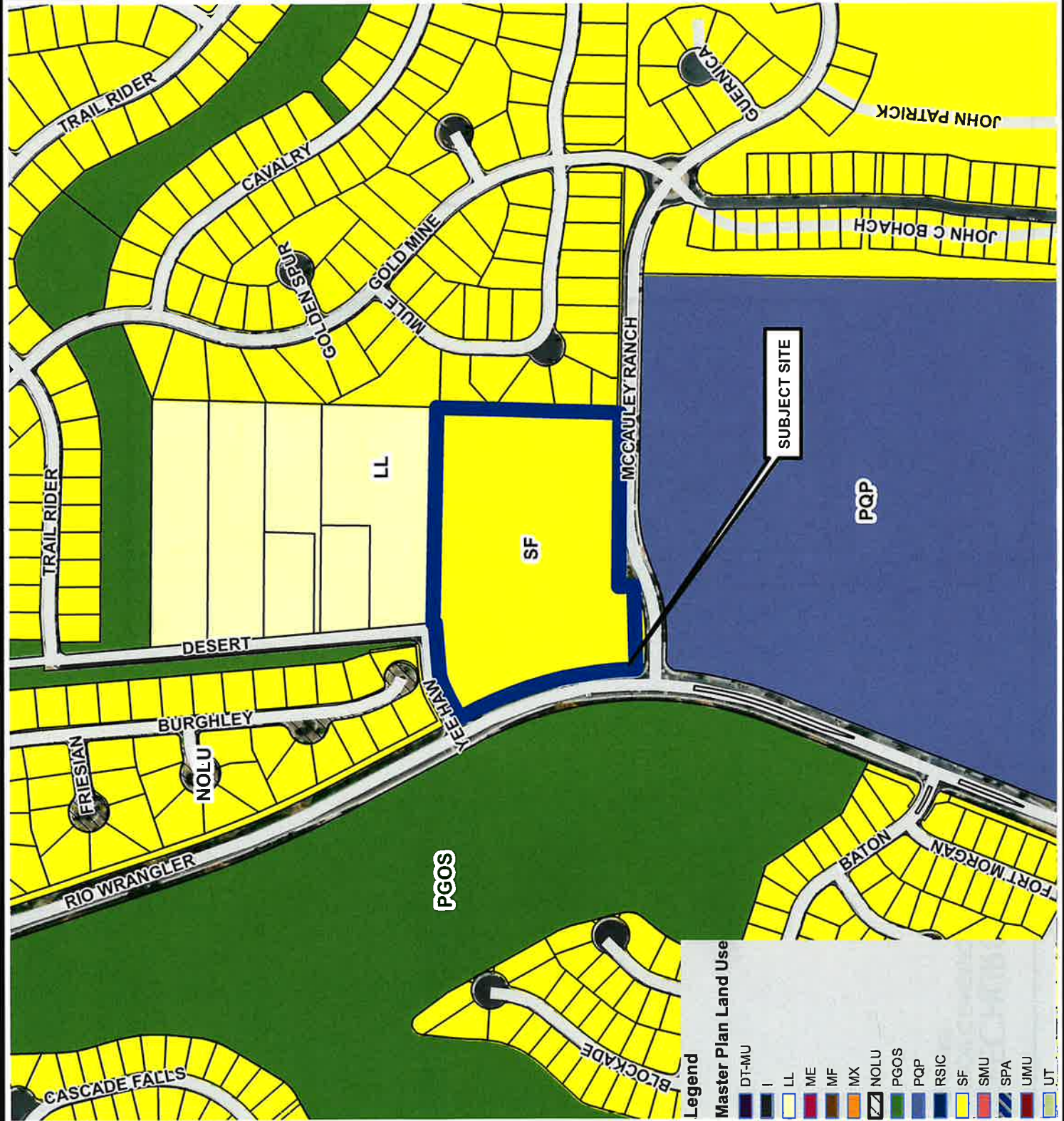


Development
Services
Department



The information hereon
is approximate and
is intended for display
purposes only.

Date: December 2023
Scale: 1 inch = 400 feet



Legend

Master Plan Land Use

DT-MU	I	LL	ME	MF	MX	NOLU	PGOS	PQP	RSIC	SF	SMU	SPA	UMU	UT
-------	---	----	----	----	----	------	------	-----	------	----	-----	-----	-----	----

OWNER/DEVELOPER:
LIFE CHURCH
0300 RIO WRANGLER PKWY
RENO, NV 89521
(775) 852-3833

NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994, HIGH ACCURACY REFERENCE NETWORK (HARN 83/94-HARN), AS DETERMINED USING REAL TIME KINETIC (RTK) GPS OBSERVATIONS WITH CORRELATIONS TRANSMITTED BY THE NORTHERN NEVADA COOPERATIVE REAL TIME NETWORK'S (NNCRN) STATIONS. THE CLARING BETWEEN GPS RECEIVERS (GARMIN 60CSXZ), SCORING STATION 7979 AND NNCRN BEACON HT-50000A IS TAKEN AS NORTH 30° EAST. ALL MEASUREMENTS SHOWN ARE GROUND DISTANCES. CONVERSION GRID-TO-GROUND FACTOR = 1.000187939.

THE BASIS OF ELEVATION IS BASED ON THE NORTH AMERICAN CRITICAL DATUM OF 1988 (NAVD 88) AS TAKEN FROM CITY OF KNOX BENCHMARK 2987, WITH A PUBLISHED ELEVATION OF 252.339 FT. BENCHMARK 2987 IS DESCRIBED AS BEING 1' X 6" DIA STEEL CAP SET IN THE TOP OF CURB AT THE NE CORNER OF HIO WHEELER PARKWAY AND YEE HAW WAY, APPROXIMATELY 10' NORTHERLY OF THE ECR ALONG BIG BRANCH PARKWAY.



SCHOOL PHASE PROJECT AREA: 10.2 AC
 EXISTING BUILDINGS TOTAL FLOOR AREA: 33,750 SF
 SCHOOL PHASE PROJECT FLOOR AREA: 33,750 SF
 SCHOOL PHASE PROJECT ACQUIRED LANDSCAPE AREA: 24.4 AC
 SCHOOL PHASE PROJECT ACQUIRED LANDSCAPE AREA: 34,848 SF
 SCHOOL PHASE PROJECT ACQUIRED LANDSCAPE AREA: 34,848 SF

OVERALL PROPERTY:	
TOTAL PARKING REQUIRED FOR CITY CODE-ILLINOIS, MINIMUM USE: 113 STALLS	
TOTAL PARKING REQUIRED FOR CITY CODE-CHICAGO, MINIMUM USE: 69 STALLS	
TOTAL PARKING REQUIRED FOR ILLINOIS USE: 183 STALLS	
TOTAL PARKING PROVIDED: 415 STALLS (176 EXISTING, 239 PROPOSED)	
TOTAL ACCESSIBLE PARKING REQUIRED: 12 STALLS	
TOTAL ACCESSIBLE PARKING PROVIDED: 12 STALLS (EXISTING, 0 PROPOSED)	
SCHOOL PHASE:	
TOTAL PARKING REQUIRED FOR CITY CODE-SCHOOL, USED 20 STALLS	
TOTAL PARKING REQUIRED FOR NON-PRIVATE SCHOOL USE: 120 STALLS	
TOTAL PARKING REQUIRED FOR ALL SCHOOLS: 140 STALLS	
TOTAL ACCESSIBLE PARKING REQUIRED: 8 STALLS	
TOTAL ACCESSIBLE PARKING PROVIDED: 8 STALLS	
DISTRICT PHASING SEQUENCE:	
TOTAL BIKC PARKING REQUIRED: 45 STALLS	
TOTAL BIKC PARKING PROVIDED: 45 STALLS MINIMUM	
TOTAL BIKE PARKING PROVIDED: 45 STALLS MINIMUM	
SSCS0000 PARCEL NUMBER	

MEGAN W. OVERTON, DO HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED BY ME OR UNDER MY SUPERVISION AND WAS COMPLETED ON THE 19th DAY OF FEBRUARY 2004.

WILLIAM W. MORTON, JR., 110000

SHEET NO.	SHEET OF	DATE OF REVISION
1	T-1	TITLE SHEET
2	S-1	PRELIMINARY
3	G-1	PRELIMINARY GRADING PLAN
4	U-1	PRELIMINARY UTILITY PLAN
5	CS-1	PRELIMINARY CROSS SECTIONS
6	L-1	PRELIMINARY LONGITUDINAL PLAN

LIFECHURCH SCHOOL
TITLE SHEET

WOOD ROGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

1361 Corporate Boulevard
Reno, NV 89502

Tel 775.623.4066
Fax 775.623.4066

2846011

JANUARY 2007

SHEET T-1 OF 6

LIFECHURCH SCHOOL

MINOR CONDITIONAL USE PERMIT

PRELIMINARY SITE PLAN

140-020-78
NEVADA TRIPARTNERS
(NOT A PART)

LEGEND:

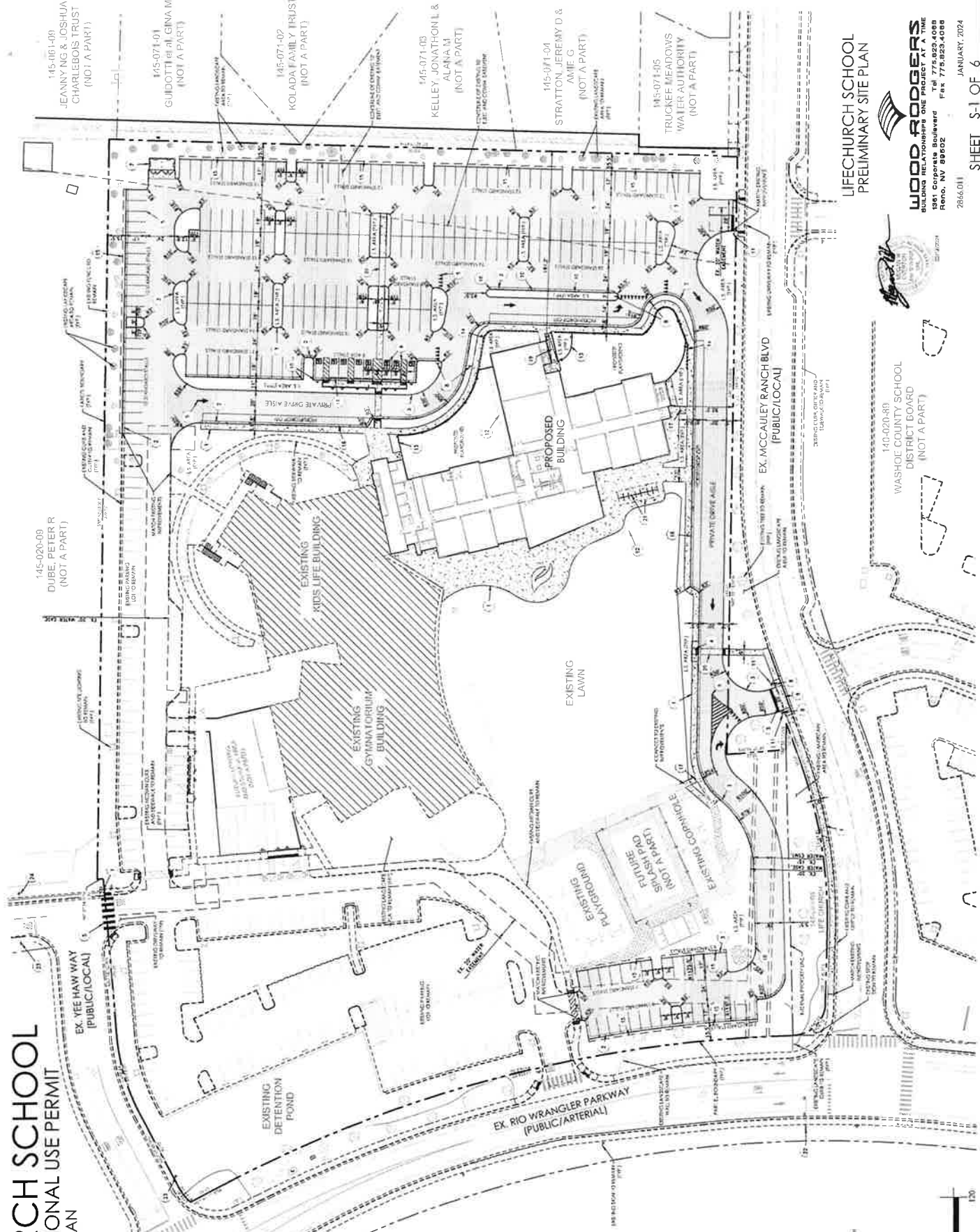


SITE NOTES:

1. ALL EXISTING UTILITIES TO BE MAINTAINED AND PROTECTED.

SITE KEY NOTES:

- (1) A/C CONCRETE (NOT A PART)
- (2) P/C CONCRETE (NOT A PART)
- (3) A/C CONCRETE (NOT A PART)
- (4) A/C CONCRETE (NOT A PART)
- (5) A/C CONCRETE (NOT A PART)
- (6) A/C CONCRETE (NOT A PART)
- (7) A/C CONCRETE (NOT A PART)
- (8) A/C CONCRETE (NOT A PART)
- (9) A/C CONCRETE (NOT A PART)
- (10) A/C CONCRETE (NOT A PART)
- (11) A/C CONCRETE (NOT A PART)
- (12) A/C CONCRETE (NOT A PART)
- (13) A/C CONCRETE (NOT A PART)
- (14) A/C CONCRETE (NOT A PART)
- (15) A/C CONCRETE (NOT A PART)
- (16) A/C CONCRETE (NOT A PART)
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- (18) A/C CONCRETE (NOT A PART)
- (19) A/C CONCRETE (NOT A PART)
- (20) A/C CONCRETE (NOT A PART)
- (21) A/C CONCRETE (NOT A PART)
- (22) A/C CONCRETE (NOT A PART)
- (23) A/C CONCRETE (NOT A PART)
- (24) A/C CONCRETE (NOT A PART)



LIFECHURCH SCHOOL

PRELIMINARY SITE PLAN



140-020-80
WASHOE COUNTY SCHOOL
DISTRICT BOARD
(NOT A PART)

WOOD RODGERS
BUILDING RELATIONSHIP ONE PROJECT AT A TIME
1981 Corporate Boulevard
Reno, NV 89502
Tel 775.825.4088
Fax 775.825.4088
JANUARY, 2024
2866.011

LIFECHURCH SCHOOL

MINOR CONDITIONAL USE PERMIT

PRELIMINARY GRADING PLAN

145-020-09
DURE, PETER R
(NOT A PART)

EX. YEE HAW WAY
(PUBLIC/LOCAL)

EXISTING
DETENTION
POND

EXISTING
KIDS LIFE BUILDING
EX. FF#670

EXISTING
GYMNASIUM
BUILDING
EX. FF#670

140-020-78
NEVADA TRI PARTNERS
(NOT A PART)

FEMA NOTE:
ALL ELEVATIONS ARE LOCAL
AND NOT MSL

EXISTING
LAWN

EX. RIO WRANGLER PARKWAY
(PUBLIC/ARTERIAL)

PROPOSED
BUILDING
FF#670

EXISTING
PLAYGROUND

EXISTING
GRAPHITE
SPRASH PAD
(NOT A PART)

EX. MCCAULEY RANCH BLVD
(PUBLIC/LOCAL)

140-020-89
WASHOE COUNTY SCHOOL
DISTRICT BOARD
(NOT A PART)

LIFECHURCH SCHOOL
PRELIMINARY GRADING PLAN



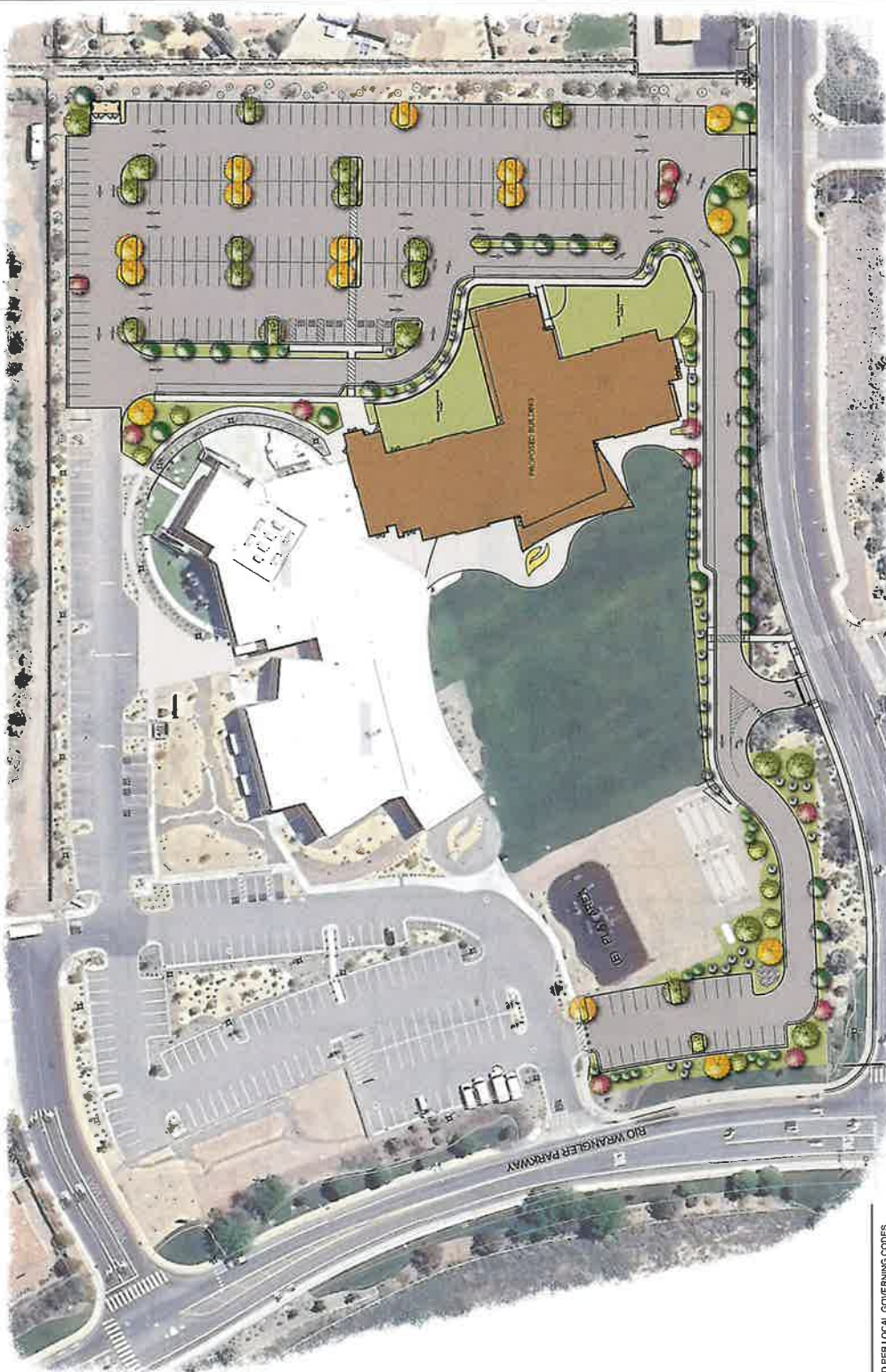
WOOD RODGERS
REGISTERED PROFESSIONAL ENGINEER
1981 Corporate Boulevard
Reno, NV 89502
TEL 775.823.4088
FAX 775.823.4089

2866011
JANUARY, 2024
SHEET G-1 OF 6





No.	Rev./Issue	Date
1	1	02/22/2013

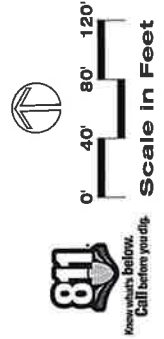


PLANT LEGEND

- ORNAMENTAL TREES
- DECIDUOUS SHADE TREES
- EVERGREEN TREES
- LANDSCAPE AREA
- EXISTING LAWN

LANDSCAPE DATA

- SITE AREA (TO BE DEVELOPED) = 174,200 SQ. FT. (4 ACRES)
- OVERALL PARCEL SIZE = 444,372 SQ. FT. (10.2 ACRES)
- ZONING: SF3 (SINGLE-FAMILY RESIDENTIAL, 3 UNITS PER ACRE)
- REQUIRED LANDSCAPE AREA = 34,948 SQ. FT. (20% OF TOTAL SITE AREA)
- PROVIDED LANDSCAPE AREA = 34,948 SQ. FT.
- TREES REQUIRED = 141
 - 1 TREE PER 200 SQ. FT. OF REQUIRED LANDSCAPE AREA
 - 1 TREE PER 10 PARKING SPACES (234 SPACES PROVIDED)
- SHRUBS REQUIRED = 846
 - 6 SHRUBS PER REQUIRED TREE
- SHRUBS PROVIDED = 846 MIN.



GENERAL NOTES

- ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.
- TREES:
 - EVERGREEN TREES SHALL HAVE A MINIMUM CALIBER OF 2 INCHES.
 - DECIDUOUS TREES SHALL HAVE A MINIMUM HEIGHT OF 6 FEET.
 - ADDITIONAL TREES, BEYOND THOSE REQUIRED BY CODE, MAY BE REDUCED IN SIZE AT INSTALLATION.
 - ALL TREES SHALL BE APPROVED SPECIES LISTED ON THE URBAN FORESTER STREET TREE LIST.
- FINAL PLANT SELECTION AND LAYOUT WILL BE BASED ON SOILS, HORTICULTURAL, PLANTING, AND IRRIGATION REQUIREMENTS. PLANTING SHALL BE BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. A REDUCED-PRESSURE, TYPE BACKFLOW PREVENTOR WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.
- ALL SHRUB BEDS WILL RECEIVE 4" DEPTH MULCH WITH WEED CONTROL.
- ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. CONTAINER PLANTINGS WILL BE DROPPED IRRIGATED BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. A REDUCED-PRESSURE, TYPE BACKFLOW PREVENTOR WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.
- PLANT IS CONCEPTUAL. PLANT QUANTITIES INDICATED ARE PER CITY OF RENO CODE REQUIREMENTS. PLANT LOCATIONS, FINAL SPECIES SELECTION, AND SIZE AT PLANTING SHALL BE DETERMINED DURING DEVELOPMENT OF THE FINAL CONSTRUCTION DOCUMENTS.

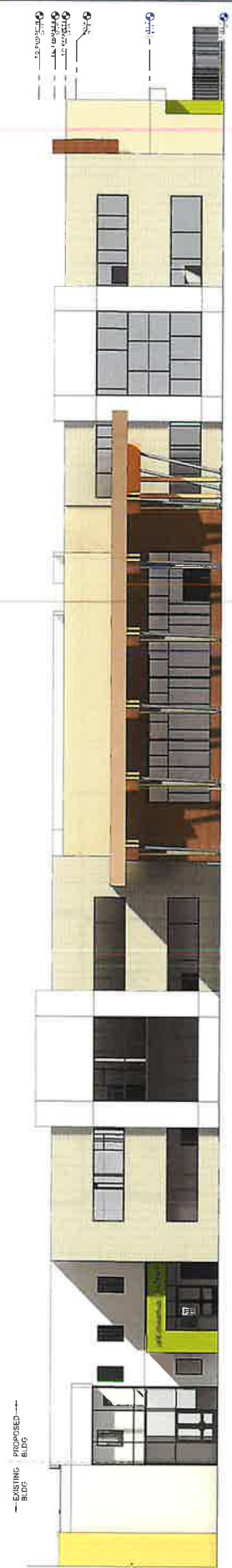




EAST ELEVATION	1
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SOUTH ELEVATION	2
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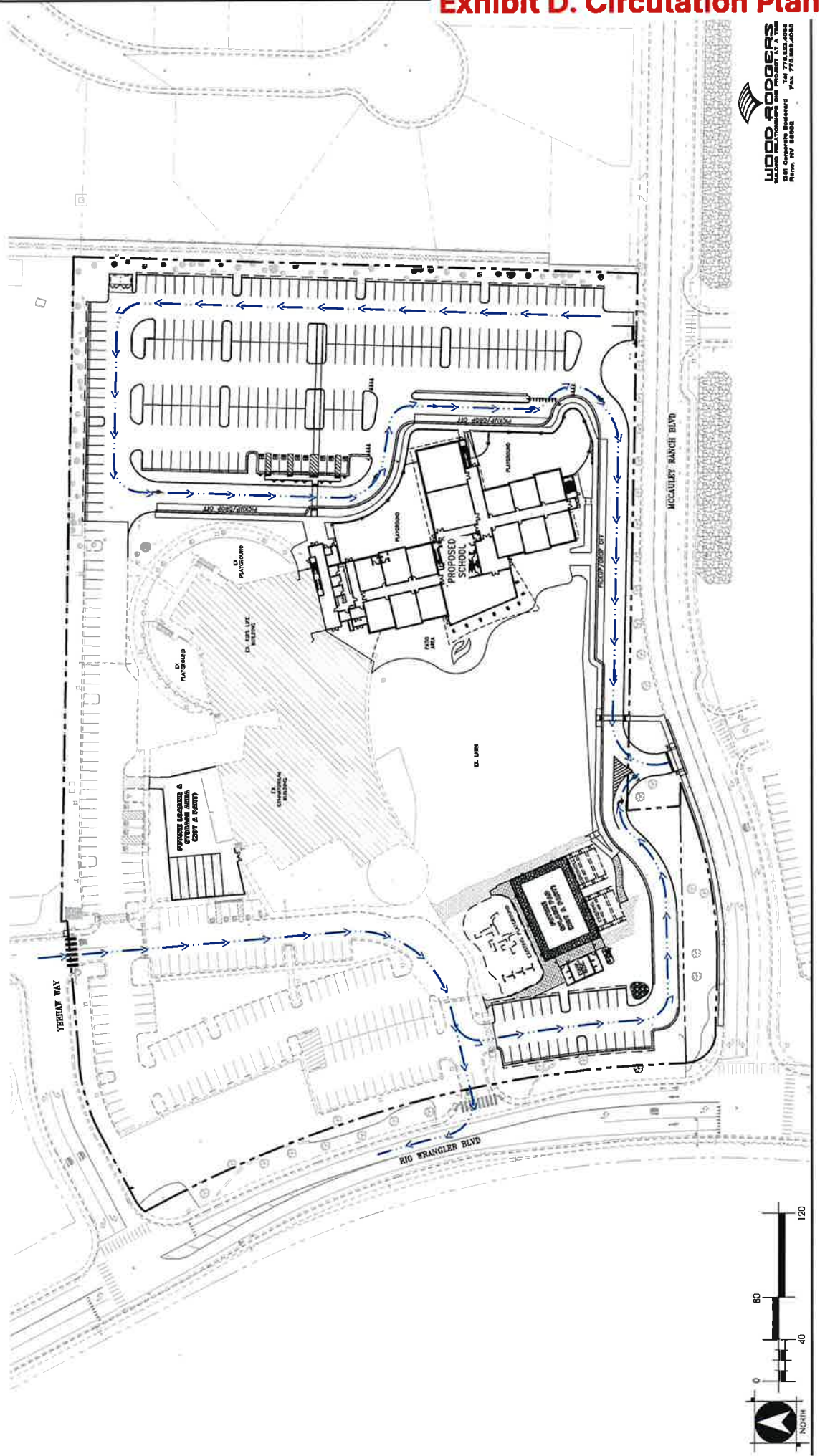


WEST ELEVATION 3

PRELIMINARY SITE PLAN - VEHICLE CIRCULATION

LIFE CHURCH

RENO, NEVADA
JANUARY 2024





REGIONAL TRANSPORTATION COMMISSION

Metropolitan Planning • Public Transportation & Operations • Engineering & Construction

Metropolitan Planning Organization of Washoe County, Nevada

December 14, 2023

Jeff Foster
Development Services Department
City of Reno
1 East First Street
Reno, NV 89501

RE: LifeChurch Primary School – MUP24-00012 – RTC Comment Letter

Dear Mr. Foster

RTC appreciates the opportunity to comment on the proposed LifeChurch Primary School project located at 10300 Rio Wrangler Parkway in Reno. RTC is committed to working with City staff, developers, and other stakeholders across Washoe County to create developments that improve regional transportation by reducing congestion, expanding mode share, and designing walkable neighborhoods.

The purpose of this letter is to make comments ensuring that the Project is in compliance with approved RTC plans, programs, and initiatives, and to provide recommendations based on the project's proximity to any RTC existing or upcoming roadway improvements and/or transit services.

Traffic Impact Study

RTC has reviewed the traffic impact study, and has the following comments for consideration by the City:

- RTC completed an Intersection Control Evaluation (ICE) for the Rio Wrangler Parkway / McCauley Ranch Boulevard intersection, the results of which recommended construction of a roundabout at this location. The Traffic Impact Study should include the roundabout scenario for level of service analysis.
- The recommendations of the finalized traffic impact study should acknowledge the possible aforementioned roundabout at the Rio Wrangler/McCauley Ranch intersection. Inclusion may remove the need for the recommended all-way stop control.

2050 Regional Transportation Plan (RTP)

Rio Wrangler Parkway between Spring Flower Drive and Western Skies Drive, just south of the proposed project, has been identified in the 2050 RTP for "Capacity" enhancements in the 2031-2050 timeframe. City staff along with the project sponsor should coordinate project design efforts with RTC to ensure consistency.

Active Transportation

RTC supports the goals and principles outlined in the Reno Master Plan, which emphasize mixed-use, transit-oriented development and community revitalization projects that encourage walking, bicycling, and easy access to transit. In order to enhance pedestrian and bicycle access to the proposed development, the City should consider requiring installation of wide sidewalks along McCauley Ranch Boulevard along the entire length of the parcel, as well as pedestrian lighting, ADA-compliant curb ramps, and easily accessible bike racks along the McCauley Ranch Boulevard and Rio Wrangler Parkway frontages as conditions of project approval.

Additionally, RTC encourages the incorporation of pedestrian-oriented building design strategies such as placing of building facades along the sidewalk, locating surface-level parking behind the building and away from walkways, and strategically including entrances and windows facing the street for convenient pedestrian access.

RTC looks forward to reviewing any further documents related to this project. If you have any questions regarding this response, please contact Marquis Williams by phone at 775-332-0174, by email at MWilliams@rtcwashoe.com, or by mail at the following address:

RTC Development Review
1105 Terminal Way, Suite 211
Reno, NV 89502

Sincerely,

A handwritten signature in black ink, appearing to read 'Marquis Williams', with a stylized, flowing script.

Marquis Williams
Senior Technical Planner



Washoe County School District

425 East Ninth Street * P.O. Box 30425 * Reno, NV 89520-3425
Phone (775) 348-0200 * Fax (775) 348-0304 * www.washoeschools.net

Board of Trustees: Beth Smith, President * Diane Nicolet, Vice President * Joe Rodriguez, Clerk
Jeff Church * Adam Mayberry * Colleen Westlake * Alex Woodley * Susan Enfield, Ed.D., Superintendent

Kyle Chisholm, School Property Planning Manager
14101 Old Virginia Rd.
Reno, NV 89521-8912
(775) 789-3810

December 13, 2023

City of Reno, Development Services Dept.
Attn: Jeff Foster, Associate Planner
PO Box 1900
Reno, NV 89505

Dear Mr. Foster,

The Washoe County School District (WCSD) respectfully submits the following comments and/or concerns in regards to the application for a Minor Conditional Use Permit (Case No. MUP24-00012 "LifeChurch Primary School"):

WCSD has strong concerns over the additional traffic potentially generated by this project and the impacts it will have to the existing Damonte Ranch High School (DRHS) operations. Specifically, the traffic study provided demonstrates that the traffic levels at the Rio Wrangler/McCauley Ranch intersection are already poorly functioning and as a result of the project will reach a LOS F. The traffic study mentions an all-way-stop (AWS) will be necessary at this intersection but states that it will be "further analyzed" upon full buildout of the project. This is unsatisfactory as the phasing and timing of the project is not guaranteed and this improvement is needed now. WCSD requests that this AWS be conditioned and required to be installed prior to completion of any expansion and the first phase of the project.

Also, the DRHS's two existing driveways along McCauley ranch and the existing Rio Wrangler/Yee Haw Way will be negatively impacted with the addition of this project. The traffic study does not recommend any improvements to either of these intersections. City Engineering staff should analyze and vet the proposed function of these driveways to ensure no negative impacts to DRHS will occur.

Further, the logic stated in the traffic study regarding the 30 minute staggered bell times between the new and existing schools and associated traffic counts appears to be inaccurate. First, the recommended bell times of "8:15-9:15 AM and 3:15-4:14 PM" do not provide for said 30 minute staggering. DRHS's current bell times are 8:00 AM and 2:30 PM. Further, most of the parent traffic arrives at least 20-30 minutes before bell time for pick-up and drop-off so there is still substantial overlap between the schools. WCSD recommend the project be conditioned to require bell times of 9:00 AM & 3:30 PM to ensure adequate staggering and to allow parents exiting after bell times reduced congestions. Also, the proposed school should be required to use their primary access point at Yee Haw for pick-up and drop-off traffic so as not to conflict with DRHS's two existing driveways along McCauley Ranch.

Thank you for your time and attention to this matter. Please contact me should you have any questions or want to discuss further.

Sincerely,

Kyle Chisholm



**WASHOE COUNTY
SCHOOL DISTRICT
POLICE DEPARTMENT**
425 East Ninth Street □ P.O. Box 30425

**SAFE
ROUTES
TO SCHOOL**

MEMO

To: Kyle Chisholm, School Property Planning Manager
From: Officer Robbie Pape, Safe Routes Coordinator
Jennifer Iveson, Safe Routes Coordinator
RE: Life Church – Damonte
Date: 12/12/2023

In review of the Life Church application, Safe Routes to School anticipates a large volume of traffic using both Rio Wrangler Parkway and McCauley Ranch Blvd to include the joining intersection. To mitigate the upcoming dangers, Safe Routes recommends the following improvements and pedestrian safety measures. These measures will assist the overall safety of both motorists and pedestrians traveling to and from Damonte Ranch High School and the Life Church School. See attached diagram.

1. Crosswalks in front of proposed southeast exit/entrance on McCauley.
2. Sidewalk installation on McCauley in front of the proposed Life Church School.
3. Additional Crosswalk at McCauley and Rio Wrangler.
4. All way-controlled stop at Rio Wrangler Parkway and McCauley Ranch Blvd.
5. Use primary egress/ingress on Yee Haw way for pick-up & drop-off activities.

Respectfully,

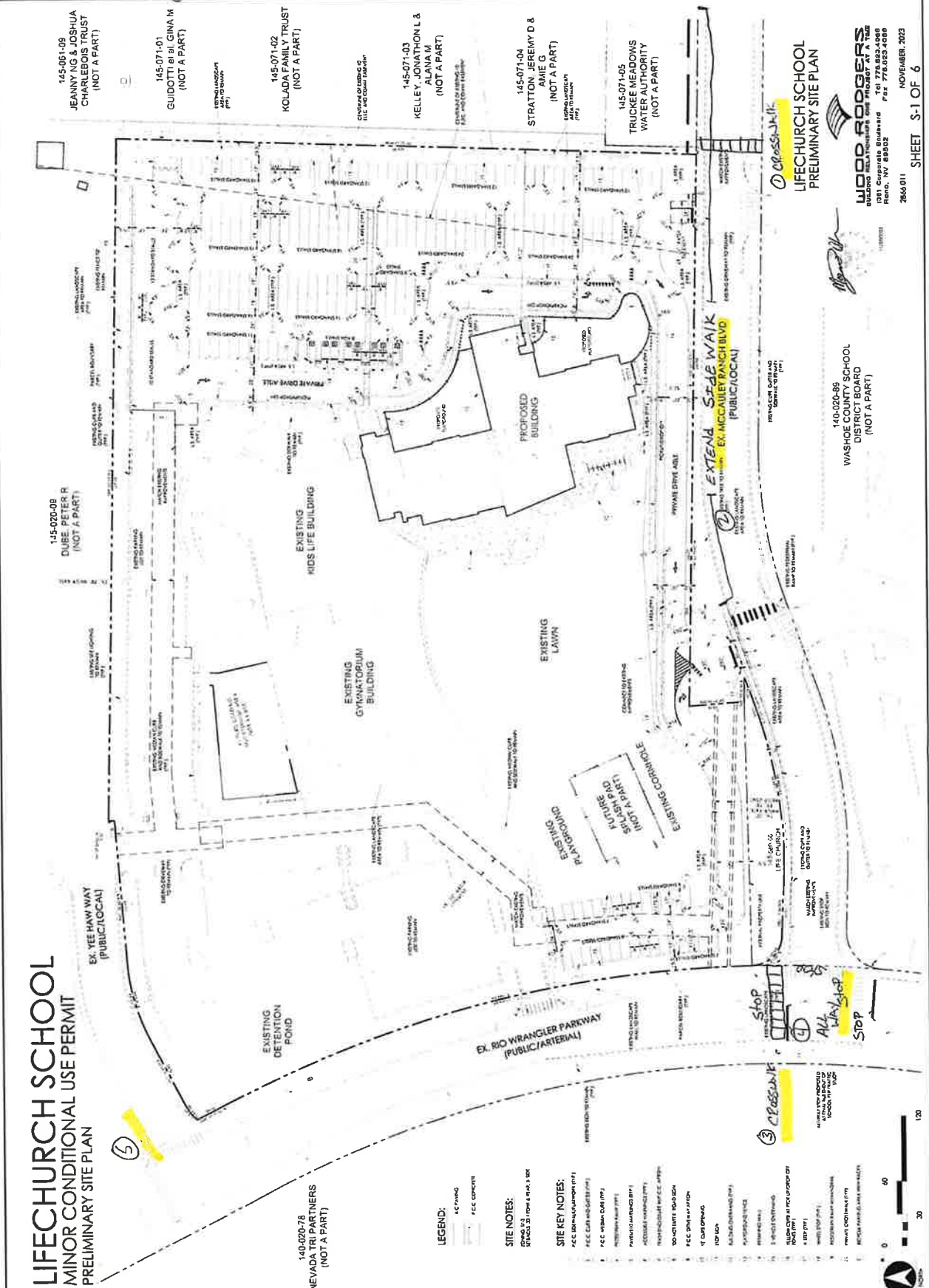
Officer Robbie Pape
Jennifer Iveson
Program Coordinators, SRTS
rcpape@washoeschools.net
jennifer.iveson@washoeschools.net
(775) 348-0288

- ① CROSSWALK
- ② EXTEND SIDEWALK
- ③ CROSSWALK
- ④ ALL WAY STOP
- ⑤ RECOMMEND

LIFECHURCH SCHOOL

MINOR CONDITIONAL USE PERMIT

PRELIMINARY SITE PLAN



WOOD ROGERS
 140020-09
 WASHOE COUNTY SCHOOL DISTRICT BOARD
 (NOT A PART)
 2866 011
 NOVEMBER 2023

WOOD ROGERS
 140020-09
 WASHOE COUNTY SCHOOL DISTRICT BOARD
 (NOT A PART)
 2866 011
 NOVEMBER 2023

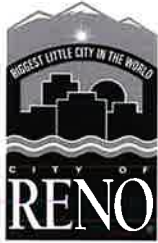
WOOD ROGERS
 140020-09
 WASHOE COUNTY SCHOOL DISTRICT BOARD
 (NOT A PART)
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 NOVEMBER 2023

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 (NOT A PART)
 2866 011
 NOVEMBER 2023

WOOD ROGERS
 140020-09
 WASHOE COUNTY SCHOOL DISTRICT BOARD
 (NOT A PART)
 2866 011
 NOVEMBER 2023





Environmental Control

MEMORANDUM

Date: December 11, 2023
To: Chris Pingree – Director of Development Services
Jeff Foster – Associate Planner
From: Eric Farrar, Environmental Control Officer
Subject: **December 1, 2023 Current Development Projects Review/Comments**

The Environmental Control Section (EC) under the Utility Services Department has reviewed the Development Projects memorandum dated December 1, 2023. We offer the following comments or conditions:

LifeChurch Primary School - MUP24-00012

EC has no comments regarding the request for a Minor Conditional Use Permit. The need for pretreatment devices (such as grease interceptor), Environmental Control permit or applicability of wastewater discharge requirements will be evaluated upon construction/tenant improvement or Business License application submittals. If the school includes a kitchen/food prep area, EC would require a properly-sized grease interceptor (minimum 750 gallons).

December 18, 2023

City of Reno
Planning and Development Division
PO Box 11130
Reno, NV 89520-0027

RE: LifeChurch Primary School; 145-020-17
Minor Conditional Use; MUP24-00012

Dear City of Reno Staff:

Northern Nevada Public Health (NNPH), Environmental Health Services Division (EHS) has reviewed the above referenced project.

1. EHS has reviewed the above referenced application and has no concerns for its approval of the change in land use as submitted.
2. The proposed school and subsequent parcel are served by community water and sewerage systems.
3. If the application is approved all subject civil improvement or building plans must be routed to EHS for review and approval.
4. If the project is approved it would be subject to all permitting requirements as outlined by the Washoe County District Board of Health Governing Food Establishments and must meet the standards of Nevada Administrative Code for the design and construction of the school if approved..

If you have any questions or would like clarification regarding the foregoing, please contact James English, EHS Supervisor at jenglish@nnph.org regarding all Environmental Health comments.

Sincerely,



James English, REHS, CP-FS
EHS Supervisor
Environmental Health Services
Northern Nevada Public Health

Jeff Foster

From: COOPER, CLIFFORD E <cc2132@att.com>
Sent: Monday, December 4, 2023 7:42 AM
To: Jeff Foster
Subject: RE: LifeChurch Primary School MUP24-00012

Jeff,
AT&T does not have any adverse comments regarding this project.

CLIFF COOPER
SR SPECIALIST-OSP DESIGN ENGINEER
AT&T NEVADA
1375 Capital Blvd rm 115
Reno, NV 89502
ROW Office: 775-453-7578
Email: cc2132@att.com
TEXTING and DRIVING...It Can Wait

Jeff Foster

From: Katriel Van Cleve <kvancleve@nevada.unr.edu>
Sent: Monday, December 11, 2023 12:17 PM
To: Jeff Foster
Subject: Support for Life Church's Proposed New School (Rio Wrangler and McCauley Ranch Blvd., South Reno)

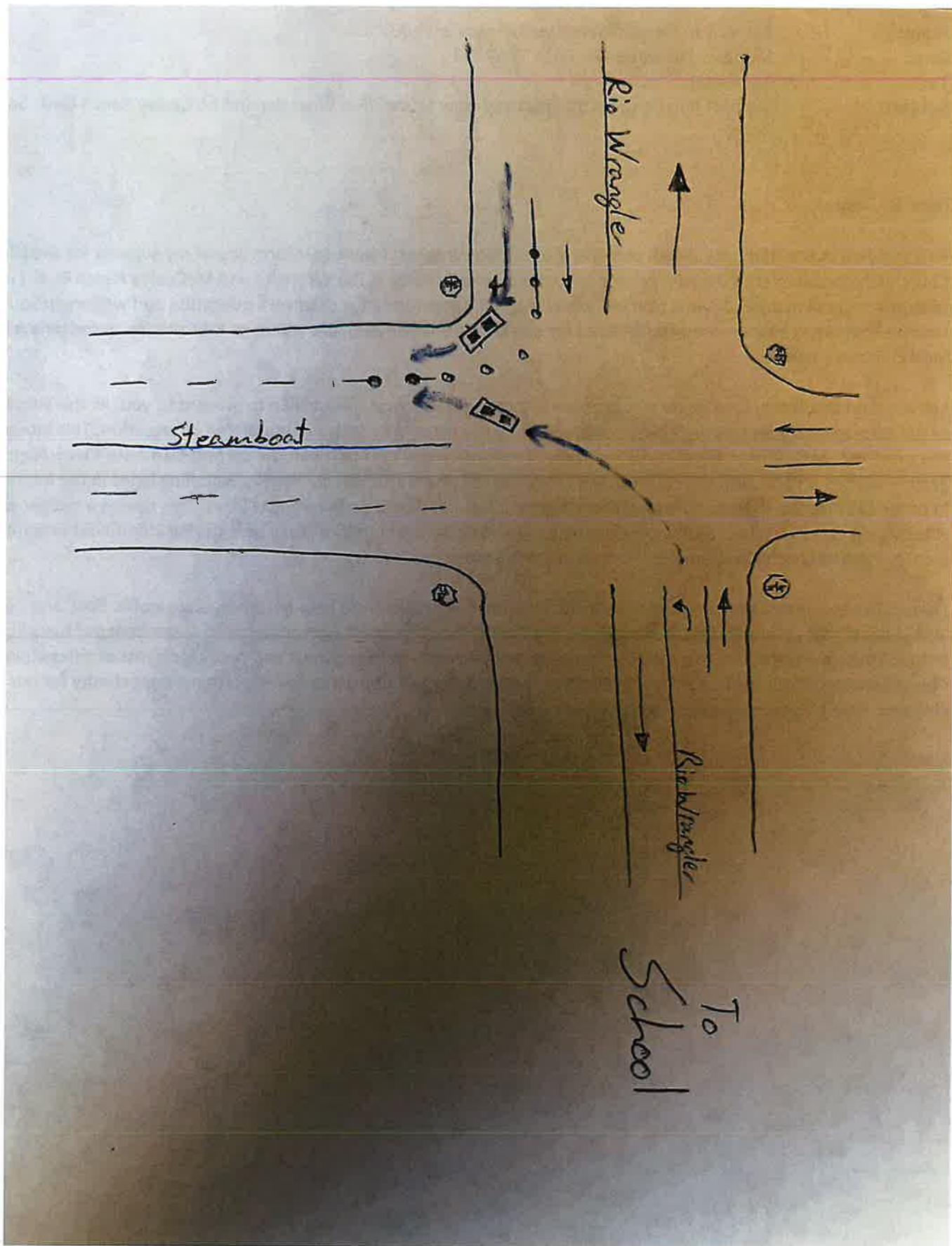
Dear Mr. Foster,

As a resident in the Damonte Ranch area living off of Rio Wrangler, I want to inform you of my support for the Life Church's proposal to create a new private school on their property at Rio Wrangler and McCauley Ranch Blvd. I urge you to support the plan amendments that will allow another opportunity for children's education and welfare in South Reno. I realize there may be increased traffic; but I for one (along with others), are willing to take the increased delays for our local children's benefit.

I have taken the liberty to prepare a suggestion for easing traffic that I would like to present to you. At the T-intersection of Rio Wrangler and Steamboat Pkwy, currently, there is a three-way stop sign-mediated intersection. This intersection has provided inefficient traffic control for a great time with many cars that exit the current Damonte Ranch High School getting backed up and with drivers from the school disobeying traffic law by illegally switching lanes in the intersection in order to enter the right-hand lane rather than their left-hand lane on Steamboat Pkwy. This causes a danger of sideswiping cars as well as more inefficiencies for drivers who could theoretically be entering Steamboat simultaneously from north and south Rio Wrangler if drivers were following the law.

I would like to suggest that stop lights be installed at that intersection to help better regulate traffic flow, and I would also suggest that pylons be installed curving from the northern end of Rio Wrangler onto Steamboat as I have illustrated below. These modifications can ease traffic congestion and prevent dangerous and costly incidents of sideswiping. Please consider these traffic controls in addition to approving Life Church's new educational opportunity for our children. Thank you for your time and consideration.

Sincerely,
Katriel Van Cleve



Jeff Foster

From: Katriel Van Cleve <kvancleve@nevada.unr.edu>
Sent: Tuesday, December 12, 2023 9:40 PM
To: Jeff Foster
Subject: Continued Support for Life Church's New School

Dear Mr. Foster,

I am aware of resistance to the establishment of a new private school run by Life Church (located at Rio Wrangler and McCauley Ranch Blvd.). I believe this school and the educational opportunities it can bring to our children are important enough in order to warrant a second letter of support for its establishment as planned in Life Church's proposal. I am certain that any traffic issues that arise can be remediated. I encourage and implore that you, and those under your direction, consider my proposed traffic solutions to the Rio Wrangler and Steamboat intersection that I sent in my prior email sent Monday. Additionally, I would like to suggest road widening measures along Rio Wrangler as well as school schedule, start-time delays as other options to aid traffic. Please support Life Church's new school. Our children's education is far more important than mild delays (especially when these delay have solutions). Thank you again for your time and consideration.

Sincerely,
Katriel Van Cleve

**Which Category
Describes You**

Citizen

Case Number

MUP24-00012

Citizen General Public Comment Form

Full Name

William McLarty

Contact Email

wmclarty@hotmail.com

Contact Phone Number

4157253349

Position

In Opposition

**Leave comments on
this case here.**

School is OKAY, but timing for traffic is a huge consideration as Damonte Ranch HS is next door. Traffic during school opening and closing is already at a standstill.

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Which Category Describes You Citizen

Case Number MUP24-00012

Do you wish to opt-in to receive Reno Connect Development Project email newsletters? Yes

Citizen General Public Comment Form

Full Name Dan Conklin

Contact Email danscvx@gmail.com

Contact Phone Number 6619933180

Position In Opposition

Leave comments on this case here.

McCauley Ranch Road is not built for extra traffic. The traffic reports don't factor in all of the new developments being approved (canyons, dpli, valley view, etc) this adds up to at least 160 cars a day, if only one person per household were to drive that will be driving on McCauley or Yeehaw daily. Either do something about widening and stop light or stop this from passing.

God forbid a fire broke out and both schools were full and everyone in the canyon needed to get out and dump onto Rio Wrangler. A two lane road!

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Jeff Foster

From: Michael Bordallo <bordallo34@hotmail.com>
Sent: Monday, December 11, 2023 10:41 AM
To: Mayor; Devon Reese; Jenny Brekhus; Naomi Duerr; Miguel Martinez; Meghan Ebert; Kathleen Taylor; Jeff Foster
Subject: Proposed Life Church School

Hello City Council and Manager,

I am writing to voice a safety concern on behalf of my family and neighbors living in the vicinity of a proposed life church school. This location is a terrible option for anymore vehicle traffic and school density. There is already unsafe road widths on Desert Way and Yeehaw that may injure or even kill pedestrian or vehicle occupants. We went through this with Doral Academy proposal that was cancelled due to the smart decision making of this council. With the new elementary school opened (J Wood) and the already congested traffic, opening another elementary school would create traffic hazards and fire hazards for the neighborhoods above Life Church and Damonte High School. Please do not support this unsafe congestion to an already highly trafficked area.

Thank you for your time and I highly recommend against any additional congestion or traffic to this area. The Church is trafficked with a small dare care, week night meetings and Sunday Churh, which is what it was intended for. This is unacceptable for the Church to look at profits at the expense of their neighbors.

Thank you for your time and attention.

Mike Bordallo
(775)686-9388

Jeff Foster

From: JoAnn McGoff <jamcgoff@att.net>
Sent: Monday, December 11, 2023 6:48 PM
To: Jeff Foster
Subject: Life Church Primary School expansion

Mr. foster,

I live very near Rio Wrangler and am concerned about the above building. My concern is not the building of a school, but the location. I have been told that ship has sailed, and the school will be built.

Traffic is certainly a concern with more housing planned for the area and two schools already within a mile of the planned school. Other concerns are expansion of the school...can it add another building for a middle school? Can the planned building be expanded with mobile facilities? Does it have to be two stories?

Lots of concerns which I hope will be addressed on 12/22.

Thank you.

JoAnn McGoff
2685 Hanovarian Way

Jeff Foster

From: Jon Kelley <fattire775@gmail.com>
Sent: Monday, December 11, 2023 6:00 PM
To: Jeff Foster
Subject: MUP24-00012 Life Church Primary School Permit

Hello Jeff,

We received City of Reno notification via USPS regarding project MUP24-00012 Life Church Primary School and we have a couple of questions as the information online was limited.

We live directly behind the church currently (Mule Circle) and our backyard is the church. If available, can you provide any details on the building such as location on the property and height? The church itself blocks our view west (Windy Hill) and we're concerned our views of Mt. Rose and related might be impacted. We are also curious about the traffic impacts with the completion of the Palisades subdivision, pending Canyons Edge and 40 +- acres by the water tank above the Palisades, new elementary school, and existing high school.

Thank you for your time.

Jon Kelley

Jeff Foster

From: Lynn Ault <lynn@hopereno.church>
Sent: Wednesday, December 13, 2023 8:39 AM
To: Jeff Foster
Subject: Proposed South Reno School

Hello,

My name is Lynn Ault, I own a home, with my wife, located at 10170 Cavalry Circle, Reno, NV 89521. This is just up the hill from where Life Church is located, and where the proposed school would be located. I would ask the city to reject this proposal based on the traffic concerns. Those of us who live above Life Church use two roads to get in/out of our neighborhood, and both those are already jam packed with school traffic Monday-Friday, before school and after school. On top of that, there are games and events that bring congestion to these roads as well. On Sunday mornings, there is a lot of church traffic. The church is already there, as is Damonte Ranch High School, but we do not have to add another school with all of its traffic into the mix as well. Please do not increase the amount of traffic in this already limited and congested area.

Yours Truly,

Lynn Owen Ault II

Home Owner and south Reno resident

Jeff Foster

From: Tammi Proulx <tammi.proulx@sbcglobal.net>
Sent: Sunday, December 17, 2023 9:49 PM
To: Jeff Foster
Subject: RE: MUP24-00012

Jeff Foster
City of Reno
Development Services Department
via email: fosterj@reno.gov

RE: MUP24-00012
44,351 sq. ft. LifeChurch Primary School

Dear Mr. Foster,

My name is Tammi Proulx and I live at 2725 Gold Mine Court, in the Golden Hills Subdivision and have since 2007. My family and I are extremely concerned about the proposed +44,000 sq. ft. primary school LifeChurch would like to construct at 10300 Rio Wrangler Parkway. We are already seeing increased traffic patterns due to the (much needed) new JWOOD Raw Elementary and I'm sure you are aware of the additional 150+ homes and townhomes (via another variance to original master plan of SF-3 for this area) that were approved to be built above Damonte Ranch High School. Adding traffic from the approved housing, with all cars flowing to the single lane surface road of Rio Wrangler is unsustainable - add another primary school to the mix, and it becomes dangerous. I would invite you to drive to our neighborhood at release time for the schools already in place so you can experience how heavily affected those of us who live here already are. Should there ever be an emergency evacuation, God help us.

In my opinion, there just isn't sufficient infrastructure to accommodate this project and an amendment to the conditional use permit should NOT be approved.

I appreciate your time and thank you for listening to my concerns.

Happy Holidays,

David and Tammi Proulx
tammi.proulx@sbcglobal.net

Sent from my iPhone

Jeff Foster

From: Mike Glock <mglock@dcsnv.com>
Sent: Monday, December 18, 2023 12:09 PM
To: Jeff Foster
Cc: Chuck Poe; Suzy Romero
Subject: Re: Conditional Use Permit for the Life Church

I was just emailed the permit application where they did include a traffic analysis. If you read that, it says the existing condition reaches a level of service (LOS) of F. What the hell, why would we even consider dumping more traffic on Rio Wrangler if the LOS is an "F"?

I'm sure both the City and the County have some culpability in the traffic congestion on Rio Wrangler. Neither agency has addressed the dangerous situation. But yet, you consider further growth with nothing in place to address traffic congestion.

I have to ask, if you already have a LOS of an "F", what do you think is going to happen when you dump another 700 cars on the road. And, that number is a lie as well. Since when is a school only a school. There are sporting events, club meetings, parent meetings, and on and on. Those 700 vehicles mentioned is a joke. It'll be all day long traffic. And keep in mind, those numbers quoted in the traffic study are one-way, and very conservative. If you factor in the two-way and all the other activities that a school conducts, you'll see no less than 2000 each day. And since when is a LOS a C with a 20 minute delay to make a turn.

I'm getting more frustrated as I investigate this further and type this note. We all see the issue, why don't you.

Thanks,
Mike Glock, PE
Cell: (775) 221-1545
mglock@dcsnv.com

On Dec 18, 2023, at 11:41 AM, Mike Glock <mglock@dcsnv.com> wrote:

Hi Jeff, I live in the neighborhood above the Life Church. Our neighbors complained quite vehemently about the proposed Doral Academy school that was proposed for that same corner long before the Life Church was constructed. We were then lied to by the church, saying that there would be minimal impact to us and only on Sundays. Not so. Ever since they opened, they've run a day care facility out of it contributing to a significant amount of traffic in and out of that parking lot onto YeeHaw. And on Sundays, they can't even accommodate the traffic that they generate. At least they try to keep folks from parking on Desert Way, but that doesn't always work.

Personally I understand traffic design very well and have to ask if any traffic analysis has been performed on the impact to Rio Wrangler. The traffic going to and from the high school already overloads the intersection with Steamboat Pkwy every day. As it is, we cannot get into or out of our neighborhood during those drop-off or pick-up times. The church compounds that problem and I guarantee you another school on that corner will do the same.

You probably hear it often, but the intersections on Steamboat Parkway are already overloaded. I routinely experience 5 min to 10 minute delays getting through each intersection on my way home every day. I know, this isn't about Steamboat Pkwy, but your traffic analysis would tell you where these folks are coming from and would tell you that the intersections are already beyond capacity during peak periods. And that also poses a safety concern for emergency services too that can't get through the intersections.

If your intersections are meeting signalization warrants, you should be requiring the developers to install the signals. Nothing has been done to mitigate the congestion and overloaded intersections along Steamboat or Rio Wrangler. I would ask that you try to drive from 580 to Rio Wrangler at 5pm any day and see for yourself the mess that's been created by the growth without addressing the infrastructure of the roadways.

I can talk to you more on this if you'd like, but basically, I object to another school on that lot. And if you do allow it, I would ask that you require a traffic analysis and address the delays at Steamboat and Rio Wrangler, and the ingress/egress to Yee Haw.

Thanks,
Mike Glock, PE
Cell: (775) 221-1545
mglock@dcsnv.com

Jeff Foster

From: Valerie Truce <valerietruce@mac.com>
Sent: Monday, December 18, 2023 1:57 PM
To: Jeff Foster
Subject: Life Church proposal and traffic concerns

Thanks for returning my call today. Here is the list of my concerns for the proposed elementary school relating to traffic:

1. The school zone that ends north McCauley needs to be extended to north of Yee Haw. It's very dangerous to turn south onto Rio Wrangler from Yee Haw during the drop offs and pick ups from Damonte HS, which will be heightened by adding an additional 300+ cars during commuters hours.
2. There is also grave concern for the amount of traffic on Yee Haw before and after worship services. Life Church currently blocks their congregants from entering the parking lot from Rio Wrangler, allowing them to enter only via Yee Haw. Forcing congregants to enter via Yee Haw creates traffic blocks both north and south on Rio Wrangler, but especially hinders neighbors from accessing their homes during any services at Life Church. The church's daycare/preschool are also only allowed to use Yee Haw for drop-offs and pick-ups. Has the city approved of either situation?
3. While the engineers are looking over the site and its impact on traffic, it's also important for them to take a look at Desert Way and the impact of increased traffic. Desert Way's curbs are painted red on the east of the street, but not on the west. Congregants of Life Church will often choose to park on the west side of Desert Way, very near the 90 degree turn our neighborhood uses to access homes via Yee Haw. I have seen more than one near head-on at that corner. Drivers often go too fast and take the turn too sharply, creating an unsafe situation for anyone trying to turn right at the corner of Yee Haw and Desert Way, especially if there is a car parked on the east side of Desert Way very near the turn. Also, there is no place for drivers entering Desert Way to go, without hitting a parked car or a car with passengers.

Thanks for your help. I look forward to seeing appropriate changes to traffic flow to/from Yee Haw and gaining safer access to Rio Wrangler from Yee Haw.

Sincerely,
Valerie Truce
Trail Rider Drive, Reno, Nevad

Jeff Foster

From: Mary Harger <marycjharger@gmail.com>
Sent: Tuesday, December 19, 2023 9:59 AM
To: Jeff Foster
Cc: Mandy Hodach; Erin Brown; Matt Kramer; Gayle Kern
Subject: Life Church- Primary School Opposal

Jeff,

I am writing on behalf of Damonte Ridge HOA to express our opposition to the proposed Life Church Primary School. I am also cc'ing the members of our Board, our Community Manager and General Counsel.

Our community abuts to Rio Wrangler, and all the homes whose backyards face Rio Wrangler will be affected by the additional traffic, specifically the sound.

The section in question is Rio Wrangler northbound between Yeehaw Way and Steamboat Parkway. This section already has significant traffic in the morning during rush hour, as well as during Damonte Ranch High School beginning and end of school.

The issue is the northbound cars approaching the 4-way stop at Rio Wrangler and Steamboat, where they all line up when traffic becomes heavier. These cars come to a complete stop and idle on Rio Wrangler, from the stop sign at Steamboat to more than 3/4 of the way back to Yeehaw. During this time, the noise from these cars in our Homeowners' backyards is unbearable.

If the Life Church Primary School was to be approved, this would create even more traffic stopping along Rio Wrangler, adding to the noise pollution.

Damonte Ridge HOA is adamantly opposed to this project, and asks the City to deny approval.

However, should the City choose to move forward despite the concerns, Damonte Ridge HOA demands the City require a concession from Life Church (or whoever is the developer) to pay for the installation of a soundproof wall along Yeehaw Way and the section of Rio Wrangler discussed above, to mitigate the noise pollution created with the additional traffic.

We truly appreciate your consideration, and can make ourselves available to meet to discuss matters further.

Many thanks,
Mary Harger
Damonte Ridge HOA
President
214-280-7384

Jeff Foster

From: crp161@aol.com
Sent: Tuesday, December 19, 2023 11:04 AM
To: Jeff Foster
Subject: Conditional Use Permit for Life Church Primary School

Jeff Foster

Thank you for taking the time to talk to me on the phone and for sending me the application submitted by Life Church. From talking with you and reading the application, I understand Life Church wants to build a K-8 primary school on their existing grounds located east of Rio Wrangler Parkway, north of McCauley Ranch Blvd. and south of Yee Haw Way.

As a resident in the residential tract adjacent to this parcel, I am very much opposed to this proposal. It is my opinion that until engineering changes are made on both Rio Wrangler and Yee Haw Way, this added traffic will be unacceptable for us residents trying to exit and enter our tracts. It is already a problem that needs to be addressed.

Currently, with the tremendous influx of homes and high-density units in our area, traffic has become an issue. When we add to this the traffic from Damonte Ranch High School in the morning, lunch time and afternoon it becomes nearly impossible for us to enter or exit our tract as there is no form of traffic control on Rio Wrangler at Yee Haw, our exit point. Traffic on Rio Wrangler comes to a standstill every day during these times. The very last thing us residents need until this issue is addressed is the 200-300 more cars this school will add every day to the already existing problem.

I am not a traffic engineer, but I do have some experience in this area. In my opinion there are several ways to address this issue.

- 1 - Rio Wrangler needs to be expanded from its existing 2 lanes to 4 lanes from Steamboat to south of the high school, where it already becomes 4 lanes all the way to Veterans Parkway.
- 2 - A traffic signal needs to be installed at the intersection of Rio Wrangler and Steamboat.
- 3 - The exit from the Life Church parking lot that is at Yee Haw and Desert Way needs to become an emergency exit only.
- 4 - The intersection of Yee Haw and Rio Wrangler needs some form of traffic control during the morning and afternoon school traffic.

Until this issue is addressed and corrected this application needs to be denied.

Thank you,

Charles Poe
10025 Barrel Racer Dr
Reno, NV 89521

775-721-4556
crp161@aol.com

Jeff Foster

From: Debra Y. <debyates1000@gmail.com>
Sent: Tuesday, December 19, 2023 2:09 PM
To: Jeff Foster
Subject: Re: MUP24-00012 LifeChurch Primary School

Hi Jeff,

Thank you for sending the information and traffic study related to the Proposed Private Elementary School planned on the property adjacent to my home. My reading of the reports appears that the City/staff is giving the project the Green Light. I previously expressed my opposition via phone message and our phone call. Below is my official statement of opposition.

First, the City previously denied Doral Academy to build an elementary school on this property. Citizens came out in record numbers to oppose the project. Instead, the property was purchased by Life Church who built their facilities. This seemed like a compromise. However, now LifeChurch wants to build a School. Those conditions and concerns that existed in 2017 have not lessened and only grown greater. The direct impact of traffic on Rio Wrangler road has grown dramatically since 2017. Since this time Damonte Ranch High School expanded their student capacity thus traffic impact after building a new facility on the campus. Washoe County School District has added J Wood Raw Elementary school, also dumping significant traffic onto Rio Wrangler and ancillary streets. Many Lennar Homes now appear on the eastern slope of the hill (with more to come) who also utilize the same access roads as proposed for the school. Toll Brothers Caramella Ranch subdivision is near built out adding over a thousand homes and corresponding traffic, Toll Brothers Saddle Ridge completed their build out, increasing traffic directly on Rio Wrangler. Toll Brothers Regency & Precido, HARVEST apartments, and build out of 100's of townhomes across from Harvest next to the park, while not directly on Rio Wrangler, it does clog Steamboat and impacts Rio Wrangler. It is easy to look myopically at just this one project, but in totality there has been dramatic and at most times unmanageable traffic on Rio Wrangler as a result of all the other projects approved - which in turn impact ancillary roads.

Second, stating that all will be good simply because the Church will adjust its start times is flawed. J Wood Raw School start time of 9:00 am and 3:00 dismissal already causes peak traffic times and noise to be extended, compounding the already crazy Damonte High School traffic jams, adding Life Church School to this time frame simply makes a terrible condition worse. Also, don't forget the impact of staff driving to and from work - this typically starts an hour or so before and after start times. All of the proposed NEW students will most likely be transported by single cars as opposed to Damonte High and J Wood Raw where many ride buses to school.

Third, It is frustrating that NOW the church comes back with a different proposal. I suspect that if the Community thought the Church was going to come back for another "bite at the apple" later that included a 400 student school - there would have been GREAT opposition to the original Church plans. Make them adhere to the original plan.

When I look at the various maps related to roads I also see where there may be plans to extend Rio Wrangler towards Mira Loma. What will the traffic impacts be if something like that happens? Is this being factored into the "traffic studies" or again tunnel vision on just this one more project?

I have lived in my home for almost 10 years now and when I moved out here the range horses roamed freely, much of the land was full of cattle grazing, with open space and manageable traffic. Quality of life is now dramatically eroded, as it relates to traffic, noise, crime, congestion, ACCIDENTS, pedestrian & cyclists injuries and death, and insane levels of horse deaths by car, breaks my heart. When will enough GROWTH - be enough? It sure doesn't feel like there are any BRAKES on the erosion of quality of life for the Damonte Ranch Community. Additionally, I see no noticeable increase of Police presence. People run stop signs freely, frequently do not heed flashing yellow lights, hit bicyclists, and speed

excessively. Speed limits seem only optional when there is no enforcement. Only after there is a serious accident do I see Police presence and then only for maybe an hour or so for the day! The next day all the insanity starts again! I have lost count of the number of "close calls" I have had over the past years. Scary!

I urge the Council to reject this proposal for the same reasons they did for the 2017 Doral Academy. My recollection of when Doral was proposing a school was 500 students (not the 900 I was recently told) and this proposed 400 students school and traffic impact will be no better than proposed in 2017- except much worse due to all the other developments/traffic that have been added since 2017.

Thank You for your service to the citizens of Damonte Ranch.

Sincerely,
Debra Yates
10155 Burghley Ct
Reno, NV

On Mon, Dec 11, 2023 at 11:26 AM Jeff Foster <FosterJ@reno.gov> wrote:

Deb,

Following up on our conversation, please find attached the application submitted by LifeChurch for a proposed K-8 school on the existing 10-acre site. In order to shrink the file size to one that the email system would allow to be emailed, I removed the drainage study and sanitary sewer reports, figuring those would likely not be important like the traffic study is. The full file is almost 56 MB (too big to email) and this reduced file without those two studies is 29 MB. If you would like those studies separately, just let me know.

Jeffrey A. Foster



Associate Planner

Development Services Department

775.393.4165 (o) or 775.399.5153 (c)

fosterj@reno.gov

1 E. First St., Reno, NV 89505

Reno.Gov

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

Jeff Foster

From: Suzy Romero <suzy@romeroinc.com>
Sent: Tuesday, December 19, 2023 4:03 PM
To: Jeff Foster; Naomi Duerr
Subject: OPPOSE LIFE CHURCH SCHOOL

Hi Jeff, Naomi, and those who are considering the Life Church School expansion,

We strongly oppose the construction of the school at Life Church because of the substantial safety hazards that the increased traffic would create.

We have lived above Damonte Ranch High School the past 6.5 years and in that time, Rio Wrangler Parkway has become increasingly inundated with school traffic. Whether you are exiting the high school or coming off Yee Haw Way, there are too many cars on Rio Wrangler, especially with only one lane each direction. As it is, we wait at least 5-8 minutes in a calm fashion to get from Yee Haw to Steamboat on Rio Wrangler in the morning and afternoons.

Quite frankly though, the congestion during drop-off and pick up times is my least concern. Considering that the jam-packed roads can barely accommodate the current traffic conditions, what would happen in a true emergency such as a school shooter, fire, earthquake, etc.? I could not imagine the frenzy of having the panicked parents of both Life Church's and Damonte Ranch High School's students trying to get in and out of the area. Emergency services would not be able to get through and residents in the area would not be able to evacuate safely. It would be absolute chaos.

This entire area needs to be revisited with an updated, independent traffic analysis.

The permit application that was drawn, with the original traffic analysis, says the existing condition reaches a level of service of an "F." Why would another school permit even be considered or allowed? Since then, there has been another school built and many high-density developments in the area, which cannot handle this dangerous situation. I could not imagine another 500-700 vehicles on Rio Wrangler at any given time, especially during an emergency. I know they say they will modify the pickup and drop off times, but that is not the largest concern. Safety for everyone in the community is the number one concern and adding another school in this location is not acceptable.

Warmest Regards,

Suzy Romero

Gary Romero, Inc.
Romero Door & Hardware
(775) 824-0687

Our office will be closed on Monday 12/25 for Christmas and Monday 1/1 for New Years. Happy Holidays!

Jeff Foster

From: Philip Klink <pkklink@gmail.com>
Sent: Thursday, December 21, 2023 8:37 AM
To: Jeff Foster
Subject: MUP24-00012 LifeChurch School application

Hello Jeff,

I am writing to express my deep concern and disapproval regarding the application and approval for construction of a 44,000 sq. ft. school on Yee Haw and Desert Way. A former application for a school at this location was denied. There were good reasons for that denial. Traffic and safety issues have only increased since that denial for the Doral Academy. I have been a resident of 10130 Burghley Ct for 17 years and purchased this home in the knowledge that no development other than residential would be permitted behind me.

The school and traffic it would generate are totally incompatible and unwelcome in this neighborhood. Please do not approve the zoning change or the permit to build a school or any other major traffic driven project in this neighborhood. Please consider the negative effect this project would have on the safety and livability of existing residents.

Thank you in advance for taking into consideration the effect this project would have not only on the existing residence but also the children who would be exposed to greater jeopardy should this project go forward.

Respectfully submitted,

Philip Klink & Kathy Wilson
10130 Burghley Ct

Jeff Foster

From: dburns rocketwireless.com <dburns@rocketwireless.com>
Sent: Thursday, December 21, 2023 11:06 AM
To: Jeff Foster
Cc: naomi@votenaomi.com
Subject: FW: MUP24-00012 LifeChurch Primary School

Jeff – my name is David Burns and I live in Damonte Ridge. I want to add my outrage to the facts delineated by Deb Yates below. It is outrageous and incredulous that the city would consider approving this school. As Debra said, the development all around us over the past 8 years THAT I have lived here has degraded substantially our quality of life. The traffic, the noise the impeding of views, and in particular, the increasing death of horses recently is HORRENDOUS! It may be easy for you because you do not live here but if you did, you would NEVER approve such a project. The out-of control development in this area is unconscionable and we demand that this project be stopped. It was rejected some 8 years ago BEFORE all of the recent development. So now it is that much more important to stop it again for the residents of the area. I do not think you want to be part of a legacy that is ruining what once was such a beautiful and open area. STOP THIS PROJECT!

From: FriendsofDamonteRidge <friendsofdamonteridge@gmail.com>
Sent: Wednesday, December 20, 2023 10:31 PM
Subject: Fwd: MUP24-00012 LifeChurch Primary School

Friends of Damonte Ridge,

Debra Yates sent me information about a proposal to build a new school for 400 students at the Life Church just south of our development. This development will increase traffic on Dessert Way, Yee Haw way and Rio Wrangler and Steamboat.

Feel free to review the information below.

You can contact Debra Yates if you would like more information. debyates1000@gmail.com

Tom Fitzgerald

 LifeChurch Application- School 2023.pdf

Here is the Application submitted to the City, staff comments and traffic study.

On Tue, Dec 19, 2023 at 2:26 PM Debra Y. <debyates1000@gmail.com> wrote:

Hi FriendsofDamonteRidge, Some may or may not know that the Life Church facility is proposing an almost 400 student school on the Church campus at the end of our subdivision. Here is a copy of the letter I recently wrote to the City in opposition to the project. If you feel appropriate to share with other Damonte Ranch Homeowners - that would be great. My understanding is the City Council will be voting on this just after Christmas. The 27th or 29th??? Important that homeowners in opposition get comments into the City soon. Thank You!

----- Forwarded message -----

From: Debra Y. <debyates1000@gmail.com>
Date: Tue, Dec 19, 2023 at 2:08 PM

Jeff Foster

From: Kate&Bill Tolles <tolles2018@gmail.com>
Sent: Thursday, December 21, 2023 10:31 PM
To: Mayor; Devon Reese; Jenny Brekhus; Naomi Duerr; Miguel Martinez; Meghan Ebert; Kathleen Taylor; Jeff Foster
Subject: Case #MUP24-00012 LifeChurch Primary School

Reno City Council/ City Planner,

I would like to register my concerns with the proposed building/expansion of the LifeChurch Primary School. Based on the published information, this will be a private school for 350+ students K-8. This means that parents will be dropping off/picking up their students throughout the entire school year. The proposed entrance and exit are off of McCauley Ranch Road, just east of the intersection with Rio Wrangler Rd and immediately across from Damante Ranch HS.

My primary concern here is traffic. LifeChurch is surrounded by three roads, McCauley Ranch Road, Yee Haw Way, and Rio Wrangler Rd. All of these are one-lane roads. Rio Wrangler and McCauley Ranch currently get backed up with traffic significantly during the workweek due just to the High School. Adding another school will significantly exacerbate the situation. Rio Wrangler from Western Skies north to Steamboat were just not designed for this level of traffic

Yee Haw and McCauley Ranch are the only entrances to the Damonte Foothills housing development. Compound this with the pending additional development of housing behind (east) of Damonte Foothills, again with only YeeHaw and McCauley as the primary access and these streets will become impossible to navigate during the work week. Bring in pedestrians and school children and the regular appearance of wild horses and we have all the elements for frequent major traffic incidents and fatalities.

Consequently, the traffic issue should be enough to put a halt to the building of a primary school on the LifeChurch property. It should also be noted that a major portion of the proposed site is currently single-family residential, not a school zone.

My apologies for the last minute submission of my concerns. But it is due to the short turn around of when this proposal was publicly posted at the entrance to the development and the City Council meeting. Barely 30 days during the busy holiday season. I would also add that for every person registering a concern with the City, I am confident that there are many, many more who have the same or similar concerns but have not had the time to submit to you. Or, frankly, they may feel it would fall on deaf ears. Please prove them wrong.

Thank you for your time and consideration of my concerns.

Respectfully,
Catherine Tolles
Damonte Ranch resident

Jeff Foster

From: em <kuemily@yahoo.com>
Sent: Friday, December 22, 2023 11:45 AM
To: Jeff Foster
Subject: Recent Planning for a new school by Life Church

Good Morning Jeff,

I live in the neighborhood above the Life church. Recently I heard our city is planning for another school near by us, Doral Academy?

You might have heard lots of complains regarding our bad traffics especially in the morning and when they are out. Although only certain time periods of the day affect our traffic load but if there is any emergency it could be a disaster, especially Rio Wrangler is a near our area is not a wide street and we have only one exit there for our community.

Please reconsider not to have another school for the safety of our neighborhood as well the children and their parents when travel to this area for schooling.

Sincerely,
P. Emily Ku
530-563-6267

Jeff Foster

From: Scot Sherman <scotsherman@hotmail.com>
Sent: Friday, December 22, 2023 1:34 PM
To: Jeff Foster
Cc: marne sherman
Subject: RE: Re: LifeChurch Primary School

Hi Jeff,

My wife made a very good point regarding the impact the school will have on Desert Way. With 365 students at this new school parents will be using Desert Way as a parking lot to pick up their children and Desert Way simply is not wide enough to handle cars parked along it. The Church already puts out 'Do not park' signs on Sunday to stop church goers from parking on that street. With cars parked on that street it will make that blind corner a danger to everyone driving that street along with a high likely of a head on collision or a child getting hit. The City will need to paint those curbs red and make it illegal to park on that street.

Best Regards,
Scot

From: Scot Sherman
Sent: Friday, December 22, 2023 12:33 PM
To: fosterj@reno.gov
Cc: marne sherman <gingerblossoms1@yahoo.com>
Subject: Re: LifeChurch Primary School

Good afternoon Jeff,

Thank you for taking the time out of your busy schedule to talk with me regarding the proposed LifeChurch Primary School project.

As discussed over the phone my biggest concern is with traffic in the area. With the proposed new LifeChurch school that will make 3 major schools in the area (JWood Raw Elementary School, Damante Ranch High School, & The LifChurch Primary School) while the City of Reno has done nothing to improve the infrastructure in the area. The LifeChurch will prolong the time of traffic on Rio Wrangler Parkway even longer both in the morning hours and afternoon. I understand that the City plans on putting in a round about at the intersection of Rio Wrangler Parkway and McCauley Ranch Blvd., but that will not address the congestion on Rio Wrangler itself or the major issues that already exist at the intersection of Rio Wrangler Parkway and Yee Haw Way. Even though Yee Haw Way would not be the primary exit for the LifeChurch school parents are sure to use that exit to bypass the traffic at McCauley Ranch Blvd. As it is everyone who leaves during these peak times take their lives in their hands trying to get out of Yee Haw Way, including my son. I would consider this intersection to be a major concern and add yet adding another school to the area will not improve the situation.

My stance on the LifeChurch project is that if the city is not planning on improving the intersection of Rio Wrangler Parkway and Yee Haw Way in addition to addressing the traffic jam on Rio Wrangler Parkway then I am 100% against the new school. However, if the City plans on improving the intersection of Rio Wrangler Parkway and Yee Haw Way and somehow addressing the traffic jam on Rio Wrangler by either widening it or improving the intersection at Steam Boat and Rio Wrangle Parkway then I am ok with the new school project. The City must realize that if they approve projects such as these without taking into consideration things such as traffic then they take on the responsibility / liability if something does occur. i.e.: A major accident or an emergency where residents and students alike can't leave the area in a timely manner. Almost every day I see potential accidents at this intersection as drivers on Rio Wrangler don't stop to

let you in. (Every once in awhile you get a nice citizen that will let you in). You just need to go for it and hope beyond all hope they will stop.

Best Regards,
Scot Sherman
775-846-2178

Jeff Foster

From: City of Reno <reno@enotify.visioninternet.com>
Sent: Sunday, December 10, 2023 10:31 AM
To: Jeff Foster
Subject: justmandym@gmail.com

Message submitted from the <City of Reno> website.

Site Visitor Name: Mandy Hodach
Site Visitor Email: justmandym@gmail.com

Hello Jeff,

I am writing in regard to the potential rezoning of the area for Life Church to build a school. As an educator I understand the need for additional private faith based schools in the Reno area. Unfortunately, I am voicing my non-support of building a school in that particular location. I live in the Damonte Ridge neighborhood, and my home backs up to Rio Wrangler. The amount of noise and traffic and speeding cars that go by one a two lane road behind my home every single day is just already too much. To add a school to an already congested and loud area where homes are is just not fair to those of us who live here.

Thank you for your time,
Mandy Hodach
2650 Friesian Court

Jeff Foster

From: thecoverts@charter.net
Sent: Monday, December 11, 2023 3:33 PM
To: Jeff Foster
Subject: Life Church School

Hello Jeff

I would like to know why this will not go to the Planning Commission or Council unless appealed? In the original approval in 2015 there was never a mention of a school. Since Life Church is now adding that, why would that not be something that should be reviewed because of the traffic impact to the community?

The traffic study says that Rio Wrangler and McCauley would be classified E or F without a 3 way stop sign. Would not the City and RTC be involved in deciding if that road can have a stop sign at that location. The traffic is horrendous now and this is just going to add to the mess. And the city has approved more houses above the newly completed Lennar project above the high school. That is the main concern. With the new elementary school just opened it is even more of a mess.

What would be the timing and process to appeal so that Council and Planning at least know what is going on in our area?

Best,

Judy Covert
10105 Gold Mine Drive
775-772-0749

Jeff Foster

From: thecoverts@charter.net
Sent: Tuesday, December 19, 2023 9:45 AM
To: Jeff Foster
Cc: Naomi Duerr; Jenny Brekhus; Hillary Schieve
Subject: MUP24-00012 LifeChurch Primary School (Opposed)

Dear Jeff,

My husband and I have lived in Golden Hills for over 11 years and we know and experience every day what has happened to traffic here. It is not only during the week days but there are many other activities during the evening and weekends at the two existing schools. We oppose Life Church school proposal because of the increased traffic issues we currently have with the new J Wood Raw school on Rio Wrangler, as well as the increased traffic generated by Damonte Ranch High School, plus all the new homes in the entire Damonte area.

The traffic study done by LifeChurch is outdated and still says E or F LOS rating at McCauley Ranch and Rio Wrangler. It suggested the only way to alleviate that intersection rating is a 3 way stop. I cannot imagine how bad that will be for existing traffic if RTC would approve such a suggestion. We tried to get the school yellow blinking light zone extended so we could get out on Rio Wrangler with all the traffic, and they wouldn't even do that.

This decision needs to be based on current home levels not from 2015 when the Church received the SUP. I would like to know how many houses and condo approvals have been approved and not been built yet, plus all the homes built in this entire area since the SUP which does not include any wording of a school building.

I drove down McCauley Ranch Blvd this weekend. Strangely enough that road from the roundabout to Rio Wrangler has recently been re-paved with two right turn lanes turning north onto Rio Wrangler? Even if there is a 3 way stop there how are two cars going to be able to turn onto a one lane road at the same time? And did the city suddenly decide to pave that street? There are many other streets in Damonte Ranch that are in dire need of repaving. McCauley had nothing wrong with it.

Please flag my email address so we know when the decision is made.

Thank you for your time and consideration.

Sincerely,

Judy and Jim Covert
10105 Gold Mine Drive
Reno, NV 89521

From: thecoverts@charter.net
To: [Jeff Foster](#)
Cc: [Naomi Duerr](#)
Subject: Comments for Life Church Primary School MUP24100012
Date: Monday, March 4, 2024 1:53:29 PM

Date: March 4, 2024
To: Jeff Foster, Associate Planner, City of Reno
From: Judy Covert

Re: Comments to MUP24-00012 Life Church Primary School

Jeff, thank you for all your assistance with my previous questions.

In the November 21, 2023 Project Description prepared by Wood Rodgers, the exact parcel the school building will be built on is zoned residential SF3. According to their Project Request page 2 of 11 ‘ “School, Primary” is permitted in the SF-3 zoning district with approval of a Minor Conditional Use Permit.’ I believe this is a dangerous precedent for any future city developments that want to easily change zoning. Why isn’t this required to go through a normal rezoning request not a MUP?

Below are my comments regarding Wood Rodgers response to Staff Comments dated February 19, 2024.

Planning Comments:

- #2. What is the total number of students including Kidslife, Phase 1A, Phase 1B. The 240 total number of students does not appear to include the Kidslife of 120 mentioned on page 1 of 11 under Project Background but the Traffic Study Table 4 says 360 students on page 6 of 15. The Kidslife max student population on that table says 20. These numbers need to be verified.
- #6. A photometric plan needs to be done before any city decision. The school will back up to residential homes.
- #13. Additional note from Wood Rogers: “Due to rising construction costs and the church’s reliance on fundraising, they MAY utilize portable units in lieu of the building, either temporarily **or permanently**. Please verify the original SUP was for a school building with no mention of portable buildings on a SF3 parcel.

Engineering/Public Works Comments:

- #2. A completely new Traffic Study needs to be done by RTC to be sure the information provided by Headway Transportation is accurate for current information and will be approved by RTC.

When was the referenced November 21, 2023 study actually completed? It references 8 Tables and 8 Figures. There are no Figures included in the 15 page document provided with the MUP request. Does the Traffic Study include The Canyons, Canyons Edge? If so are they a part of the six 40-acre parcels above Claim Jumper and to the south. One (145-010-06) has been approved for 75% SF3 and 25% PGOS so that’s another 90 homes. DPII for 80 condos. The others are HDR and UT 40 and at some point, will most likely be asking for zoning changes to residential. All land that will be developed in the future should be included as the only way for those properties to eventually exit to Rio Wrangler is i.e. via Trail Rider to YeeHaw, McCauley Ranch Blvd, and Stanley to Western Skies. (The referenced project names and parcels have had name and housing numbers have changed and been revised over the last few years so it is very confusing). Is the new JWood Raw Elementary school, opened last August south of the Damonte High School, traffic included in this Traffic Study?

In addition, Sunny Hills Ranchos now owns the remaining Bella Vista parcels, and a request has been made to the City of Reno for an amendment to the Bella Vista Ranch Phase II Planned Unit Development (PUD) handbook to:..... a) increase the maximum dwelling units from ±575 units to ±609 units. This will increase the number of homes plus they will be completing Rio Wrangler from South Meadows to Steamboat Parkway. If I remember, RTC proposed a roundabout at Steamboat and Rio Wrangler when Rio Wrangler was completed to South Meadows. This, and the proposed roundabout at McCauley and Rio Wrangler, should be verified by RTC.

7. The east side of the entire curb on Desert Way needs to be painted red because there should be no parking. The church currently puts out no parking signs along the first parcel north of church on Sundays, but people still park farther up, and cars proceed in both directions when a car is parked along the east curb.

There is also a problem with Kidliflife parents rushing in and out of the church entrance on YeeHaw. They often do not stop at the church stop sign exiting from the church and turning in front of cars on Yee Haw that turn left onto Desert Way.

Judy and Jim Covert
10105 Gold Mine Drive
Reno, NV 89521

Jeff Foster

From: Colt Stewart <coltstewart46@gmail.com>
Sent: Monday, December 18, 2023 4:08 PM
To: Jeff Foster
Cc: Naomi Duerr; Jenny Brekhus; Hillary Schieve
Subject: MUP24-00012 LifeChurch Primary School (Opposed)

Dear Jeff,

Thank you for the application and reports referenced in this proceeding.

My wife And I have reviewed the material and wish to state, for the record, our opposition.

First of all there has been no effort by the Church to inform or involve the community. The fact that the Church filed on November 22 for an expedited 30 day review right during the most sacred Christian and Jewish holidays of the year is proof positive that the Church wants to put one over on you and the Golden Hills community. This is disgraceful.

Secondly, the Traffic Volumes analysis does NOT factor in the brand new Nix Toulyakidas Elementary School daily traffic at exactly the times we are concerned with.

Thirdly, the Crash History studied NDOT data which ended on December 31st 2020. That data is now four years out of date. Shame on those who failed to get the updated RPD data for all Veterans, Rio Wrangler, Damonte Ranch and Steamboat Parkways Incidents and accidents.

The population of the Golden Hills/Palisades and Caramella Ranch Developments has increased significantly since the end of 2020. How many horses have been killed this year alone as speed limits are ignored?

To say that such oversights by your professionals is merely incomplete is an understatement. It is downright prejudicial and incompetent.

Emergencies.

Elizabeth and I are 7 and a half year residents of this area. We know how difficult it is to get out of Hee Haw left or right onto Rio Wrangler. During the am, noon and afternoon school rush hours. We can avoid those times except during any emergency. Any emergency such as a medical emergency, fire, earthquake, school shooter, power failure, water main break, storm damage, etc would turn the already clogged streets into a disaster area.

Please deny this MUP.

Regards,

Coulter H & Elizabeth J Stewart
10045 Barrel Racer Drive

Sent from my iPad

Friday, March 1, 2024

Subject: MUP24-00012 Life Church Primary School

To: Jeff Foster, Reno City Planning

The following comments are a collection from several families in the existing Golden Hills Community which will have to live with and bear the brunt of the safety, security and hazardous conditions resulting from this ill advised project.

First: Seven years ago this exact same type of project was proposed, examined, evaluated and rejected by the community and the City of Reno when the Golden Hills community was one half the size it is now. That project, The Doral School, is now located on the Mt. Rose Highway, a much smarter location with four lane access.

Second: Limited Notification, to wit:

1. The applicant made NO effort to notify or involve the 500 households in the Golden Hills area, or any of the immediate communities adjacent to the proposed site prior to submittal and at no time since.
2. During the Christmas-Thanksgiving Holidays City Planning Staff posted 3 yellow signs at locations with no or severely limited safe parking so we could stop, get out and review the details of this proposal, easily.
3. The original decision on this application was slated for December 22, when many of us are away or otherwise involved in either Christmas or Chanukah activities.

Third: Public Safety & Traffic:

1. Rio Wrangler Parkway is a one lane road from Western Skies Drive, at the South end of the Damonte Ranch high School Sports fields, all the way north, through the proposed new school project area, to its present terminus at the intersection with Mira Loma Road. Two existing four lane Parkways, Steamboat and Rio Wrangler, south of Western Skies feed into this constriction. An additional 6 one lane roads also feed into this

- constricted section of Rio Wrangler, carrying commuters, students, parents, from several local neighborhoods and semis filled with rock, dirt and gravel from the, nearby, open pit Rhyolite Mine throughout the day.
2. For the reasons described above the Level of Service (LOS) here is already rated and “F” at several times of the morning and afternoon all week long.
 3. The RTC safety study data is out of date and does not include up to date crash data from the Reno Police Department for the surrounding relevant high school, and other public elementary and intermediate school commuting traffic area.
 4. It is clear, from the Staff and Rodgers and Wood responses to community concerns, that this project is not considered a neighborhood school. They state openly that the students and vehicle trips will be coming from elsewhere. They grossly misstate the number of vehicular trips their project will generate daily. They claim 700 trips daily. We know that any school generates at least triple this number with extracurricular activities throughout the week. Thus the actual number will be in the range of 2,000 daily trips .
 5. Four Lanes Required. To accommodate this level of added activity as well as for the as yet un-acknowledged hundreds of additional homes already permitted for the Dolan properties and Cyan 2 and Buena Vista 2, east and north of the Golden Hills Community, Rio Wrangler needs to be expanded to four lanes NOW, rather at some undetermined point in the future. This needs to include proper traffic control signals and signage at Steamboat Parkway and from Western Skies to Steamboat Parkway. Sooner rather than later, the Bridge from Mira Loma to South Meadows Parkway will need to be completed.
 6. Until the 4 lane segment of Rio Wrangler from Western Skies to Steamboat Parkway is completed there will be severely restricted emergency vehicle access to the Golden Hills Community throughout the week.

In Summary: This proposed school is a dangerous idea for this location without expensive and lengthy infrastructure development along Rio Wrangler Parkway. The flimsy mitigation measures proposed by Staff and Rodgers & Woods are simply inadequate to even accommodate the needs of the existing communities and traffic let alone future development.

Please decline to allow this project.

Regards,

Coulter and Elizabeth Stewart

Barrel Racer Dr. Reno, NV

Jeff Foster

From: City of Reno <reno@enotify.visioninternet.com>
Sent: Thursday, December 21, 2023 2:03 PM
To: Jeff Foster
Subject: LifeChurch change in zoning for proposed primary school

Message submitted from the <City of Reno> website.

Site Visitor Name: Peggy Spence
Site Visitor Email: survivingreno@gmail.com

These are my concerns:

- Damonte Ranch HS was here prior to the housing development. It was a known factor when purchasing property here.
- High school services all 9th through 12th graders in the greater neighborhood.
- The property on the corner of McCauley Ranch and Rio Wrangler Parkway was originally zoned as residential. Never intended for business use with the expectation of traffic flow with this narrow corridor.
- The church was built after the housing development.
- The church traffic impacts the neighborhood on the weekends and with occasional special events.
- The addition of the daycare is a business. The traffic to the daycare impacts the commute traffic from the neighborhood during the weekday mornings.
- The proposed primary school is also a business.
- The students at the proposed private school will have to arrive by private vehicle. This will have a significant impact to traffic at similar hours to the high school and commute traffic from the neighborhood.
- The proposed school will inevitably host after hours events for their school community, which would add additional impact to the neighbor.
- The main street servicing the existing church property, Rio Wrangler Parkway, is only one lane each way.
- The street to the north of the church property, Yee Haw Way, is a very narrow street with lots of traffic in the morning.
- The street to the south of the church, McCauley Ranch Road, already has a high volume of traffic from the high school and commuters exiting the existing neighborhood.
- The need to access the proposed school property will require left hand turns that will further negatively impact the existing traffic in the area.
- We have a convalescent care facility on the corner of Trail Rider Drive and Gold Mine Drive. Emergency care vehicles would be severely challenged to reach the person in need.
- These same issues that prohibited the zoning of Doral Academy on Desert Way.

December 21, 2023

Dear Jeff Foster,

I am writing in regard to the proposed addition of a primary school at the LifeChurch property on Rio Wrangler Parkway. First of all, one public notice sign was posted on McCauley Ranch Road the beginning of December. The second public notice sign on Rio Wrangler Parkway was only posted the week of December 18th. Many of the neighbors in the were unaware of the proposed project. Between the lack of notice posted and the impending holidays, you may not receive feedback from the people of the neighborhood who will be impacted by this proposed change.

These are my concerns:

- Damonte Ranch HS was here prior to the housing development. It was a known factor when purchasing property here.
- High school services all 9th through 12th graders in the greater neighborhood.
- The property on the corner of McCauley Ranch and Rio Wrangler Parkway was originally zoned as residential. Never intended for business use with the expectation of traffic flow with this narrow corridor.
- This property was donated to the church by the original owner.
- The church was built after the housing development. The homeowners were not aware there would be a change in zoning that would permit this.
- The church traffic impacts the neighborhood on the weekends and with occasional special events.
- The addition of the daycare is a business. The traffic to the daycare impacts the commute traffic from the neighborhood during the weekday mornings.
- The proposed primary school is also a business. They will service students who have the ability to pay tuition and pass their registration requirements. It is not a neighborhood learning facility.
- The students at the proposed private school will have to arrive by private vehicle. There will be no bus service for private school students. This will have a significant impact to traffic at similar hours to the high school and commute traffic from the neighborhood.
- The proposed school will inevitably host after hours events for their school community, which would add additional impact to the neighbor.
- We are already impacted by the traffic from the existing evening events at the high school.
- The main street servicing the existing church property, Rio Wrangler Parkway, is only one lane each way.
- The street to the north of the church property, Yee Haw Way, is a very narrow street with lots of traffic in the morning.
- The street to the south of the church, McCauley Ranch Road, already has a high volume of traffic from the high school and commuters exiting the existing neighborhood.
- The need to access the proposed school property will require left hand turns that will further negatively impact the existing traffic in the area.

- We also have a convalescent care facility on the corner of Trail Rider Drive and Gold Mine Drive. Emergency care vehicles would be severely challenged to reach the person in need with the additional traffic created by the proposed school.
- The same issues that prohibited the zoning of the proposed Doral Academy on Desert Way are the same issues that this proposed primary school would create.

I did see that there was a tripod set up this Wednesday (12/20) on Rio Wrangler Parkway with a device to record the traffic patterns on Rio Wrangler Parkway. However, this is finals week at the high school and the traffic to school is dramatically reduced during the finals. This would not provide you with an actual vision of the traffic in this area during the regular school session.

I hope the City of Reno will be more reflective of the negative impact this proposed change in zoning will have on the neighbors in the Damonte Ranch Highlands development.

Sincerely,



Peggy Spence

10104 Gold Mine Dr.
Reno, NV. 89521
775-851-7563
survivingreno@gmail.com

Jeff Foster

From: Jeff Foster
Sent: Monday, December 11, 2023 1:49 PM
To: Todd Landry; David Hutchinson
Subject: FW: MUP24-00012 (Life Church Primary School)

Follow Up Flag: Follow up
Flag Status: Flagged

More traffic/parking-specific concerns.



Jeffrey A. Foster

Associate Planner
Development Services Department
775.393.4165 (o) or 775.399.5153 (c)
fosterj@reno.gov
1 E. First St., Reno, NV 89505

[Reno.Gov](https://www.reno.gov)

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

From: Peter Dube <pete@thedubegroup.com>
Sent: Monday, December 11, 2023 1:28 PM
To: Jeff Foster <FosterJ@reno.gov>
Subject: RE: MUP24-00012 (Life Church Primary School)

Thanks for your comments and explanation. I shared this information on NextDoor as this proposed expansion has triggered over 100 comments last time I checked, mostly related to anger at the explosive growth and increased traffic related to apartment complexes.

For me personally, I have communicated my concerns to the City for years over increased traffic loads on Desert Way. Two tight turns (Yee Haw and Trail Rider) – it is only time before an emergency traps people. I complained when the entirety of Desert Way wasn't painted red (no parking) but when I called Planning, I was told the width of the street allowed parking on one side. Thankfully, the Church has recognized the danger and actually erects pylons along my frontage, which does make a difference. The City needs to ban street parking along the entirety of Desert Way (and Yee Haw) as part of the approval process.

Anyway, thanks again.

Dubé Group Architecture

PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001

c | 775.315.9014

*****Please note new mailing address*****

From: Jeff Foster [<mailto:FosterJ@reno.gov>]
Sent: Monday, December 11, 2023 8:44 AM
To: Peter Dube <pete@thedubegroup.com>
Subject: RE: MUP24-00012 (Life Church Primary School)

Peter,

Thank you for your emails. Correct, the school was not part of the 2015 approval. The Title 18 zoning code allowable process for this proposed use is a Minor Conditional Use Permit (MUP). According to Table 18.03.206, "School, Primary" is permitted in the SF-3 zoning district with approval of a MUP. In addition, the project triggers a Site Plan Review for development of a primary school adjacent to residentially zoned property (RMC 18.08.602(b)(2)(d)). Both applications can be combined in a MUP, so that is the current application. The previous SUP approval will be amended to reflect the change in direction such that one or both previously approved but unbuilt components may be removed from the approval.

Please let me know if you have any further questions.

I will flag your communication to send a copy of the decision letter.



Jeffrey A. Foster

Associate Planner
Development Services Department
775.393.4165 (o) or 775.399.5153 (c)
fosterj@reno.gov
1 E. First St., Reno, NV 89505

Reno.Gov

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

From: Peter Dube <pete@thedubegroup.com>
Sent: Sunday, December 10, 2023 7:43 AM
To: Jeff Foster <FosterJ@reno.gov>
Subject: RE: MUP24-00012 (Life Church Primary School)

Hi Jeff, I found the application online so understand the scope. My concern is how they get to vary from the SUP which doesn't mentions schools...

Dubé Group Architecture

PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001

c | 775.315.9014

*****Please note new mailing address*****

From: Peter Dube
Sent: Sunday, December 10, 2023 7:27 AM
To: 'fosterj@reno.gov' <fosterj@reno.gov>
Subject: MUP24-00012 (Life Church Primary School)

Good morning. I own the two parcels totaling +/- 5 acres immediately to the north of Life Church. I reviewed the approved special use permit from 2015 and a primary school (44,351) was not approved in the SUP – why are they allowed to construct such a large structure without going through SUP process again? Could you provide a site plan so we can more fully understand its impact on surrounding residential uses?

I would also like to receive a copy of the decision letter.

Thanks!

Dubé Group Architecture
PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001
c | 775.315.9014

*****Please note new mailing address*****

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ATTACHMENT 1

DAMONTE RIDGE HOA RECAP OF INVESTIGATIONAL CONVERSATIONS

Noise Consultant (Luke Saxelby, Saxelby Acoustics)

- We spoke with Luke Saxelby at Saxelby Acoustics, and explained the situation. He pulled up the map for the area, and then gave his opinion. He stated installing sound barrier walls would somewhat mitigate the noise, but as we currently have solid vinyl fencing along the perimeter which provides significant sound reduction already (vs wood slat fencing), the cost of sound barrier would most likely not be worth it.
- He said it is better to address the cause of the noise: reducing the speed limit, installing traffic calming measures (speed tables, diversion tables), and installing “quiet” pavement (hot rubber asphalt).

RTC (Jeff Wilbrecht)

- Explained what we were told by Luke Saxelby, and asked who would be able to approve something like this.
- We asked about Rubberized Asphalt and if it is ever used. He said not to his knowledge, but to talk with Kurt.
- Jeff told us RTC is in charge of maintaining Rio Wrangler, and although they have their own funding, Public Works is one who approves projects.
- Jeff said for changing speed limit, it is definitely a Public Works conversation.

Public Works (Kurt Dietrich)

- Explained what we were told by Luke Saxelby, and also conversation with Jeff Wilbrecht
- Kurt said if Rio Wrangler is a primary emergency route, no vertical calming measures (speed humps, speed tables) can be installed as it interferes with emergency vehicles.
- As far as installing horizontal traffic calming measures (diversion islands), this would be okay but the issue is funding.
- We asked funding wasn't an issue, if Life Church contributed funds as a condition of the Primary School approval to pay for the diversion tables, and he said that would take care of it.
- He also reconfirmed how speed limits are set (what Todd Landry told us at our meeting), but said exceptions can be made for schools, wildlife, etc.

SNC (Jeff Ruston- Project Manager)

- Called to ask how much more expensive Rubberized Asphalt is than standard asphalt.
- He said it is not used in Reno, so it would be a huge undertaking to change asphalt plant.
- Suggested we talk with Brian Harer at Lumos, as RTC uses them when putting projects together.

Lumos Engineering (Brian Harer)

- Brian confirmed Rubberized Asphalt is not used because there would need to be 1 million sq ft needed to make it financially worth it for the asphalt plant to mix. It creates a week of down time for the asphalt plant.

- A mobile hot plant would be the only way to do hot rubber, but it is 10x as expensive as standard asphalt.
- Brian said this section of Rio Wrangler was last repaved in 2018, and will be a candidate in 2025. It is currently type 3 asphalt (with larger aggregate), but might be able to go to smaller aggregate if it doesn't affect the durability. He said that would help a little bit (not nearly as much as Rubberized Hot Mix Asphalt (RHMA), but he would have to look at the numbers to see.
- He also recommended since there will be 2 schools in a small area, it would be a reasonable ask to reduce the speed limit permanently, he has seen it done in other areas of town.
- He confirmed Rio Wrangler is considered a primary emergency route, and as such vertical calming measures are out. However, diversion islands (like mini roundabouts) are acceptable.
- Hard calming measures are better, as they have less maintenance costs. A hard diversion island would be made of precast concrete borders that would be screwed into the existing road and would cost between \$30-40k, as long as the existing roadway is wide enough to create.
- He said Rio Wrangler is 34' wide, with 12' traffic lanes and two 5' side lanes (bicycle). They can take down the 12' traffic lanes to 10'-11' traffic lanes, which should work.
- Brian also said softer calming measures can be done by creating diversion islands with plastic traffic posts. Although these are less expensive up front, their long term efficacy depends on Public Work's commitment to repair/replace the posts when they are damaged, and ends up costing more over time with repairs.

Western Nevada Materials-Asphalt Plant (Jake Mahoney- Sales Representative)

- Jake said there are two ways to create Rubberized Asphalt, Rubberized Hot Mix Asphalt (RHMA) and Terminal Blend Rubberized Asphalt (TR).
- Jake said what Brian Harer is talking about is Rubberized Hot Mix Asphalt (RHMA), and confirmed what Brian said about converting asphalt plant to produce Rubberized Hot Mix Asphalt (RHMA). It is financially not realistic to do for such a small project.
- The way the local asphalt plant works is they mix oil, rocks and sand (in different ways for different asphalts) to create asphalt.
- To create Rubberized Hot Mix Asphalt (RHMA), rubberize particles are added to the oil tank before mixing with rocks and sand.
- The local asphalt plant has one large oil tank they use, and if they were make Rubberized Hot Mix Asphalt (RHMA) , they would have to convert this one large oil tank for the project, which they would never do for such a small project.
- Even if you wanted to have a mobile hot plant, it costs \$30k just to bring it to site. This wouldn't include the increased price of the rubber particles, or plant time to mix.
- However, Jake said there is a Terminal Blend Rubberized Asphalt (TR) is made with a Terminal Blend Oil that comes from the Valero (oil plant). You can request a premixed oil with the rubber particles already in it. Jake would just need to tell Valero know how much rubber to add.
- Terminal Blend comes in its own tank, so the local asphalt plant wouldn't have to change their oil tank just for this project. It's really easy because they just attach the hose from this tank and add it to the rock/sand. No down time for the plant at all.
- We would need to talk with Brian Harer to get the specific amount of rubber particles to be added to the Terminal Blend (5-20%), and Jake could get a specific quote from Valero.
- As a rough estimate, it would be \$20-30/ton more than standard asphalt.

- With the section of Rio Wrangler to be paved at ~61k sq/ft, that is 1600 tons of asphalt (4 inch thickness).
- This translates to a ~\$32k-\$48k increase in cost to use rubberized asphalt vs. standard asphalt for this project.

ATTACHMENT 2

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 03/14/2022 through 03/21/2022

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe
Location: 335ft S of Steamboat Pkwy

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp: 07

	Sun, Mar 13, 2022			Mon, Mar 14, 2022			Tue, Mar 15, 2022			Wed, Mar 16, 2022			Thu, Mar 17, 2022			Fri, Mar 18, 2022			Sat, Mar 19, 2022		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00							13			17			11			10			20		
01:00							12			12			16			21			20		
02:00							1			7			7			7			8		
03:00							2			7			5			6			9		
04:00							20			23			27			20			15		
05:00							55			64			48			42			23		
06:00							191			152			186			152			43		
07:00							309			337			322			290			104		
08:00							361			358			390			405			150		
09:00							300			302			376			330			215		
10:00							287			286			347			354			272		
11:00				359			342			322			371			395			310		
12:00				386			346			371			428			429			300		
13:00				335			315			305			366			387			280		
14:00				376			338			356			371			347			269		
15:00				436			391			405			382			407			266		
16:00				442			436			464			441			475			257		
17:00				462			469			456			463			377			258		
18:00				302			301			336			285			299			217		
19:00				206			200			208			228			214			183		
20:00				129			141			125			179			116			128		
21:00				97			85			90			122			100			101		
22:00				56			58			58			70			57			75		
23:00				26			32			28			33			31			47		
Total				3,612			5,005			5,089			5,474			5,271			3,570		
AM Peak Vol							378			372			392			417			310		
AM Peak Fct							.909			.886			.845			.855			.912		
AM Peak Hr							7: 45			8: 15			9: 15			8: 15			11: 00		
PM Peak Vol				471			484			489			474			475			300		
PM Peak Fct				.847			.771			.948			.871			.95			.882		
PM Peak Hr				16: 30			16: 45			16: 30			16: 45			16: 00			12: 00		
Seasonal Fct				.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988	.988
Daily Fct				.988	.988	.988	.941	.941	.941	.929	.929	.929	.918	.918	.918	.885	.885	.885	1.152	1.152	1.152
Axle Fct				.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469	.469
Pulse Fct				2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 03/14/2022 through 03/21/2022

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe
Location: 335ft S of Steamboat Pkwy

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp: 07

	Sun, Mar 20, 2022			Mon, Mar 21, 2022			Tue, Mar 22, 2022			Wed, Mar 23, 2022			Thu, Mar 24, 2022			Fri, Mar 25, 2022			Sat, Mar 26, 2022		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00	37			16																	
01:00	10			9																	
02:00	24			6																	
03:00	4			3																	
04:00	10			13																	
05:00	18			63																	
06:00	26			161																	
07:00	72			311																	
08:00	226			398																	
09:00	215			345																	
10:00	477																				
11:00	368																				
12:00	357																				
13:00	287																				
14:00	296																				
15:00	292																				
16:00	273																				
17:00	295																				
18:00	203																				
19:00	163																				
20:00	112																				
21:00	78																				
22:00	31																				
23:00	17																				
Total	3,891			1,325																	
AM Peak Vol	477																				
AM Peak Fct	.645																				
AM Peak Hr	10: 00																				
PM Peak Vol	357																				
PM Peak Fct	.884																				
PM Peak Hr	12: 00																				
Seasonal Fct	.988	.988	.988	.988	.988	.988															
Daily Fct	1.331	1.331	1.331	.988	.988	.988															
Axle Fct	.469	.469	.469	.469	.469	.469															
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000															

ATTACHMENT 3

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 04/09/2013 through 04/16/2013

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp:

Location: S of Steamboat Pkwy

	Sun, Apr 7, 2013			Mon, Apr 8, 2013			Tue, Apr 9, 2013			Wed, Apr 10, 2013			Thu, Apr 11, 2013			Fri, Apr 12, 2013			Sat, Apr 13, 2013		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00										14			10			12			13		
01:00										2			7			6			10		
02:00										2			3			7			7		
03:00										3			2			3			9		
04:00										9			6			5			6		
05:00										25			25			18			8		
06:00										80			93			90			46		
07:00										183			189			169			114		
08:00										154			135			160			124		
09:00										150			173			209			162		
10:00										162			136			166			168		
11:00										191			166			220			171		
12:00							170			148			161			208			193		
13:00							157			172			167			160			157		
14:00							163			193			170			164			173		
15:00							188			171			188			203			169		
16:00							207			205			214			194			172		
17:00							248			282			252			256			152		
18:00							147			179			207			209			149		
19:00							107			170			159			145			113		
20:00							94			90			85			82			73		
21:00							38			55			60			83			79		
22:00							17			34			32			39			48		
23:00							13			14			18			35			28		
Total							1,549			2,688			2,658			2,843			2,344		
AM Peak Vol							0			212			194			225			177		
AM Peak Fct							0			.946			.703			.938			.868		
AM Peak Hr							0: 00			157: 30			108: 45			138: 45			161: 15		
PM Peak Vol							256			294			261			262			193		
PM Peak Fct							.928			.93			.733			.799			.862		
PM Peak Hr							247: 30			251: 15			247: 30			251: 15			180: 00		
Seasonal Fct							.983	.983	.983	.983	.983	.983	.983	.983	.983	.983	.983	.983	.983	.983	.983
Daily Fct							.949	.949	.949	.926	.926	.926	.924	.924	.924	.877	.877	.877	1.113	1.113	1.113
Axle Fct							.463	.463	.463	.463	.463	.463	.463	.463	.463	.463	.463	.463	.463	.463	.463
Pulse Fct							2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 04/09/2013 through 04/16/2013

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp:

Location: S of Steamboat Pkwy

	Sun, Apr 14, 2013			Mon, Apr 15, 2013			Tue, Apr 16, 2013			Wed, Apr 17, 2013			Thu, Apr 18, 2013			Fri, Apr 19, 2013			Sat, Apr 20, 2013		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00	11			10			4														
01:00	7			3			2														
02:00	7			0			4														
03:00	6			5			4														
04:00	2			8			11														
05:00	5			28			30														
06:00	33			204			207														
07:00	45			789			842														
08:00	121			191			216														
09:00	119			193			209														
10:00	205			157			144														
11:00	153			224																	
12:00	239			204																	
13:00	162			231																	
14:00	167			511																	
15:00	182			263																	
16:00	141			335																	
17:00	184			333																	
18:00	117			165																	
19:00	95			107																	
20:00	64			58																	
21:00	25			49																	
22:00	18			23																	
23:00	12			14																	
Total	2,120			4,105			1,673														
AM Peak Vol	205			789			0														
AM Peak Fct	.765			.765			0														
AM Peak Hr	150: 00			105: 00			0: 00														
PM Peak Vol	243			511			0														
PM Peak Fct	.821			.573			0														
PM Peak Hr	183: 45			210: 00			0: 00														
Seasonal Fct	.983	.983	.983	.983	.983	.983	.983	.983	.983												
Daily Fct	1.405	1.405	1.405	.975	.975	.975	.949	.949	.949												
Axle Fct	.463	.463	.463	.463	.463	.463	.463	.463	.463												
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000												

ATTACHMENT 4

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 10/03/2016 through 10/10/2016

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp:

Location: S of Steamboat Pkwy

	Sun, Oct 2, 2016			Mon, Oct 3, 2016			Tue, Oct 4, 2016			Wed, Oct 5, 2016			Thu, Oct 6, 2016			Fri, Oct 7, 2016			Sat, Oct 8, 2016		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00							17			20			10			17			27		
01:00							4			5			13			6			18		
02:00							4			4			6			5			9		
03:00							6			2			8			8			4		
04:00							15			15			18			15			8		
05:00							48			69			46			40			11		
06:00							123			119			131			119			32		
07:00							192			209			194			241			78		
08:00							271			266			220			315			186		
09:00							240			201			248			196			194		
10:00							235			191			232			198			228		
11:00							230			192			213			253			279		
12:00							263			241			267			265			278		
13:00							264			226			335			268			230		
14:00							305			277			254			250			251		
15:00				271			288			274			242			263			204		
16:00				310			345			344			342			233			189		
17:00				321			502			439			377			314			209		
18:00				246			272			293			305			224			146		
19:00				161			458			257			244			155			130		
20:00				96			115			179			128			95			93		
21:00				71			62			83			105			84			77		
22:00				36			30			40			35			53			58		
23:00				18			25			20			17			76			24		
Total				1,530			4,314			3,966			3,990			3,693			2,963		
AM Peak Vol				0			271			266			259			349			279		
AM Peak Fct				0			.903			.853			.809			.823			.906		
AM Peak Hr				0: 00			120: 00			116: 15			157: 30			116: 15			165: 00		
PM Peak Vol				0			502			501			402			314			294		
PM Peak Fct				0			.93			.901			.922			.913			.875		
PM Peak Hr				0: 00			255: 00			251: 15			251: 15			255: 00			183: 45		
Seasonal Fct				.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985	.985
Daily Fct				.947	.947	.947	.946	.946	.946	.935	.935	.935	.926	.926	.926	.918	.918	.918	1.091	1.091	1.091
Axle Fct				.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451	.451
Pulse Fct				2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000	2.000

Nevada Department of Transportation



Short-term Hourly Traffic Volume for 10/03/2016 through 10/10/2016

Site names: 0311164,Rio Wrangler Pkwy
County: Washoe

Seasonal Factor Grp: 01
Daily Factor Grp: 01
Axle Factor Grp: 03
Growth Factor Grp:

Location: S of Steamboat Pkwy

	Sun, Oct 9, 2016			Mon, Oct 10, 2016			Tue, Oct 11, 2016			Wed, Oct 12, 2016			Thu, Oct 13, 2016			Fri, Oct 14, 2016			Sat, Oct 15, 2016		
	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N	Road	S	N
00:00	23			10																	
01:00	14			8																	
02:00	52			2																	
03:00	54			4																	
04:00	11			14																	
05:00	16			69																	
06:00	28			177																	
07:00	89			882																	
08:00	139			323																	
09:00	275			274																	
10:00	337			215																	
11:00	288			275																	
12:00	322			267																	
13:00	319			302																	
14:00	289																				
15:00	272																				
16:00	277																				
17:00	217																				
18:00	280																				
19:00	137																				
20:00	87																				
21:00	53																				
22:00	25																				
23:00	21																				
Total	3,625			2,822																	
AM Peak Vol	366			882																	
AM Peak Fct	.817			.696																	
AM Peak Hr	153: 45			105: 00																	
PM Peak Vol	322			0																	
PM Peak Fct	.839			0																	
PM Peak Hr	180: 00			0: 00																	
Seasonal Fct	.985	.985	.985	.985	.985	.985															
Daily Fct	1.372	1.372	1.372	.947	.947	.947															
Axle Fct	.451	.451	.451	.451	.451	.451															
Pulse Fct	2.000	2.000	2.000	2.000	2.000	2.000															

ATTACHMENT 5

Rubberized Asphalt Concrete (RAC)

What is RAC?

[Rubberized asphalt concrete](#) (commonly known as RAC) is a road paving material made by blending ground-up recycled tires with asphalt to produce a binder which is then mixed with conventional aggregate materials. This mix is then placed and compacted into a road surface. There are two primary types of binders for RAC, asphalt-rubber and terminal blend. Note: Definitions to many terms are displayed as [green links](#) to the RAC site glossary. From the glossary, use your web browser's "Back" button to return to your original page.

- **Asphalt-Rubber.** Asphalt-rubber is defined by [American Society for Testing and Materials \(ASTM\) Standard D6114](#) as "a blend of paving grade asphalt cement, ground recycled tire (that is, vulcanized) rubber and other additives, as needed, for use as binder in pavement construction. The rubber shall be blended and interacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles prior to use." The [asphalt-rubber binder](#) is field blended (at the hot mix plant) and requires specialized mobile mixing equipment to produce. Typical [crumb rubber modifier](#) (CRM) content for asphalt-rubber ranges from 18-22 percent. The crumb rubber modifier used in asphalt-rubber is in the 10-16 mesh range. Asphalt-rubber has been successfully used in California for over 30 years.
- **Terminal Blend.** [Terminal blends](#) are binder materials that use finely ground (less than 30 mesh) crumb rubber modifier and are typically blended at the asphalt refinery. Historically, terminal blend binders contained 10 percent or less crumb rubber modifier. However, in recent years the crumb rubber modifier content has been increased to 15-20 percent in some projects. Terminal blend has 20 years of successful use in California.

Why Use RAC?

RAC is a proven product—one that has [many benefits](#), including being cost effective, durable, safe, quiet, and an environmentally friendly alternative to traditional road paving materials.

- **Cost-effective.** In most applications, RAC can be used at a reduced thickness compared to conventional asphalt overlays—in some cases at half the thickness of conventional material—which may result in significant material reduction and cost savings. In addition there may be life-cycle cost savings from the reduction in maintenance costs and longevity of RAC.
- **Durable, Safe and Quiet.** RAC is long lasting. It resists cracking, which can reduce maintenance costs. Case studies have demonstrated repeatedly that RAC, when designed and constructed

properly, lasts much longer—often 50 percent longer—than conventional materials. Additionally, RAC provides better skid resistance, which can provide better traction. Moreover, RAC retains its darker color longer so that road markings are more clearly visible and can reduce road noise.

- **Environmentally Friendly.** California produces more than 40 million waste tires annually, of which approximately 75 percent are diverted from landfill disposal. The state still faces the challenge of dealing with roughly 10 million surplus tires annually. The majority end up in our landfills but some end up in illegal stockpiles. A two-inch-thick RAC resurfacing project uses about 2,000 scrap tires per lane mile. Over the past few years, California has used more than 10 million waste tires in RAC paving projects, diverting them from landfills or illegal disposal.

CalRecycle Supports RAC

CalRecycle supports the use of RAC in California through several programs:

- **Grant Programs.** There are several CalRecycle [RAC grant programs](#) that provide financial assistance to local governments specifically to fund RAC projects.
- **Technical Assistance and Training.** CalRecycle provides [engineering technical assistance and training](#) to local jurisdictions in California.
- **Product and Vendor Information.** [View paving materials and product vendors](#) in the California Tire-Derived Product Catalog.
- **Green Roads Fact Sheet.** This [fact sheet](#) can be used to educate local decision makers about the benefits, uses, and cost comparisons for RAC as a paving alternative.

In addition, under a contract from the California Integrated Waste Management Board (now known as the Department of Resources Recycling and Recovery, or CalRecycle) a curriculum was created titled [Continuing Education and University Curricula of Rubberized Asphalt Concrete and Civil Engineering Application of Waste Tires](#), and translated into in [Spanish](#). It is a college-level curriculum to encourage civil engineering graduates to consider use of rubberized asphalt concrete and tire-derived aggregate in their future infrastructure projects.

Resources

- [RAC Home](#)
- [Benefits](#)
- [Technical Assistance & Training](#)
- [Glossary](#)
- [Green Roads](#)
- [Tire Management Home](#)

- [Publications](#)
- [Events](#)
- [Resources](#)
- [Staff Contacts](#)

For more information contact: Tire Management Program Hotline, WasteTires@calrecycle.ca.gov

ATTACHMENT 6

Noise Reduction with Asphalt-Rubber

The proven advantages of using Asphalt-Rubber as the binder in hot mix include:

- Increases pavement Life
- Resists rutting, aging and reflective cracking
- Reduces pavement thickness
- Provides optimum skid resistance

Another major benefit is traffic noise reduction of 65- to 85-percent, eliminating the need for expensive sound barriers.

Numerous noise level studies in the United States and abroad prove use of Asphalt-Rubber as the binder in Asphalt-Rubber hot mix reduces traffic noise levels dramatically.

This phenomenon was first noticed in Brussels, Belgium, in 1981, in an Asphalt-Rubber hot mix called "Drainasphalt." Since then, there have been noise studies conducted in three continents on Asphalt-Rubber hot mix pavements. Results of these evaluations are documented in technical papers published and are briefly reported here, summarized in the conclusion.

Decibel (dB) is a unit for expressing the relative intensity of sounds on a scale from zero, for the average least perceptible sound, to about 130 for the average pain level.

The decibel scale is a logarithmic function. An increase of 3 dBs doubles the energy or intensity, and an increase of 6 dBs quadruples the energy or intensity.

Noise Reduction Studies

- Drainasphalt (Asphalt-Rubber open graded hot mix) study conducted on the Motorway South of Ghent, Belgium, on the Brussels Loop, 1981,

reported by Professor E. Nakkel, President of a technical Committee on "Asphaltstrassen," Bonn, Germany. He advises of the high cost of reducing noise levels by using sound barriers. His investigation also reveals Asphalt-Rubber hot mix provided a noise reduction of 8 to 10 dBs, a 75-percent reduction in noise.

- Michel Amilhat of the Société des Autoroutes du Nord et de l'Est de la France, Paris, 1988, presented a paper at the Austrian Conference on Asphalt-Rubber in Graz, Austria, on studies conducted in Paris, France.

An investigation was made to determine hydrostatic pressure in and under Drainasphalt placed on city streets along the Seine River in 1984. A significant noise reduction of 3 to 5 dB with no trucks, and 2 to 3 dB reduction with five percent trucks, were recorded, a 50- to 75-percent noise reduction. As a result, a recommendation was made to overlay the Paris Loop with open graded Asphalt-Rubber.

- Dipl. Ing. Horst Pochhacker of West Germany, presented information on the many advantages of Asphalt-Rubber, at the 10th Anniversary International Conference in Graz, Austria, 1988, on Drainasphalt, placed in Bonn, Germany in 1980.

He spoke on the cost of sound barriers compared to Asphalt-Rubber overlays, stating savings were in excess of ten times the cost of constructing sound reduction structures.

Egil Nakkel, Director of Prof. and Pres. D. Techn Komitees der A.I.P.C.R., Bonn, Germany, informed attendees at these meetings, the thicker the overlay using Drainasphalt, the greater the noise reduction. He said that 4 cm is quieter than 2 cm, and reported a minimal 3 dB reduction in noise, which is 50-percent. Nakkel also discussed the high cost of sound barriers in comparison to 4 cm of Asphalt-Rubber drain mix, which is called FlüsterAsphalt."

- Test Road in Dordrecht, Belgium. Paper presented at the national Seminar on Asphalt-Rubber, Kansas City, Missouri, 1989, by Ir. J.C.P. Heerkens and Ir. A. Von Meier. A 2.3 inch (6 cm) layer of Asphalt-Rubber hot mix placed in 1988 had a noise reduction of 3.5 dB as compared to dense asphalt concrete, and a 9 dB in comparison to portland cement concrete at 72 mph (120 km). This represents a reduction of 60- to 80-percent.

- Test conducted in Europe, reported at the national Seminar on Asphalt-Rubber, Kansas City, Missouri, 1989, by Hugo Ban de Veld paper titled, "The Use of Asphalt-Rubber Bitumen in Road Construction," (Draining Mix), presented by Jacques G. Bardot. Van de Veld reported draining mixes using Asphalt-Rubber significantly reduce traffic noise. Three to ten dB reductions with speeds of 35 mph (60 km) to 60 mph (100 km) were recorded, representing 50- to 90-percent reduction in noise levels.
- City of Phoenix, 7th Street Sound Level Survey, 1990, of a one-inch, gap-graded, Asphalt-Rubber hot mix overlay placed in 1989. Conducted by Western Technologies Inc., of Phoenix, Arizona, the study disclosed a noise reduction of 10 dB. This correlates to a sound intensity reduction of eight times, or 88-percent.
- Arizona Department of Transportation (ADOT), Interstate 19, South of Tucson, open graded Asphalt-Rubber hot mix overlay, placed on a portland cement concrete pavement in 1989. Studies conducted by Western Technologies Inc., Phoenix, Arizona, in 1989, reported an 80.4 dB on the existing portland cement pavement, and a 73.7 on the Asphalt-Rubber overlay. The 6.7 dB difference is a noise level reduction of 78-percent.
- At the 1988 Asphalt-Rubber Conference in Graz, Austria, Helmut Prager, Eng. of Austrian Highways and Bridges, Vienna, Austria, presented a paper on research conducted on Highway A-9, the Pyhrnam Autobahn and A-123, the Inntal Motorway.

This investigation confirmed 4 to 5 cm provides better noise reduction than 3 cm for Silent Asphalt Flüsteraspahlt. Also, a major noise reduction of 3 or more dB, with 50-percent or more noise reduction, were verified on old stone city streets overlaid with Flüsteraspahlt.

- Research reported by Dipl. Ing. E. Reinsih at the 1988 Austrian conference on Asphalt-Rubber on Concrete Autobahns overlaid with Drainasphalt in 1985 and 1987, provides significant mix design data.

Asphalt-Rubber surfaces tested in uphill and downhill grades, curves and hills, using Asphalt-Rubber with 6.6-percent binder indicated a need for 20-percent voids in Drainasphalt. Noise

reduction values of 6 dB, or 75-percent noise reductions were recorded.

- Noise Level Reduction through Silent Asphalt, by Neivelt, Stehno, Stickler and Ertle, a joint venture of CT-Bitument Gesellschaft, Vienna, ESSO-Specialbitumen, Vienna; Trainfeller Baugesekkschaft Scheibbs, on Inntal Motorway between Innsbruck and Angath.

Noise levels were reduced by 4.1 to 5.5 dB or 60 to 70 percent. The greatest reduction occurred at night, with a wet surface. The average noise level reduction was 4.8 dB or 65-percent.

The study advises a 3 dB or 50-percent reduction corresponds to:

- Reduction of the traffic volume by half
- Twenty-five percent reduction in speed
- Doubling of the distance from the noise source

Conclusion

Asphalt-Rubber offers many advantages that cannot be denied. Research, Demonstration Products, and 20 years of performance on thousands of lane miles of roads, attest to this fact.

Noise suppression qualities of Asphalt-Rubber were often overlooked in early research. However, work on the Brussels Loop revealed a very important advantage of using Asphalt-Rubber.

European Engineers discovered in th 1980's, Asphalt-Rubber reduces noise. In recent years, engineers in the United States have recognized the importance and value of this noise reduction quality.

Research has verified a significant noise reduction due to open graded design and the inclusion of crumb rubber from scrap tires. Several comparison studies indicate a 10 dB or 90-percent noise reduction. In all cases, noise has been reduced by no less than 50-percent.

Pavement surfaces can be designed to reduce noise by 3

dB without rubber. However, the addition of rubber in the binder increases the dB by 6 or more.

The maximum acceptable dBs highway and street designers expect is 64 dBs. Many streets and roads have 79 or greater dBs. A well-designed surface with Asphalt-Rubber can move noise factors back into acceptable comfort zone, and eliminate the need for noise abatement structures. Sound walls cost more than \$400 per linear foot of centerline pavement. Asphalt-Rubber hot mix overlays cost \$12 per linear foot, per one 12-foot lane per inch.

Noise abatement is only one of the many advantages in resurfacing city streets and urban roads with Asphalt-Rubber.

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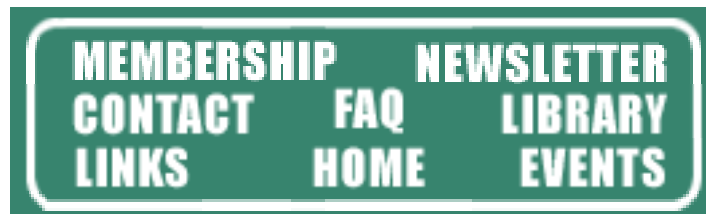
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ATTACHMENT 7

Report on the Status of Rubberized Asphalt Traffic Noise Reduction in Sacramento County



Prepared For:

**Sacramento County
Public Works Agency - Transportation Division**

Prepared by:

**Sacramento County
Department of Environmental Review and Assessment**

And

**Bollard & Brennan, Inc.
Consultants in Acoustics and Noise Control Engineering**

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ACKNOWLEDGEMENTS

**Sacramento County Public Works Agency
Transportation Division**

906 G. Street, Suite 510
Sacramento, California 95814
(916) 874-6291
Chief: Thomas Zlotkowski
Senior Engineer: Theron Roschen

**Sacramento County Department of Environmental Review and
Assessment**

Public Projects Division

827 7th Street, Room 220
Sacramento, California 95814
(916) 874-7914
Environmental Coordinator: Dennis Yeast
Division Manager: Bob Caikoski
Project Leader: Antonia Barry
Student Intern: Melinda Coy

Bollard & Brennan, Inc.

Consultants in Acoustics and Noise Control Engineering

3805 Taylor Road, Suite 2
Loomis, California 95650
(916) 660-0191
President: Paul Bollard

EXECUTIVE SUMMARY

This report is a joint study prepared for the Sacramento County Public Works Agency, Transportation Division by the Sacramento County Department of Environmental Review and Assessment and Bollard and Brennan, Inc., consultants in acoustics and noise control engineering.

The purpose of this report is to document the effectiveness of rubberized asphalt as a traffic noise mitigation measure. Rubberized asphalt is a bituminous mix, consisting of blended aggregates, recycled rubber and binding agents. The rubber is often obtained from used tires. Studies conducted locally, nationally, and internationally, have shown that rubberized asphalt can reduce the noise pollution that is associated with roadway traffic.

The specific findings of this analysis are based primarily on a series of traffic noise level measurements conducted along the Alta Arden Expressway, between Howe and Watt Avenues, from 1993 to the present. Although similar noise measurements have been conducted along a segment of Antelope Road, the smaller number of variables affecting the measured traffic noise levels along the Alta Arden Expressway before and after paving with rubberized asphalt made that roadway a more statistically reliable test subject. Therefore, this analysis focuses on the series of test results for Alta Arden Expressway.

Bond Road between Stockton Boulevard and Florin Road, was used as the control site for conventional (non-rubberized) paving. Although the Bond Road test segment was widened at the time of paving with conventional asphalt, the relationship of the roadway to the noise measurement site remained relatively unchanged.

The conclusions of the 6-year study indicate that the use of rubberized asphalt on Alta Arden Expressway resulted in an average four (4) decibel reduction in traffic noise levels as compared to the conventional asphalt overlay used on Bond Road. This noise reduction continued to occur six (6) years after the paving with rubberized asphalt. This degree of noise attenuation is significant, as it represents a 60% reduction in traffic noise energy, and a clearly perceptible decrease in traffic noise. This traffic noise attenuation from rubberized paving is similar to the results documented in several non-related studies conducted in recent years at other locations, both nationally and internationally.

The conclusions of this study are based on tests conducted in Sacramento County on the Alta Arden Expressway and Bond Road. Attenuation provided by rubberized asphalt may vary in other locations with different climates and different percentages of medium duty and heavy-duty trucks.

INTRODUCTION

The main theme of this report is the effectiveness of rubberized asphalt as a traffic noise mitigation measure. Locally collected noise information is supplemented with general noise test results from various locations, both nationally and internationally, where other jurisdictions are exploring the use of rubberized asphalt. However, this report does not attempt to reproduce the result of those other studies herein. The interested reader is encouraged to contact those entities or jurisdictions where other studies were performed for further information. This report is primarily meant to provide information on the studies conducted in Sacramento County.

In addition to the various noise test results, this report offers an overview of the factors that contribute to traffic noise generation. The report also contains the Sacramento County, State and Federal noise standards, which mandate the consideration of noise abatement measures in cases where traffic noise levels exceed acceptable limits. The noise standards are provided to illustrate the importance that is given to traffic noise impacts in Sacramento County, which in turn has led to substantial requirements for traffic noise abatement.

In recent years, Sacramento County has relied upon noise barriers as the primary noise mitigation option, and often times the only viable noise mitigation option, for roadway improvement projects in the County. As a result, a substantial number of noise barriers have, and continue to be, constructed in areas where traffic noise is determined to be excessive. Concerns regarding the proliferation of noise barriers have resulted in the investigation of rubberized asphalt paving as a viable noise mitigation alternative. This investigation has been ongoing since the paving of Alta Arden Expressway with rubberized asphalt in October of 1993. This report summarizes the results of Sacramento County's ongoing investigation to date.

HISTORY OF NOISE REDUCING PAVEMENT

The history of adding recycled tire rubber to asphalt paving material can be traced back to the 1940's when the U.S. Rubber Reclaiming Company began marketing a devulcanized recycled rubber product, called Ramflex™, as a dry particle additive to asphalt paving mixture. In the mid-1960's, Charles McDonald began developing a modified asphalt binder using crumb rubber. This product was marketed by Sahuaro Petroleum and Asphalt Company as Overflex™.

The Arizona Refining Company Inc., created the second modified binder in the mid-1970's, replacing a portion of the crumb rubber with devulcanized recycled rubber and marketing it under the name Arm-R-Shield™. Both Overflex™ and Arm-R-shield™ were patented and eventually brought under single ownership. The companies marketing these two products founded a trade association known as the Asphalt Rubber Producer Group in the mid-1980's. Ramflex™ disappeared from the market when its parent corporation sold the U.S. Rubber Reclaiming Company.

In addition to the US, Sweden also made tremendous contributions to the development of rubberized asphalt. In the 1960's, two Swedish companies began developing an asphalt paving surface mixture that would resist studded tire and chain wear. The mixture included a small amount of crumb rubber as an aggregate and was named Rubit™. In the late 1970's this product was introduced and patented in the United State as PlusRide™. It evolved in a series of field projects in Alaska and other states from 1979 through 1985. PlusRide™ has been managed by a number of firms and is presently marketed by Envirotire, Inc.

In recent years there has been a great surge to make use of the used tires that are being stockpiled all around the world. This is primarily due to the advancement in technology and realization of benefits associated with application and reduction of used tires. Because of the increase in the number of tires accumulating around the world, and environmental hazards associated with them, more nations are looking for ways to make use of this tremendous resource.

THE PROCESS OF PRODUCING RUBBERIZED ASPHALT

Rubberized asphalt is a process of incorporating crumb rubber (CRM) with asphalt paving materials. Crumb rubber consists of recycled rubber that has been reduced in sizes less than 6.3mm. Crumb rubber can be incorporated by a wet process or a dry process. In 1991, the Federal Highway Administration (FHWA) introduced standard terminology to improve the ability to communicate the experience of highway agencies when evaluating CRM processes.

Wet Process

Wet process refers to modification of asphalt cement binder with 5-25%wt of fine tire rubber crumb modifier (CRM) at an elevated temperature. The wet process includes the blending of the crumb rubber with the asphalt. The method of blending can be divided into three categories: batch blending, continuous blending and terminal blending. Batch blending defines those wet process technologies that mix batches of CRM and asphalt in production. Continuous blending describes those wet process technologies that have a continuous production system. Terminal blending is associated with wet process technologies that have product with extended storage (shelf life) characteristics and are produced at an asphalt cement supply terminal.

Dry Process

The dry process includes mixing the rubber particles with aggregates prior to addition to asphalt. This process provides a way to blend the crumb rubber with the asphalt and aggregate without the use of the special equipment needed in the wet process. There are some technical problems associated with this method, but new technologies are being introduced that are improving the process. Currently, the only process approved for use by the California Department of Transportation (Caltrans) is the wet process.

CURRENT USES OF RUBBERIZED ASPHALT

Although the idea of using old tires to make asphalt was started in United States in 1940's the idea has not gained much momentum. One reason is due to the FHWA position against the use of the rubberized asphalt as a noise mitigation measure. Rubberized asphalt continues to be labeled as experimental and thus funding for its use can be hard to obtain. Other reasons for its less than wide spread use include state preferences for the use of older methods for pavement, 'impostor' projects that don't adhere to standards, thereby resulting in failures, and the Interstate Surface Transportation Efficiency Act (ISTEA), mandate.

ISTEA provides federal funding through the FHWA for transportation projects and was superceded by Tea-21 in May of 1999. The ISTEA mandate holds that funding must be used to research and implement studies on the use of rubberized asphalt.

ISTEA, Section 1038(d), mandated the States use recycled tires in asphalt paving. Through 1995, Congress provided moratoriums on implementation but the section remained as federal law. There were also specific penalties for those States unable to comply. In 1995, Section 1038 was modified by striking subsection (d). This eliminated the rubber mandate and all associated penalties. It was further amended to require research and development of tests and specifications for rubberized asphalt. This research requirement was aimed primarily at cost and performance; traffic noise reduction was not an issue.

There were two consequences resulting from this mandate. First, the mandate caused political fallout within the industry and thus created a rift within its parent industry. Secondly, the revocation of this mandate caused funding and projects to be dropped in favor of more traditional practices. However, the FHWA allows the use of rubber asphalt where it is both cost effective and it can be properly engineered mainly as a tire waste management mitigation program. It is not allowed as a noise mitigation measure in National Environmental Policy Act (NEPA) documents.

The use of rubberized asphalt is becoming more popular as countries around the world are faced with the problem of noise pollution and excess used tires. They are beginning to rely on rubberized asphalt to mitigate the noise problems associated with roadway transportation. This phenomenon was first noted in Brussels, Belgium, in 1981, in asphalt rubber hot mix called "Drainasphalt". The study showed a dramatic reduction in traffic noise levels. As a result, numerous countries around the world have started noise level studies to evaluate the validity of claims being made.

In 1984, an investigation was made by the French to determine hydrostatic pressure in and under Drainasphalt on City Street along the Seine River. Their findings showed a reduction of 3 to 5 dB with no trucks, and a 2 to 3 dB reduction with five percent trucks. As a result of their findings, the researcher made a proposal to overlay the Paris Loop with open graded Asphalt-Rubber.

As a result of these findings, other countries, such as Canada, were convinced to do further research on the benefits of using rubberized asphalt. In 1994-1995 Canada started the full-scale use of the rubberized asphalt. In the full-scale phase six streets were paved using rubberized asphalt. Table 1 lists international projects carried out or under way.

Table 1
Countries Used/Using Rubberized Asphalt
and Resulting Noise Reduction

Country	Year Reported	Noise level Reduction
Belgium	1981	8-10 dB (65-85%)
Canada	1991	Shown noise reduction
England	1998	Project not completed
France	1984	2-3dB/3-5dB (50-75%)
Germany	1980	3dB (50%)
Austria	1988	3+ dB
Netherlands	1988	2.5dB

Within the US, some of the cities and counties that are currently evaluating the use of rubberized asphalt include Tucson AZ, Phoenix AZ, Sacramento CA, Orange CA, Los Angeles CA and San Diego CA.

Table 2
States Using Rubberized Asphalt and Resulting Noise Reduction

State	Counties & Cities	Year	Noise Level Reduction
Arizona	Phoenix, AZ	1990	10dB (88%)
Tucson,	AZ	1989	6.7dBs (78%)
California	Sacramento County	1993	7.7 - 5.1 dB
California	Orange County	1992	3-5 dB on Open Graded asphalt
California	Los Angeles County	1991	3-7 dB
California	San Diego County	1998	Project in process
Texas	San Antonio	1992	Data not Provided
Oregon	Corvallis	1994	Data not Provided

* Table is not comprehensive. Studies may have taken place in other states.

Since 1992, rubberized asphalt has been used in Sacramento County. Table 3 shows the locations where it has been used.

Table 3
Rubberized Asphalt Usage in Sacramento County

Year/s	Location
1992 / 1994	Auburn Boulevard
1992	Folsom Boulevard
1992 / 1993	Alta Arden Expressway
1992	Arden Way
1992	South Watt Avenue
1992 / 1995	Watt Avenue
1002	Van Maren Way
1992	Sunset Ave
1993	Air Base Drive
1993	Chase Drive
1993	Coloma Road
1994	Antelope Road
1996	Marconi Avenue at Watt Avenue
1996	Arden Way at Watt Avenue
1996	Greenback Lane at Hazel Avenue
1996	Fair Oaks Boulevard at Watt Avenue
1996 / 1998	Elkhorn Boulevard
1997	Orange Grove Avenue
1997	Roseville Road
1997	Sly Parkway
1998	Engle Road
1998	San Juan Avenue
1999	Calvine Road

STUDIES OF RUBBERIZED ASPHALT OUTSIDE OF SACRAMENTO COUNTY

Rubberized Asphalt Studies in Other California Counties

Rubberized asphalt has been studied in other California counties outside of Sacramento. Orange County studied the effectiveness of rubberized asphalt as a noise mitigation measure in a report entitled Mixed Roadway Surface Noise, prepared by Mestre Greve Associates in February of 1992. The City of Thousand Oaks also conducted a study in 1992 entitled Asphalt Rubber Overlay Noise Study, prepared by Acoustical Analysis Associated, Inc. Both studies determined that rubberized asphalt successfully mitigated traffic noise.

The study conducted for the County of Orange looked at the difference in noise levels between four different pavement types: dense grade asphalt, rubber asphalt (gap graded), rubber asphalt (open graded), and open grade (with latex). The goal of this analysis was to eliminate the effect due to different traffic conditions at each segment of roadway thus resulting in a different noise level due specifically to the asphalt type. *The study concluded that rubber asphalt-open graded was 3.9 dBA quieter than new dense grade asphalt.*

The noise study conducted for the City of Thousand Oaks measured the reduction in traffic noise levels experienced due to resurfacing. The street conditions before resurfacing were poor and therefore, noise reduction due to the new paving was striking. *Noise reduction on the six sites tested ranged from 3-7 dBA, depending on traffic and speed. When compared with the new standard asphalt, rubberized asphalt was found to be 2-5 dBA quieter.*

National Rubberized Asphalt Studies

On a national scale, rubberized asphalt has been studied by many states as well as the federal government. Arizona has been the leader in the production and use of rubberized asphalt. In March 1990, Western Technologies Inc. performed a sound level survey to determine the noise levels produced during peak traffic flow on different types of pavement, including rubberized asphalt. In November of 1995 the Texas Department of Transportation conducted a study on the crumb rubber modifier used in rubberized asphalt as a successful method to reduce tire noise. Finally, the National Research Council conducted a study in 1997 entitled the Relationship between Pavement Surface Texture and Highway Traffic Noise.

Two studies were conducted in Arizona. One was prepared for the City of Phoenix and the other was prepared for the City of Tucson. The study in the City of Phoenix compared standard chip seal asphalt laid in 1984 and rubberized asphalt that was laid in 1989. *The study concluded that there was an approximate 10 dBA reduction in noise with the rubberized asphalt compared with the chip seal asphalt.* The study prepared for the City of Tucson compared asphalt rubber concrete pavement and standard concrete pavement. *The study*

showed that the asphalt rubber concrete was 6.7 dBA quieter than the concrete pavement.

In 1995, the Texas Transportation Institute conducted a study to identify potential problems with the current rubberized asphalt mix design, develop recommendations on those problems, develop recycling guidelines, and evaluate alternatives. Researchers monitored CRM mixtures paved in 1992 and 1993 in San Antonio, Texas. *The results of these tests concluded that rubberized asphalt performed well in construction practices, and that the rubberized asphalt mixes gives a higher durability with better stability than dense-grade mixes.*

The National Research Council conducted a study showing the effect of different surface types on noise levels. *The Council studied many types of roadway surfaces and determined that open graded asphalt showed the greatest potential for noise reduction when compared to dense graded asphalt.* The study examined research done by the Kansas Department of Transportation in 1990/1991, that studied the effects of rubberized asphalt. The results in Kansas showed that the open graded asphalt always showed a decrease in noise level. In contrast, when the asphalt rubber pavement was compared to the asphalt surface, there were both reductions and increases in noise level. *Thus, the results of this Kansas study did not show a clear noise reduction trend with rubberized asphalt.* However, the study done by the National Research Council did not examine any other research than the Kansas study.

Global Studies

Rubberized asphalt is a process that is not only of interest in the United States but also globally. In 1995, the Canadian Technical Asphalt Association performed a study for British Columbia on rubberized asphalt. Their study entitled, The Full Scale Evaluation of Rubberized Asphalt Concrete in British Columbia, was a response to the need for improvement of binders in the road building industry. In a paper done by Netherlands researchers, entitled Open Grade Rubberized Asphalt for Traffic Noise Reduction in Urban Areas, research was conducted to analyze the development of rubberized asphalt as a mitigation measure. Other studies have been done in Great Britain, West Germany, Belgium, and other European Countries.

The study conducted in British Colombia compared conventional pavement binders to Rubberized Asphalt (Rub-Arb [TM]) in various locations throughout British Columbia over a period of five years. This study concluded that within the laboratory, the asphalt rubber binder showed improved properties at extreme temperatures compared to convention asphalt. This study also concluded, that modified asphalt rubber binders can be manufactured for a wide range of climate conditions and requirement, it is more flexible at low and sub-zero temperatures, and that the thickness of the asphalt rubber concrete overlay can be reduced from the traditional 50mm overlay down to 38mm of modified asphalt rubber concrete.

In Dordrecht, Belgium a test was conducted using open graded rubberized asphalt in order to study the effectiveness of rubberized asphalt on noise. In this

study the researchers concluded that it is possible to design an asphalt mix to reduce traffic noise in urban situations where the traffic noise is dominant. *The study found, that a noise reduction can be achieved of between 2.1 and 3.2 dBA at the speeds of around 50 km/h.*

Additional studies have been conducted in other European countries. *The Societe des Autoroutes du Nord et de l'Est de la France, Paris conducted a study that showed a noise reduction level of 2-3 dBA with rubberized asphalt along the Seine River.* In a paper presented at the 1988 Asphalt-Rubber Conference in Graz, Austria, Helmut Prager, Engineer of Austrian Highways and Bridges showed how the rubber overlay provides better noise reduction. Finally, in Bonn, Germany a study showed that using rubberized asphalt as a sound mitigation measure is more cost effective than using sound barriers. *Most of these studies concluded that rubberized asphalt could reduce noise by 2-3 dBA with few technical problems.*

Finally, The European Commission Green Paper, published in the June 1997 edition of Noise/News International, cites the following on Page 87:

“Low-noise porous road surfaces have been the subject of much research. These porous road surfaces reduce both the generation and propagation of noise by several mechanisms – which can be related to the open structure of the surface layer. Results have shown that the emission noise levels can be reduced from levels generated on equivalent non-porous road surfaces by between 3-5 dB(A) on average; by optimizing the surface design, larger noise reductions are feasible. At present, the cost of porous asphalt surfacing is higher than conventional surfaces (for resurfacing, but for new roads, the cost is minimal), but may drop as contractors gain experience with porous surfaces. The material is also less durable. However, improvements are being made to durability and, in many countries, these materials are already being used as part of normal road construction in noise-sensitive areas.”

SACRAMENTO COUNTY RUBBERIZED ASPHALT NOISE STUDIES

Overview of Noise and Rationale for Rubberized Asphalt Noise Studies

Noise pollution is the presence of intrusive and unwanted sounds that can seriously affect physical and psychological health. Some examples of the effects from noise pollution include the loss of hearing, anxiety, sleeplessness, aggression, increase in heart rate, and stress. Noise is measured by decibels (dBA) which are a logarithmic function of the ratio of the sound pressure squared over the reference pressure squared. Appendix A provides definitions of acoustic terminology used in this report. Levels of noise can range from very faint to painful and dangerous. For example, human breathing has a dBA of 10 which is considered very faint, office activities have an average dBA of 50, which is considered moderate, and a jet engine at 75ft has a dBA of 140 which is considered painful or dangerous. Because noise has potentially harmful effects, local, state, and federal agencies established noise thresholds beyond which traffic noise abatement must be considered.

Specific noise policies and standards which affect decisions regarding noise mitigation in Sacramento County are provided in Appendix B. It is evident from the various noise standards shown in Appendix B which apply to both development and roadway construction projects in Sacramento County, that this topic is given considerable attention in the environmental review process. The comprehensive County noise criteria has set standards that are often exceeded due to the ever increasing traffic noise levels that cannot be mitigated in traditional ways.

In light of this routine occurrence, the investigation into alternative noise abatement options, other than barriers, was considered to be warranted by Sacramento County. The initial studies of rubberized asphalt were commissioned by the County in 1993. Subsequent testing has been commissioned by the County twice since the initial tests were conducted in 1993. The following sections provide an overview of how traffic noise is generated, followed by the detailed rubberized asphalt test procedures and results of those tests.

How Traffic Noise is Generated and the Implications for Rubberized Asphalt

Traffic noise is generated primarily by the interaction of the tires and pavement, by the internal combustion engine of the vehicle, and by the engine exhaust. For automobiles, the vast majority of the noise is generated by the interaction of the tires and pavement due to quieter engines and exhausts on modern vehicles. As a result, the effective noise source height for automobiles is considered to be zero (0) feet above the pavement, or right where the tire meets the road.

For medium duty trucks (2 axle trucks), there is a slightly larger contribution of noise from the engine compartment and exhaust pipe, so the effective noise source height is considered to be an average of those sources at two (2) feet above the pavement. For heavy trucks, not only is there a greater contribution of noise from the engine and exhaust, the exhaust stack opening is typically 11 feet or so above the pavement. Therefore, the effective noise source height for heavy trucks (3 axles or more), is considered to be eight (8) feet above the pavement, or the weighted average heights of the tires, engine and exhaust stacks.

This information pertaining to the noise generation of the various vehicle types is relevant in that rubberized asphalt is believed to obtain most of its' noise-reducing properties from a combination of the porosity and ductility of the rubberized roadway surface. As a result, tire noise is reduced, but engine and exhaust noise is not appreciably affected by the rubberized surface. Therefore, a roadway containing primarily automobile traffic would be expected to exhibit greater decreases in traffic noise following paving with rubberized asphalt than would a roadway that has a high percentage of heavy trucks.

Traffic Noise Prediction Model

A discussion of the method by which traffic noise is predicted is appropriately included in this report in that normalization of the traffic conditions present during the various noise measurement surveys was accomplished using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108). This normalization was required to isolate the effectiveness of the rubberized paving from the other variables affecting traffic noise generation which were present during the noise tests.

The FHWA Model is the traffic noise prediction model used by Sacramento County for traffic noise assessment. Several adaptations of the model have been developed, including Stamina and Sound 32, but these models are all fundamentally based on FHWA-RD-77-108.

The Federal Highway Administration is currently working on a new traffic noise prediction model which will theoretically replace the existing model, called the Traffic Noise Model (TNM). The TNM will reportedly make adjustments to traffic noise predictions based on roadway surface, but it is not known whether rubberized asphalt will be included in those surfaces. According to FHWA officials, the new TNM has been released and is in use by various State Departments of Transportation (DOT's). It is likely that the new TNM will be required in situations where state or federal funding is involved, but it remains to be seen whether the complexity of the new model will be required for all traffic noise modeling efforts. At the time of this writing, the new TNM has not been adopted for use on California roadways by Caltrans.

Traffic Noise Prediction Model Calibration

The FHWA Model provides reasonably accurate traffic noise predictions under "ideal" roadway conditions. Ideal conditions are generally considered to be long straight roadway segments with uniform vehicle speeds, a flat roadway surface,

good pavement conditions, a statistically large volume of traffic, and a unimpeded view of the roadway from the receiver location. However, ideal conditions are more the exception than the rule. As a result, it is often necessary to calibrate the FHWA Model through site-specific traffic noise level measurements and concurrent traffic counts.

The calibration process is performed by conducting concurrent traffic noise level measurements and vehicle counts, and comparing the measured level with that predicted by the Model for the given traffic conditions. This calibration procedure can be used to normalize the model output for varying traffic volumes, speeds, and truck compositions present during the noise measurement samples. Once these factors have been normalized, and the other variables affecting measured traffic noise levels (measurement equipment, distances, measurement technique, etc.) held constant, the differences between measured traffic noise levels before and after the paving with rubberized asphalt can be attributed to the roadway surface. This calibration procedure is the basis for the assessment of the noise reducing properties of rubberized asphalt reported in this report.

Traffic Noise Prediction Model Inputs

Inputs to the FHWA Model include the number of vehicles per hour, the percentages of medium (2 axle) and heavy (3 or more axles) trucks, the average vehicle speeds, the distance between the traffic and receiver, and the characteristics of the intervening ground located between the roadway and the receiver (hard vs. soft site). During the calibration procedure described above, each of these factors was accounted for.

Specific Rubberized Asphalt Test Procedure

The fundamental methodology employed to determine the effectiveness of rubberized asphalt in reducing traffic noise levels in Sacramento County was to take the difference between normalized traffic noise levels measured before and after paving of certain County roadways with rubberized and conventional asphalt overlays. As stated previously, there were several factors which influenced traffic noise generation which needed to be carefully considered in the analysis. Those factors, which include test roadway geometries, noise level measurement equipment location and configuration, atmospheric conditions, and traffic volume, speed, and heavy truck usage, are discussed below.

Test Roadways Evaluated in the Sacramento County Studies: The roadways selected by Sacramento County for assessment of the noise reducing properties of rubberized asphalt were Alta Arden Expressway between Howe and Watt Avenues, and Antelope Road between Auburn Boulevard and Old Auburn Road.

The paving of Alta Arden Expressway was completed in October of 1993, and was not associated with any other widening or reconstruction of that roadway. Therefore, the effects of rubberized asphalt in reducing traffic noise levels on this roadway could be studied without complications which arise from additional travel lanes, roadway realignment, or substantial changes in speeds which could result from such modifications.

The paving of Antelope Road with rubberized asphalt was completed following a roadway widening project on this roadway around April of 1995. As a result, the roadway geometry varied considerably between the pre- and post-paving noise level measurement periods. An effort was made to conduct the noise level measurements at the same distance from centerline before and after the paving. However, due to the widening, the near travel lane moved closer to the noise measurement sites, and speeds increased due to reduced congestion on this roadway. It is not specifically known to what degree the change in roadway geometry and speeds affected the noise measurement results. It is likely, however, that the post-paving noise levels were marginally higher than had the widening not occurred.

The paving of the Bond Road control segment with conventional (non-rubberized) asphalt occurred as part of a roadway widening project in August of 1995. As a result of the roadway realignment, the roadway geometry varied considerably between the pre- and post-paving noise level measurement periods. An effort was made to conduct the noise level measurements at the same distance from centerline before and after the paving. However, due to the widening, the near travel lane moved closer to the noise measurement sites, and speeds increased due to reduced congestion on this roadway as well. It is not specifically known to what degree the change in roadway geometry and speeds affected the noise measurement results. It is likely, however, that the post-paving noise levels were marginally higher than had the widening not occurred, as was the case for Antelope Road.

Elapsed Time Between Measurements: In the Alta Arden assessment, the traffic noise measurement survey was conducted one month prior to the paving with rubberized asphalt. The survey was repeated one month after paving, 16 months after paving, and six (6) years after paving with rubberized asphalt.

In the Antelope Road assessment, a period of 16 months elapsed between the “before” and “after” noise measurements. The asphalt overlay was installed approximately 10 months into this period, around April of 1995. Therefore, the “before” measurements were conducted approximately 10 months prior to the paving, and the “after” measurements were about 6 months after the paving with rubberized asphalt. The measurement survey was subsequently repeated in September of 1999, approximately 4 1/2 years after the paving with rubberized asphalt.

In the Bond Road assessment, the traffic noise measurement survey was conducted one month prior to the paving with conventional asphalt. The survey was repeated one month after paving, and again four (4) years after paving with conventional asphalt.

Asphalt Compaction: Compaction of the asphalt overlay reduces the porosity of the road surface, which is believed to account for some of the noise reduction properties of the rubberized asphalt pavement. According to Sacramento County Public Works Agency, Transportation Division staff, the compaction of the paving material is essentially complete within one year of the paving. Therefore, the

varying periods of time which elapsed between the paving of the test roadways and the follow-up measurements provides insight into the effects of compaction on the noise-reducing properties of rubberized asphalt. The specific findings regarding compaction follow in a later section of this analysis.

Noise Measurement Duration, Equipment Locations and Configurations: The noise level measurement surveys initially consisted of continuous measurements over a minimum period of 24-hours, and short-term (15-minute) measurements at various locations along each of the three test subject roadways. The continuous noise level measurements were conducted to evaluate the differences in noise levels over 24-hour periods before and after the paving. A benefit of the continuous noise level measurements was that a statistically large sample of noise level data was obtained by which the effects of the rubberized asphalt could be generally evaluated. However, it was not practical to monitor and account for all of the factors which affected the measured noise levels over the continuous sampling periods. Therefore, the findings based on the continuous sampling are considered approximate and relevant only to the measurement periods which were not separated by extensive periods of time (i.e. periods during which traffic volumes and compositions would be expected to be relatively similar).

The short-term noise level measurements were conducted at various distances from the roadway centerlines. The continuous and short-term traffic noise measurements were conducted at a microphone height of 5 feet above ground. These measurements provided a statistically smaller sample of data by which to evaluate the effects of rubberized asphalt than did the results of the continuous monitoring, but traffic counts conducted during the short-term samples allow normalization of the measurement data as discussed previously in this report. The short-term sampling periods also allow for monitoring of all factors, which affect the traffic noise measurement results. Therefore, the normalized results of the short-term samples are believed to provide a more reliable indication of noise reduction attained by the use of rubberized and conventional asphalt paving materials on the test subject roadways.

Larson Davis Laboratories (LDL) Model 870, 700 and 820 integrating sound level meters were used for the continuous and short-term noise level measurements. The meters were calibrated before use with LDL acoustical calibrators to ensure the accuracy of the measurements. The equipment used meets all applicable specifications of the American National Standards Institute for precision sound level measurement systems. The equipment configurations were identical for all of the before and after measurements, with the meters set to the A-weighting network and slow response.

Atmospheric Conditions: Weather conditions were considered to be effectively similar for the before and after short-term traffic noise level measurements at each location. However, due to the close proximity of the noise level measurement microphones to the roadway centerlines, variations in weather conditions between the before and after noise level measurement periods are not

believed to have significantly affected the measurement results. In all cases, the measurements were conducted on dry pavement.

Traffic Volume, Speed and Heavy Truck Usage: The continuous and short-term noise level measurements were conducted during typical weekday periods. Given the relatively long period between the initial and final noise measurement periods (4 to 6 years), the traffic volumes are believed to have varied significantly. Therefore, continuous noise level measurements were not used during the 1999 measurement surveys as use of such data could lead to erroneous conclusions regarding the noise-reducing properties of rubberized asphalt.

Traffic counts conducted during the short-term samples indicated that heavy truck traffic accounted for a very low percentage of the total traffic on each of the test subject roadways during those measurement periods. This finding is important in that heavy trucks generate considerably more engine and exhaust noise than automobiles, as stated previously. As a result of the low number of heavy trucks, the traffic noise was generated primarily by the interaction of tires and pavement, which is the component of the traffic noise intended to be isolated in this study.

Average vehicle speeds were observed to be marginally after paving at the test subject roadway locations where an additional lane was added, and fairly similar at the locations where the roadway geometry was not significantly altered. This assumption is based on observations and speedometer checks.

Specific Sacramento County Rubberized Asphalt Test Results

The normalized and averaged results of the various traffic noise surveys conducted on the three test subject roadways are presented in Table 4. The Table 4 data is presented in the form of changes in traffic noise levels relative to pre-paving conditions.

Table 4
Rubberized and Conventional Asphalt Noise Test Results
Sacramento County Roadways

Roadway	Pavement Type	Duration of Time Elapsed After Paving	Change in Noise Levels, dB Leq
Alta Arden Expressway	Rubberized Asphalt	1 month	-6 dB
Alta Arden Expressway	Rubberized Asphalt	16 months	-5 dB
Alta Arden Expressway	Rubberized Asphalt	6 years	-5 dB
Antelope Road	Rubberized Asphalt	6 months	-4 dB
Antelope Road	Rubberized Asphalt	5 years	-3 dB
Bond Road	Conventional Asphalt	1 month	- 2 dB
Bond Road	Conventional Asphalt	4 years	0 dB

Notes:

The change noise levels shown in the far right column represents the average change in noise levels observed on the roadway test site at the nearest measurement locations to the roadways. For Alta Arden and Antelope Road, the change represents the average noise reduction of three test locations for each roadway. For Bond Road, there was only one test location. Due to the time elapsed between the earliest and latest noise measurements, the results were normalized for speed and traffic volume to isolate the noise-reducing properties of the paving materials.

Evaluation of the Table 4 data indicates that, immediately after paving the test roadways with rubberized and conventional asphalt, traffic noise decreased along all three roadways. However, once a sufficient amount of time had elapsed for the various roadways to be fully compacted, the roadways paved with rubberized asphalt still exhibited good traffic noise reduction, whereas the noise reduction of the conventional asphalt overlay was lost.

As stated previously, the Antelope Road test procedure was complicated in that the pre and post-paving tests were conducted on different roadway geometries. Because of this change in geometries, the noise reducing properties of the rubberized asphalt on that roadway may have been slightly understated as post-paving traffic was considerably closer to the measurement sites than pre-paving conditions. The changes in noise reduction of the rubberized asphalt on Alta Arden and Antelope noted between the tests conducted shortly after the paving and those conducted several months and years later (1 dB drop in noise reduction), is believed to be due to compaction of the roadway surfaces.

CONCLUSIONS OF THE STUDIES CONDUCTED IN SACRAMENTO COUNTY

This analysis concludes that the use of rubberized asphalt on Alta Arden Expressway and Antelope Road resulted in a net decrease in traffic noise levels of approximately 4 dB over that provided by conventional asphalt. These conclusions hold for both the near and long-term conditions. The noise reduction provided by the rubberized paving was achieved predominately in the 500 to 4,000 Hertz frequency bands, which is consistent with the frequency character of tire noise.

These local test results, when considered with other studies conducted nationally and internationally, support the use of rubberized asphalt as a viable noise mitigation option. Its use could, in some cases, eliminate the need for noise barriers or reduce the heights of the barriers required to achieve satisfaction with local, state and federal noise standards.

It should be noted that the effectiveness of rubberized asphalt in reducing traffic noise levels would be highest on roadways with relatively low percentages of heavy duty trucks, as truck engine and exhaust stack noise is not believed to be substantially affected by rubberized paving.

- Appendix A - Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.

Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the AMaximum@ level, which is the highest RMS level.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

- Appendix B -
Noise Standards Commonly Applied in Sacramento County

Sacramento County Noise Element Policies

The Sacramento County Noise Element establishes land-use compatibility criteria for both interior and exterior areas of various land uses. The County Noise Element policies which pertain to transportation noise follow.

- NO-1:** Noise created by new transportation noise sources should be mitigated so as not to exceed 60-dB Ldn/CNEL at outdoor activity areas of any affected residential lands or land use situated in the unincorporated areas. When a practical application of the best available noise-reduction technology cannot achieve the 60-dB Ldn/CNEL standards, then an exterior noise level of 65-dB Ldn/CNEL may be allowed in outdoor activity areas.
- NO-4:** Where residential land uses are proposed in areas exposed or projected exterior noise levels exceeding 60 dB Ldn / CNEL or the performance standards described above, an acoustical analysis shall be required as part of the environmental review process.
- NO-6:** The compatibility of proposed nonresidential projects with existing and future noise levels due to transportation noise sources shall be evaluated through a comparison to the standards described in Table 5 (below) and Table II-3 found in the Sacramento County Noise Element of the General Plan.
- NO-7:** Proposed Development of Residential land uses should not be permitted in areas exposed to existing or project levels of noise from transportation which exceed 60 dB to 65 dB Ldn / CNEL unless the project design includes effective mitigation measures to reduce noise.

Table 5
Sacramento County Noise Element Noise Standards
Exterior Noise Level Standard, Ldn

Land Use Category	Acceptable	Conditionally Acceptable
Residential	60	75
Agriculture Residential	65	75
Churches	60	70
Golf Courses	75	80
Office/Commercial/Professional	65	75
Industrial/Utilities/Agriculture	70	80

Source: Sacramento County Noise Element

In addition to the Noise Element Noise Standards above, the General Plan Noise Element includes standards for acceptable noise levels for the interior spaces of noise-sensitive land uses affected by Transportation Noise. Those interior noise level standards are shown in Table 6.

Table 6
Acceptable Noise Levels In Unoccupied Rooms Affected By
Transportation Noise

Location	Average Sound Level¹ dBA
Radio studies, recording studios	25-30
Music Rooms	30-35
Concert halls, auditoriums	30-35
Theaters (speech)	30-35
Motion picture theaters	40-45
Churches	35-40
Conference rooms, small offices	40-45
Classrooms	35-45
Public offices, banks, stores	45-50
Hospitals	40-45
Restaurants, cafeterias	45-50
Court rooms	40-45
Libraries	40-45

1. Leq in worst-case hour during periods of use.

California Environmental Quality Act Guidelines (CEQA)

The California Environmental Quality Act guidelines state that transportation noise will have a significant impact if it "Increased substantially the ambient noise levels for adjoining areas". There are several criteria CEQA uses to assess the transportation noise impact on a project.

1. If the exposure of persons to or generation of noise levels result in an excess of standards established the local general plan or other applicable standards
2. If the project results in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
3. If the project results in substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Federal Policies

The criteria for evaluating noise impacts that are used by the Federal Highway Administration and Caltrans are contained in the Caltrans Traffic Noise Analysis Protocol (the Protocol). The Protocol establishes Noise Abatement Criteria (NAC) for various land uses. Table 7 presents a summary of the Federal Noise Abatement Criteria.

Table 7
Federal Noise Abatement Criteria
[Hourly A-Weighted Sound Level-decibels (dBA)¹]

Activity Category	Leq (h), dBA	L10(h), dBA	Activity Category Description
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	C	C	Undeveloped Lands.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

1 Either L10(h) or Leq(h) (but not both) may be used on a project.

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ATTACHMENT 8

University of Nevada, Reno

Evaluation of Tire Rubber-Modified Asphalt Mixtures

A thesis submitted in partial fulfillment of the
Requirements for the degree of Master of Science in
Civil and Environmental Engineering

by

Stephanos H. Khalil

Dr. Peter E. Sebaaly/Thesis Advisor

May 2021

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**UNIVERSITY
OF NEVADA
RENO**

THE GRADUATE SCHOOL

*We recommend that the thesis
prepared under our supervision by*

STEPHANOS H. KHALIL

entitled

Evaluation of Tire Rubber-Modified Asphalt Mixtures

*be accepted in partial fulfillment of the
requirements for the degree of*

MASTER OF SCIENCE

Peter E. Sebaaly, Ph.D., Advisor

Elie Y. Hajj, Ph.D., Committee Member

Adam Hand, Ph.D., Committee Member

Mariah Evans, Ph.D., Graduate School Representative

David W. Zeh, Ph.D., Dean, Graduate School

May, 2021

ABSTRACT

In the late 1960's, the use of scrap tire rubber (TR) started in Arizona, USA with the intent to modify the properties of asphalt binders used in paving applications. Nevertheless, few States allowed its use in selected application types such as open-graded asphalt mixtures, gap-graded asphalt mixtures, and surface treatments. However, its use in dense-graded asphalt mixtures has been very limited because of the lack of performance records.

This thesis focuses on evaluating the engineering properties and performance characteristics of Terminal Tire Rubber (TTR) asphalt mixtures when compared with asphalt mixtures manufactured using neat and polymer-modified asphalt binders. Mix designs were performed using seven asphalt binders: one neat, 3 modified at various % TR (i.e., 10, 20, and 28%), 3 modified at various %TR and Styrene-Ethylene-Copolymers (SEC) (i.e., 10, 20, and 28% TR with 3% SEC per binder). All mixtures were manufactured using recycled asphalt pavement (RAP material with 25% content) and hydrated lime (as an additive). The mix designs were conducted following the Superpave standard method and evaluated using Tensile Strength Ratio (TSR) test for moisture sensitivity. Moreover, all mixtures were evaluated in terms of engineering property using the dynamic modulus test, resistance to permanent deformation using the repeated load triaxial (RLT) test, resistance to reflective cracking using the Texas Overlay test, and resistance to fatigue cracking using the bending beam fatigue. For the sake of brevity and limitation in time, results related to fatigue cracking were not presented in this document.

Based on results from the asphalt binders and mixtures tested in this study, it was recommended that the TTR binder be considered for further pavement application due to

its noticeable homogeneity during testing and ease of pumping without any segregation. Moreover, the lime percentage should be increased in order to meet the minimum TSR requirement as per Superpave. On one end, the engineering property and rutting performance life mixtures with 28%TR and 3% SEC are expected to exhibit optimal performance when placed on heavy trafficked roads. However, further analyses remain needed to evaluate the fatigue performance life of such mixtures characterized with high stiffness. On the other end, the reflective cracking results showed that mixtures with 10% TR and 3% SEC exhibited an optimum performance when used in overlay applications.

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Chapter 1. Introduction

1.1. Overview

The durability of Asphalt Concrete (AC) pavements has been gaining interest in the asphalt industry, along with the implementation of new mix design methodologies, as well as new additives and modifiers techniques. AC or flexible pavements may encounter several types of distresses under different traffic levels and climatic conditions, due to their viscoelastic behavior. Accordingly, these pavements shall be stiff enough to withstand the high traffic loading during hot weathers without excessive permanent deformation or rutting. On the other side, they shall be soft enough to resist the fatigue damage and thermal cracking, at intermediate and low temperatures, respectively. Additionally, it is always desired to improve the recovery of AC pavements due to their elastic component, with the aim of reducing the relative permanent deformation.

The viscoelastic properties of flexible pavements are induced by the asphalt binder component, which is characterized with high viscosity in cold weathers, making these roadways brittle and susceptible to many types of cracking. Whereas, the reduced stiffness of the asphalt binder during hot seasons, engenders rutting or permanent deformation in the wheel path. There comes the need to introduce some modifiers in order to improve the properties and mitigate these distresses induced by the viscoelastic behavior of asphalt binders. The styrene-butadiene-styrene (SBS) copolymer is a common modifier used recently, to improve rutting and fatigue characteristics of asphalt binders. However, the asphalt industry was targeting the use of recycled modifiers, being more economic and environmental friendly to enhance the properties of AC mixtures. The used tires were

usually stockpiled and land-filled, which have threatened the environment and public health, extensively. Consequently, the use of tire rubber in asphalt mixtures has been considered an effective approach to improve the performance of flexible roadways (Han et al. 2016).

In the late 1960's in Arizona, USA, the use of scrap tire rubber started to modify the asphalt binder used in paving applications. Nevertheless, few states accepted its use mainly in open-graded and gap-graded asphalt mixtures, and surface treatments, while its use in dense-graded asphalt mixtures has been very limited because of the lack of performance records.

The terminal blend tire rubber is a new promising technique of incorporating the tire rubber into asphalt mixtures, using a smooth and uniform production process prior to the transportation on job site (Huang et al. 2019). Asphalt mixtures modified with terminal tire rubber exhibit many advantages in pumping, mixing, stability, and storage, hence making the production and application process easier. In addition to the tire rubber modification, some polymers such as SBS are integrated to mitigate the reduction of rubber elasticity in the asphalt mixtures, which may increase the asphalt binder viscosity and result in many construction challenges. Considering the economic and environmental benefits of modifying asphalt mixtures with tire rubber, associated with the improved rutting and fatigue life, the presented study conducted a comprehensive analysis to evaluate the performance of terminal blend tire rubber mixes at different doses and/or Styrene Ethylene Copolymer (SEC) modified mixtures, with respect to the control asphalt mixture with neat asphalt binder.

1.2. Objective and Scope of Work

This report presents the data generated from an extensive laboratory experiment conducted to evaluate the performance properties of tire rubber-modified asphalt mixtures. The latest technologies were used to evaluate properties and characteristics of asphalt mixtures that are critical to their resistance to the various distresses. The overall evaluation process is concisely stated below:

1. Ensure that all un-modified and modified asphalt binders meet the Superpave Performance Grading System for Asphalt Binders.
2. Ensure that all aggregates meet the Superpave aggregate consensus property requirements.
3. Identify the optimum binder content (OBC) of each asphalt mixture following the Superpave Volumetric Mix Design Method.
4. Measure the engineering properties of the various asphalt mixtures at their OBCs in terms of the dynamic modulus E^* master curve.
5. Measure the following performance characteristics of the various asphalt mixtures at their OBCs:
 - a. Resistance to rutting in terms of the Flow Number and develop a rutting model
 - b. Resistance to reflective cracking in terms of critical fracture energy and crack resistance index and develop an overlay tester test model

- c. Resistance to fatigue cracking in flexural bending and develop a fatigue model
- 6. Conduct level evaluations of the various mixtures based on simple/statistical comparisons of their engineering properties and performance characteristics.
- 7. Conduct second level evaluations of the various mixtures based on their performance in flexible pavements through advanced mechanistic-empirical pavement analysis.

Chapter 2. Literature Review

2.1. General Background

Asphalt binder is a viscoelastic material produced by distillation of crude oil, and known for its good mechanical and rheological properties that make it useful for road surfaces. With the aim of enhancing these properties and supporting a sustainable transportation system, asphalt binder requires the addition of some modifiers (Hallmark-Haack et al. 2019). The most common modifiers are polymers, a petroleum-derived thermoplastic elastomer, such as styrene-butadiene-styrene (SBS). However, the price of asphalt binder and SBS polymer increased due to the lack of global crude oil reserves and to the higher demand for petroleum products. Subsequently, rubberized asphalt has gained much interest with the increase of asphalt prices during this period (Masoud and Harvey 2020). As per Hallmark-Haack et al. (2019), it is imperative to have technology that will keep up with the continuous increase in traffic volume and load levels. Therefore, Ground Tire Rubber (GTR) is a good alternative to support the required sustainable transportation system.

The accumulation of end of life tires (ELTs) and premature pavement failures are both interconnected and dependent on each other due to the enormous increase in traffic density and axle loading (Lo Presti 2013). The United States (US) generates almost 270 million waste tires each year, where approximately 27 million end up either in landfills or dumps (Hallmark-Haack et al. 2019), and about 12 million scrap tires are converted into ground tire rubber for modifying asphalt cement (Bruns and Hashemi 2019). Waste tires are a non-biodegradable product where it can be breeding grounds for rodents and mosquitos, as well as fire hazard, thus presenting health and environmental risks. Rubber is the main

component of tires that is extremely durable and resilient, which makes tires hard to dispose. On the other hand, these properties also make them useful for reuse in several applications (Hallmark-Haack et al. 2019).

Masoud and Harvey described the history of rubberized asphalt starting with the first experiments of incorporating natural rubber into asphalt back in the 1840s, and the concept of modifying asphalt binder with natural and synthetic rubber was introduced in 1843 (Masoud and Harvey 2020). It took until late 1930s, until rubber-asphalt materials were used as joint sealers, patches, and membranes. In 1960s, the head material engineer in Phoenix, Arizona, Charles MacDonald employed ground tire rubber as an additive in asphalt binder and allowed it to blend for 45 to 60 minutes. MacDonald observed swelling in the size of rubber particles after blending, which may reveal new material properties. Thereafter, Arizona experienced the first use of crumb rubber modified asphalt binders in 1964 as overlay of an existing pavement (Masoud and Harvey 2020). Nowadays, the recycled tire rubber is being used in new tires, tire-derived fuel, molded rubber products, agricultural uses, and rubber modified asphalt applications, which reduces the amount of waste tires in landfills. The benefits of integrating rubbers from tires into asphalt binders has been widely expanded and acknowledged (Lo Presti 2013).

GTR meets all three sustainability criteria: economic growth where it is cost-competitive to other polymer additives and modifiers, environmental protection by using recycled material, and social equity by regulations to encourage the use of recycled materials (Hallmark-Haack et al. 2019). Accordingly, local, state, and federal regulations have made improvements toward using more recycled materials in pavements, such as ground tire

rubber (GTR). In order to implement more sustainable options and receive federal funds, states were mandated starting 1994, to use annually increasing amount of rubberized asphalt, starting with 5 % up to 20 %, in federally funded highway projects. This effort was part of the Intermodal Surface Transportation Efficiency Act (ISTEA), which was later repealed in 1995, while providing states with up to 500,000 dollars individual grants for research and expansion of rubberized asphalt use in roadways. In the 2000s, the crumb rubber has proved able to improve flexible pavements performance and durability, with better familiarity with this product and advanced technologies (Masoud and Harvey 2020). A survey study conducted by Blumenthal et al. in 2013, found that 25 state DOTs use crumb rubber in asphalt pavements, as per **Figure 1**. Other states may be reluctant for crumb rubber applications, based on some unsuccessful previous experience.



Figure 1. State DOTs that use tire rubber in asphalt pavements as of 2013.

A more recent survey in 2016 conducted among 37 U.S. state DOTs and one Canadian DOT, shows that 54% of the surveyed states include GTR as a component in asphalt concrete (AC) mixtures. As per **Figure 2** the higher use of GTR in this survey can be credited to the superior performance, environmental benefits, incentives, and cost effectiveness of rubberized asphalt mixtures (Hallmark-Haack et al. 2019).

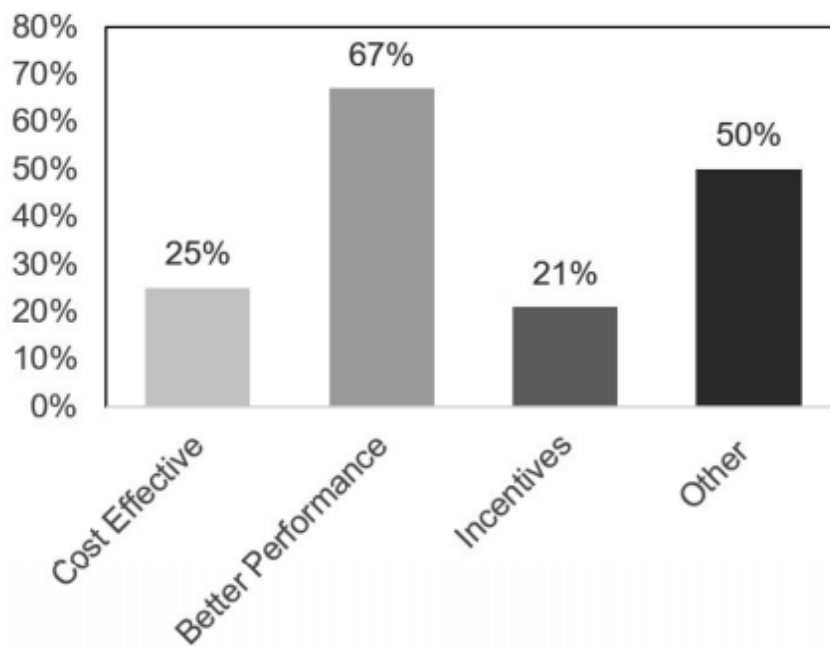


Figure 2. Results of 2016 state DOT survey.

Ghabchi et al. performed a survey in 2016, indicating the general field applications where crumb rubber has been employed, including fog seals, chip seals, stress absorbing membrane interlayer (SAMI) and many others. The results in **Figure 3** suggest that crumb rubber was mostly used in chip seals and thin overlay dense-graded pavement applications by many state DOTs (Masoud and Harvey 2020).

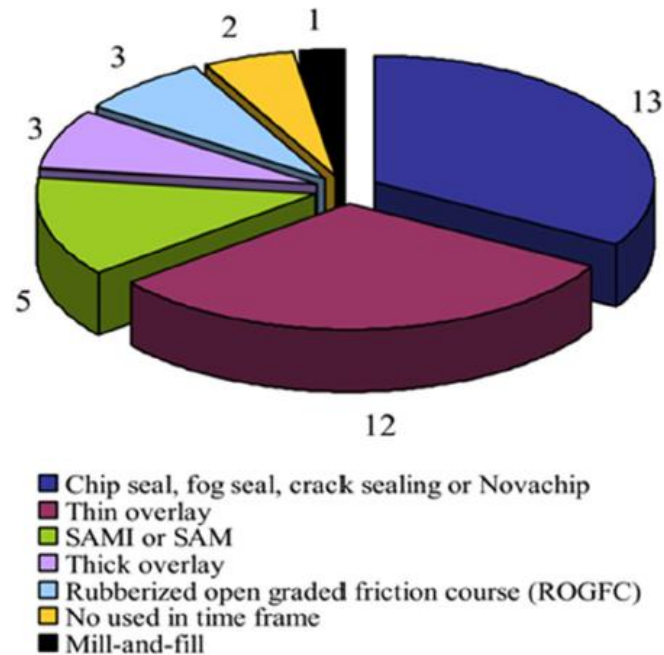


Figure 3. State DOT survey 2016 of crumb rubber applications.

Furthermore, rubberized asphalt mixtures have provided smoother ride and reduced noise compared to conventional asphalt mixtures, along with better skid resistance and winter maintenance. In addition, asphalt rubber has improved high resistance to rutting associated with a higher resistance to thermal, reflective, and fatigue cracking. Despite all the benefits of GTR implementation into asphalt binder, there are some challenges that should be mentioned. The first is a workability challenge introduced by a viscosity increase, which can be mitigated with a polymer modifier. A second challenge is the stability of GTR in asphalt concrete mixtures. GTR is heavier than asphalt binder, which may cause settlement over time (Hallmark-Haack et al. 2019).

From the structural point of view, the tread, the body, the side walls, and the beads are the main components of a tire as presented in **Figure 4**. The tread is the upper pattern in contact with the road. The body gives the tire its shape and supports the tread. Beads are metal-wire bundles covered with rubber, which helps holding the tire on the wheel (Lo Presti 2013).

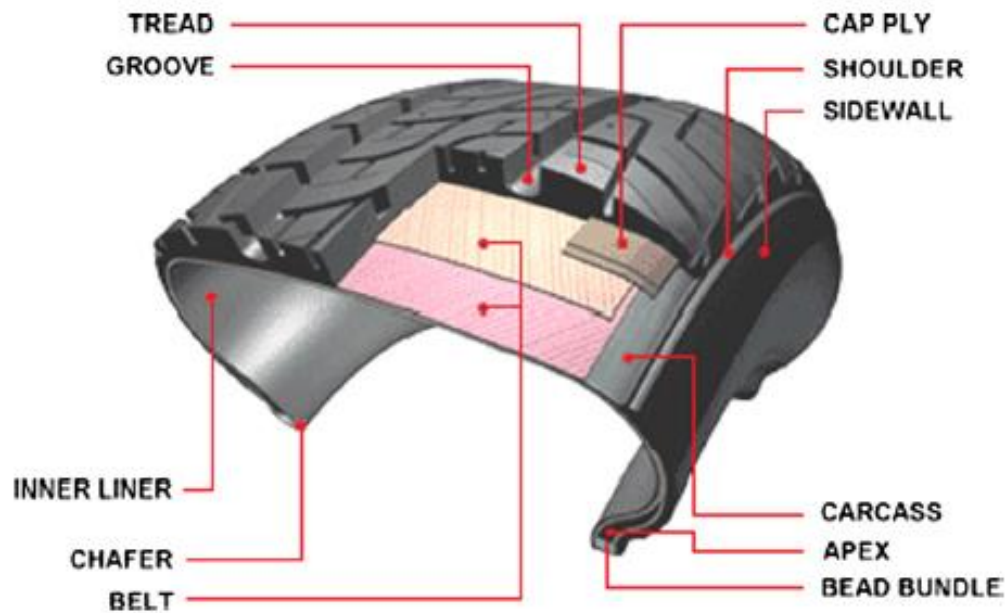


Figure 4. Tire structure.

Production, consumption, collection of used tires, and waste management constitute the tire life cycle where the size of shreds and chips is reduced at the end of its life in order to produce GTR. The latter are suitable to be re-used in the asphalt industry, and Crumb Rubber Modifier (CRM) is the common name used to modify asphalt binders.

Today's production of crumb tire rubber, from handling to shredding, is a highly controlled and consistent process. During the process, the tire's reinforcing wire and fiber are removed. Ambient grinding is a mechanical grinding, performed by means of rotating blades and knives, in which the critical step is the separation of the steel fibers. It is a processing method where scrap tire is ground or processed at or above ordinary room temperature. The product is irregularly shaped, torn particles having relatively large surface areas allowing interaction with the asphalt binder. On the other hand, cryogenic grinding involves the use of liquid nitrogen to freeze the tire and make it brittle at a temperature typically between -87 to -198 °C, the frozen tire is crushed in a hammer mill into smooth particles having relatively lower surface area than those obtained by ambient grinding.

Using method known as “dry process”, two Swedish companies introduced the GTR material as a portion of the mineral aggregates in order to design obtain an asphalt mix resistant to studded tires as well as to snow chains (Lo Presti 2013). In the same period, Charles McDonalds, was the first to introduce the “wet process” illustrated in **Figure 5**, generated from thoroughly mixing GTR with the asphalt binder for a period of 45 - 60 min. Nowadays, asphalt rubber obtained as a result of the wet process, has proven successful in roads built in the last 30 years. The nature of the mechanism by which the interaction between the asphalt binder and the GTR that takes place in the wet process has not been fully characterized (Lo Presti 2013). It has been reported that the interaction is not chemical in nature and the swelled rubber particles are not the only reason for the increase in binder viscosity. The wet process technology comprises two simultaneous processes: partial digestion of the GTR particles into the asphalt binder and adsorption of the aromatic oils in the binder into the polymeric chains of the GTR particles. The absorption of aromatic

oils from asphalt binder into the rubber's polymer chains causes the rubber to swell and soften. The use of the GTR modified asphalt in roadways built in the last 40 years, proved the success of the "wet process" technology. Asphalt mixtures produced with GTR modified asphalt binders have been used in different parts of the world as solutions for multiple quality problems and have enhanced the performance of pavements, despite some downsides, in the majority of the cases (Lo Presti 2013).

During the period between 1985 and 1994, 17 test sections composed of dense graded, open-graded, and gap graded HMA, were constructed by the Oregon Department of Transportation (ODOT), using the wet and the dry processes for GTR modified asphalt mixtures (Masoud and Harvey 2020). The sections were visually assessed and evaluated for smoothness using the South Dakota-type profilometer. The findings of this study showed that both processes, exhibited a lower performance than the control sections of dense graded crumb rubber mixtures. The dry process mixtures showed the worst performance among the evaluated sections. Same observations were found by a Florida DOT study, where crumb rubber projects were evaluated for 10 years starting in 1999. The test section results emphasized on the wet process effectiveness in improving the cracking resistance within surface mixtures. The percent cracking observed within the CRM wet process sections ranged between 1 and 6 % of their surface, compared to 30 % for the dry process test sections (Masoud and Harvey 2020).

Lo Presti listed several terminologies that were used to describe the incorporation of tire rubber in asphalt binder. These terms may have different production or preparation methods, mix composition, structural and physical properties (Lo Presti 2013).

- McDonald process: This process consists of blending GTR with asphalt binder in a blending tank. The binder is then transferred into a holding tank provided with augers to ensure circulation for 45 - 60 min to allow for proper reaction within the blend.
- Continuous blending-reaction systems: This system is similar to the McDonald process, the difference is that the GTR is continuously blended with the asphalt binder during the blend production by means of a unique unit with agitators where the reaction takes place and can be stored for later use.
- Field blends: The blend is typically produced at the asphalt plant by incorporating some modifications to the existing asphalt plant.
- Terminal blends: This process consists of digesting the crumb rubber into the asphalt binder at the refinery or at the terminal, and subsequently deliver the modified binder to the mixing plant when needed.

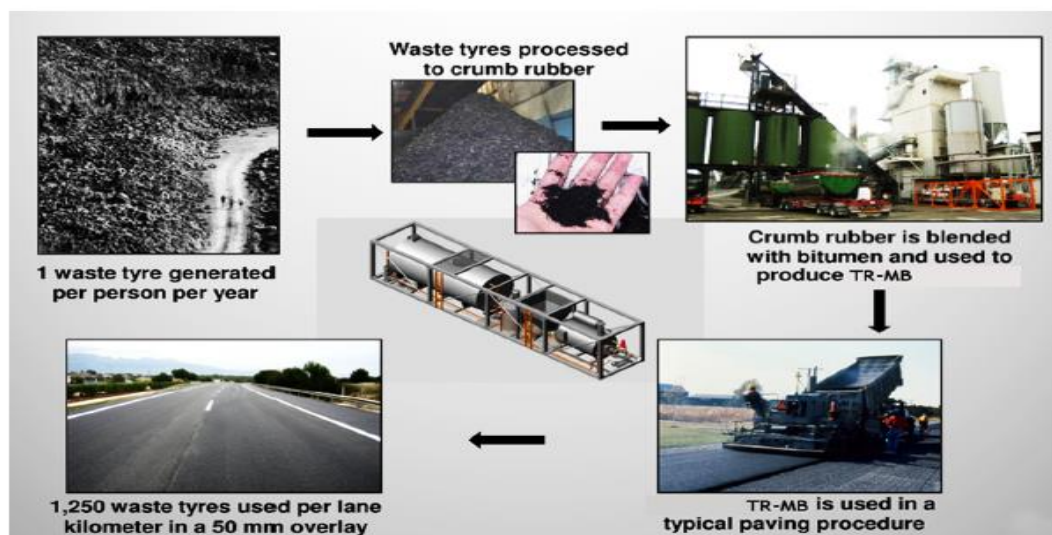


Figure 5. Scheme of rubberized asphalt production through the wet process.

Table 1 summarizes the main properties for the most three common processes adopted in modifying asphalt concrete mixtures with tire rubber.

Table 1: Dry and wet process properties (Masoud and Harvey 2020)

Dry Process	Wet Process (on-site Blending)	Wet Process (Terminal Blend Tire Rubber (TTR))
<ul style="list-style-type: none"> Aggregate Replacement Process Added similarly to the RAP at the mix production plant Larger rubber particles: 1 to 4.75 mm Cryogenic rubber typically used The mixture aggregates should be Gap-graded 	<ul style="list-style-type: none"> Field blended at 350 to 400°F (175 to 200°C) for 45 to 60 minutes Swelling of rubber particles after asphalt binder absorption Further to the absorption and swelling → AR binder viscosity increases AR binder viscosity slightly decrease with reaction time → digestion Increase in production and paving temperatures 	<ul style="list-style-type: none"> Produced at a supplier's terminal and shipped to the mix production plant GTR particles < 0.6mm Transport vehicles and storage tanks with agitation are recommended Continuous agitation in the storage tanks via recirculation pumps and stirring paddles

2.2. Tire Rubber (TR) Binder Rheological Properties

State DOTs have conducted several studies that indicate the success of the wet-processed CRM asphalt binders on flexible pavement performance. CRM used in normal HMA mixtures have significantly improved the properties of asphalt binder and its effect is nearly similar to the addition of polymer to conventional asphalt cement. CRM increases the binder stiffness, and thus effectively reducing rutting; whereas the much increased film thickness and improved ductility generally mitigates the fatigue cracking in asphalt pavements (Shu and Huang 2014).

Most of the distresses observed in AC pavements, are mainly due to the viscoelastic behavior of asphalt binder with time and temperature dependent behavior. At low temperatures, asphalt binders experience significant brittleness while it exhibits viscous behavior at high temperatures. Modifiers are needed to enhance asphalt binders properties by increasing their stiffness at high temperatures while keeping it flexible at intermediate and low temperatures (Behnood and Olek 2017). Behnood and Olek evaluated the rheological properties of modified asphalt binders with varying dosages of styrene-butadiene-styrene (SBS), ground tire rubber (GTR), or polyphosphoric acid (PPA). The conventional performance grading (PG) was adopted in this study. The dynamic shear rheometer (DSR) test was conducted on original, rolling thin film oven (RTFO) aged, and pressure aging vessel (PAV) aged binders, whereas the bending beam rheometer (BBR) test was employed to determine the low PG. **Figure 6** and **Figure 7** illustrate the rutting parameter ($G^*/\sin\delta$) from the DSR test on original and RTFO aged binders, respectively. It can be inferred from **Figure 6** that the rutting parameter of the binder with 8% GTR started to get lower compared to the binder with 4% SBS, after 52°C. **Figure 8** shows the DSR results on the PAV aged binder, confirming the high effectiveness of GTR in reducing the brittleness of the aged binder as compared to SBS and PPA modifications. The BBR results in terms of stiffness and m-value are shown in **Figure 9** and **Figure 10**, respectively. **Figure 9** presents a notable trend where the stiffness decreases with higher GTR percentages at low temperatures. On the other hand, the SBS and PPA modifiers showed a slight decrease in stiffness, when compared to the neat binder. In terms of m-value, GTR and SBS surprisingly decreased the relaxation parameter relative to the control neat binder, particularly at -6°C. Despite the fact that PPA was capable of bumping the m-value of the

binder, this increase was not statistically significant as per Bonferroni's multiple comparison tests. It should be mentioned that the authors indicated some limitations of the BBR test, specifically for the m-value. They suggest that the m-value parameter cannot address the elastomer effect, which increases the binder tensile strength while reducing its ability for stress relaxation.

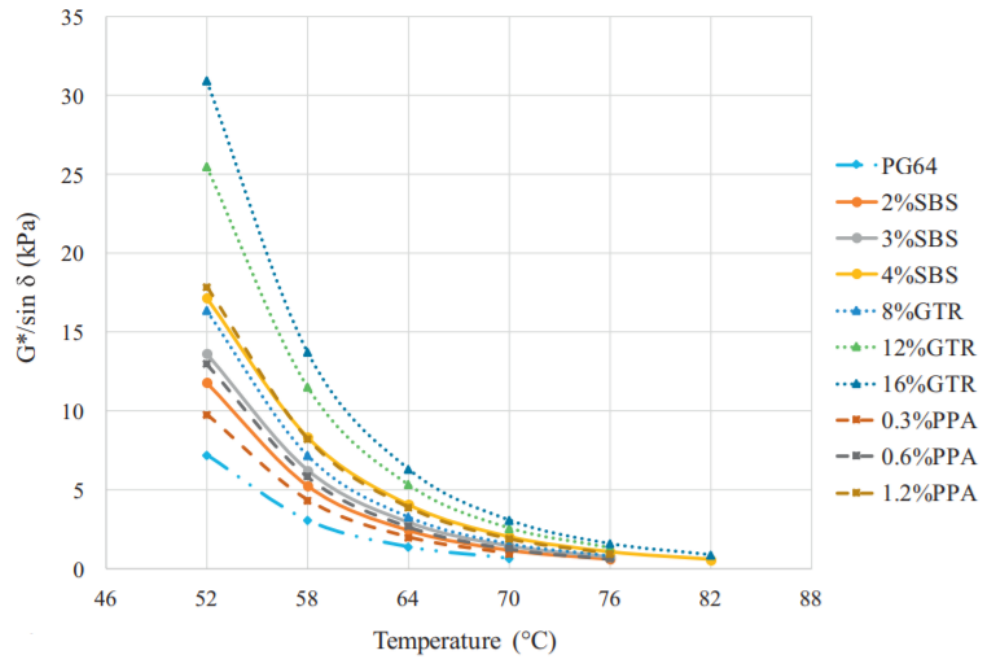


Figure 6. Rutting parameter of original binders from DSR test.

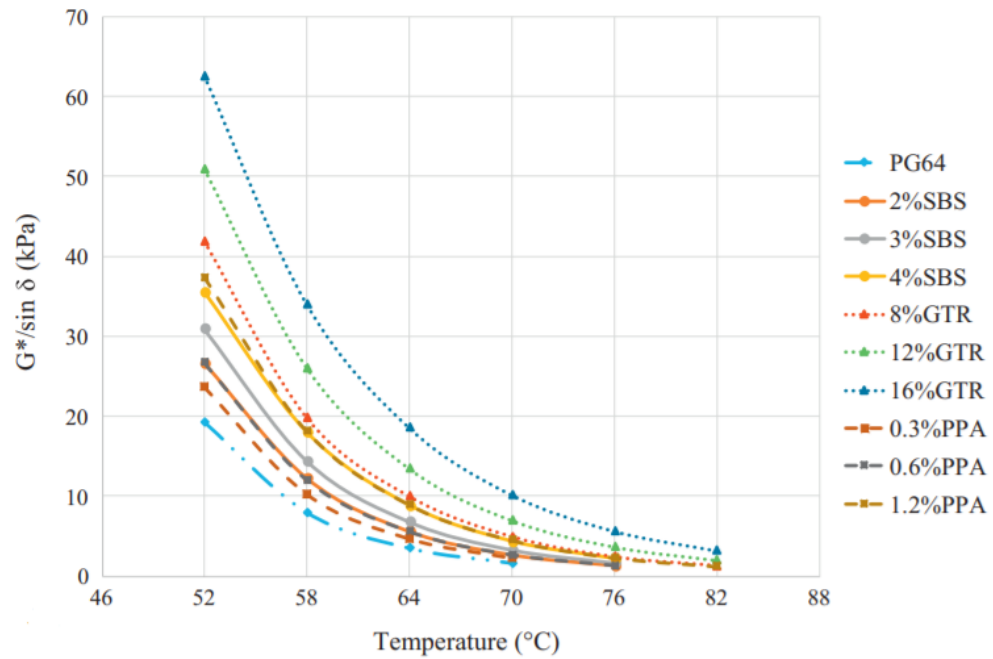


Figure 7. Rutting parameter of RTFO aged binders from DSR test.

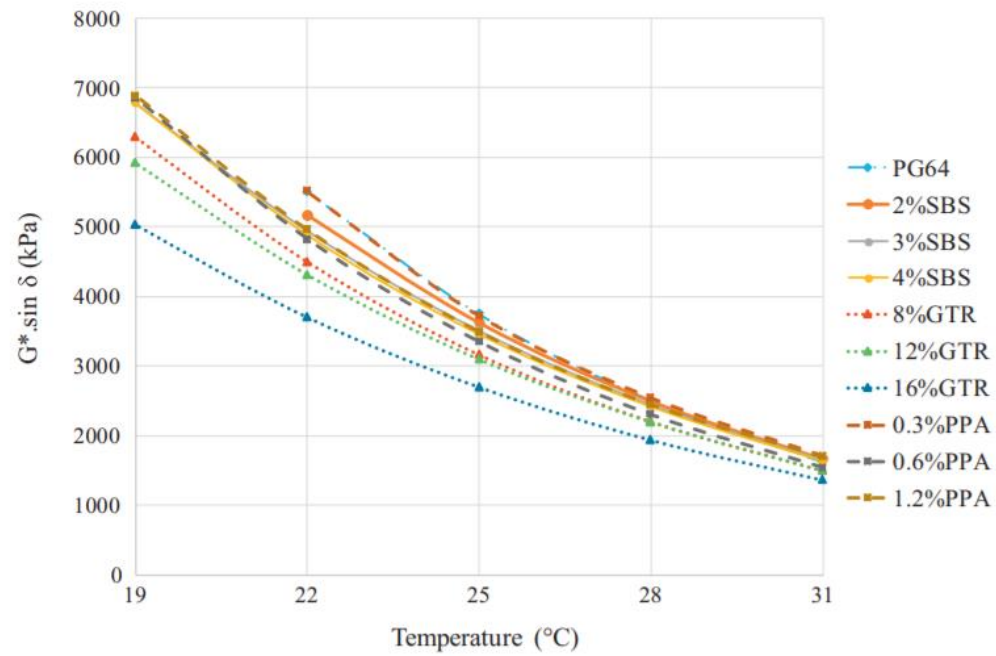


Figure 8. Intermediate temperature parameter of PAV aged binders from DSR test.

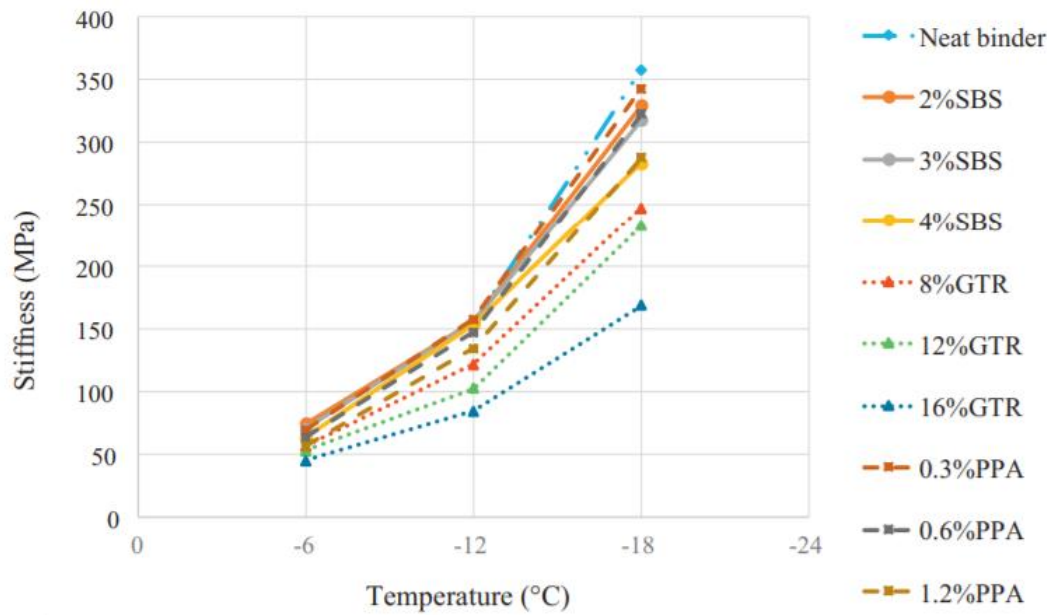


Figure 9. Stiffness for PAV aged binders from BBR test.

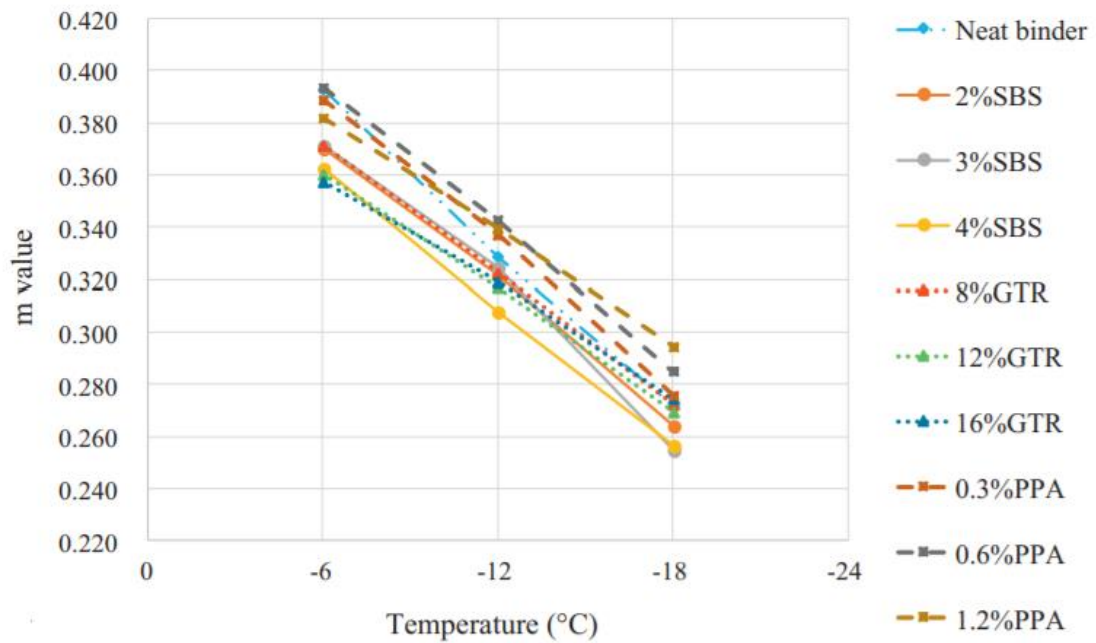


Figure 10. Slope (m-value) for PAV aged binders from BBR test.

Based on the presented experimental and statistical analyses, the main conclusions found in this study by the research team included:

- A considerable improvement at high temperatures was noticed by the three types of modifiers investigated, through increasing the binder stiffness and complex shear modulus, while lowering the phase angle.
- At intermediate temperature, only the GTR was able to decrease the binder stiffness significantly, with higher reduction at lower intermediate temperatures.
- All three modifiers reduced the binder stiffness at low temperatures, based on the BBR test results, with an overall effect on the low true PG being at most 2°C. However, the GTR modifier did not improve the relaxation parameter (m-value) considerably.

Similarly, Trejos et al. proposed that many mix design and performance testing of HMA samples trends can be expected from the performance grade of the asphalt binders. The high temperature PG may indicate the rutting resistance of HMA, while the low temperature PG may correlate with the expected resistance to thermal cracking. In addition, the higher the viscosity of the asphalt binder, the higher the optimum binder content (OBC) for the mix design (Castillo et al. 2018).

Three TTR binders were investigated in this study including a PG70-10 neat asphalt binder, a PG70-16R modified asphalt binder produced with a Rapid Digestion Process with 50% tire rubber (RDP50), and a PG70-28TR modified asphalt binder with a blend of RDP50 and SEC polymer (Castillo et al. 2018). The following observations were made according to the experimental results of this study:

- Higher rotational viscosity (RV) values of the asphalt binder at 275°F leads to higher OBC.
- The PG70-16R (RDP50) binder has the highest true PG, which may indicate a better rutting resistance than the other two binders.
- The PG70-28TR binder has lower temperature susceptibility than the other two binders.
- The PG70-28TR binder has the lowest true low PG, and intermediate PG, which is consistent with the nomenclature of the binder. This may indicate that this binder may outperform the other two binders for fatigue resistance.
- According to AASHTO M320, the real Performance Grade of the PG70-16R (RDP50), and the PG70-10 were PG70-22R, and PG70-16, respectively.
- Care must be taken when conducting the BBR test, since the high flexibility of the rubber may result in high deformations. If the sample accumulates more than 4 mm of deformation, the elastic theory is not valid for the sample.

2.3. TR Mixture Laboratory Performance

Hajj et al. described the terminal blend tire-rubber (TTR) as modified asphalt binder produced at the asphalt refinery using fine GTR materials that are typically blended and fully digested into the binder (Hajj et al. 2011). During the mid-1980's, the first initiative of using terminal blend tire rubber modified asphalt binders started in California and Florida, by introducing GTR at less than 10% rubber in hot mix applications. This technology has been increasing since its introduction in the mid-1980s. In recent years, other states started increasing the amount of rubber up to 20% as a finished TTR modified

asphalt binder performance grades (PG-TR). Using a high shear process, the GTR material is digested and integrated into the asphalt binder at the terminal or refinery, then shipped as a final product to the hot plant or jobsite, thus eliminating the need for blending unit at the job site and reducing the associated costs. According to the producers, tire-rubber modified asphalt binders are processed similar to polymer-modified asphalt binders without excessive heating, and that the fully digested tire rubber into the asphalt binder results in storage-stable binders (Hajj et al. 2011). Over the past ten years, the product has been engineered specifically to meet the climatic conditions defined by Superpave performance grade system “PG” and the minimum percent of TR specified by the agency, which may vary anywhere between 5 and 20%. Different PG-TR asphalt binders have been manufactured and have been used in a variety of applications such as dense graded, open graded, gap graded asphalt mixtures, and some surface treatment applications such as chip seals and cape seals (Hajj et al. 2011). The research team of this study prepared and evaluated a total of four HMA mixtures namely:

- Northern Nevada mixture designed with a polymer-modified PG64-28NV binder and Lockwood aggregate.
- Northern Nevada mixture designed with a terminal blend tire-rubber modified PG64-28TR binder and Lockwood aggregate.
- Southern Nevada mixture designed with a polymer-modified PG76-22NV binder and Sloan aggregate.
- Southern Nevada mixture designed with a terminal blend tire-rubber modified PG76-22TR binder and Sloan aggregate.

Mixtures were treated with 1.5% hydrated lime by dry weight of aggregates and designed according to the Hveem Mix design method. All four mixtures were evaluated in terms of their resistance to rutting, fatigue cracking, thermal cracking, dynamic modulus, and moisture sensitivity. The mixtures were further evaluated by means of a simple mechanistic analysis to assess the combined impacts of mixture properties and their resistance to the various failure modes to pavement responses under traffic load. For instance, the PG76-22TR resulted in a lower tensile strain at the bottom of the HMA layer than the PG76-22NV when both of the mixtures are subjected to the same traffic load in the same pavement structure due to the higher dynamic modulus for the PG76-22TR mix, compared to the PG76-22NV mix. Substituting this lower strain at the bottom of the TR layer into the laboratory developed fatigue relationship may result in a better fatigue life. Putting together the findings of the laboratory evaluations and the mechanistic empirical analyses, the following can be concluded from this study (Hajj et al. 2011):

- The terminal blend and the polymer-modified asphalt mixtures exhibited good resistance to moisture damage and met the 70% criterion for the tensile strength ratio (TSR).
- All mixtures displayed good resistance to rutting. For the Repeated Load Triaxial (RLT) test, Nevada Department of Transportation (NDOT) specifies a maximum permanent axial strain criterion of 3% after 12,000 load repetitions, while setting a maximum Asphalt Pavement Analyzer (APA) limit of 8 mm at 60°C after 8,000 load cycles. As per both test results, all mixtures met the NDOT criteria.

- The PG64-28TR mix showed lower fatigue resistance at strain levels higher than 500 microns, same fatigue resistance at 500 microns, and higher fatigue resistance at strain levels lower than 500 microns compared to the PG64-28NV mix. The laboratory fatigue resistance of the PG76-22TR mix was lower than the laboratory fatigue resistance of the PG76-22NV mix at all strain levels.
- The dynamic modulus of the PG64-28TR mix was similar to the PG64-28NV mix at 70°F (21.1°C), while the dynamic modulus of the PG76-22TR mix was significantly higher than the PG76-22NV mix at 70°F (21.1°C). The higher stiffness for the PG76-22TR proved the lower laboratory fatigue resistance in the flexural beam fatigue test under strain-controlled mode of testing.
- Both mixes with PG64-28TR and PG64-28NV binders, showed good resistance to thermal cracking, since both mixtures exhibited fracture temperatures colder than the low performance temperature of the binders (-28°C). The obtained fracture temperatures were insignificantly different, within 1.8°C.
- The PG64-28TR mix outperformed the PG64-28NV mix in fatigue resistance and in dynamic modulus.
- The PG76-22TR mix outperformed the PG76-22NV mix in resistance to rutting and in dynamic modulus.

In summary, terminal tire rubber blends are anticipated to perform well in Nevada given that fatigue cracking is more susceptible in northern Nevada while rutting is more prone in the southern part of the state. Hence, the use of tire rubber binders would increase the

benefit of recycling tire rubber without jeopardizing the performance and the quality of asphalt pavements (Hajj et al. 2011).

Castillo et al. investigated the laboratory performance of TTR asphalt mixtures including Field Mix Lab Compacted (FMLC) and Lab Mix Lab Compacted (LMLC) samples, then compared their relative engineering properties with neat asphalt binder mixtures (Castillo et al. 2018). The asphalt binders evaluated in this study, comprise one neat binder and two types of TTR added to 25% RAP mixtures, that were marinated using 1.5% lime by Dry Weight of Aggregate (dwa). The LMLC hot asphalt mixtures were designed as per Superpave methodology and evaluated for moisture damage through TSR test, which exceeded 90% for all the mixes denoting a high moisture resistance. The mixture performance testing conducted consist of dynamic modulus master curves, fatigue cracking resistance, permanent deformation, and reflective cracking resistance. The Asphalt Mixture Pavement Performance (AMPT) machine was employed to perform the dynamic modulus tests and build the master curves, as well as the flow number tests to fit the Francken Model. Whereas, the Texas overlay machine was used to generate the reflective cracking results. Finally, the number of cycles for fatigue failure were founded on the results of hydraulic beam fatigue machine (Castillo et al. 2018).

The results of dynamic modulus tests highlighted on the brittle behavior associated with the PG70-10 mix, showing the highest E^* property followed by the mixes with PG70-16R (RDP50) and PG70-28TR. Accordingly, the mix with PG70-10 may exhibit higher stability toward rutting, but lower cracking resistance, when compared to the tire modified mixtures.

Meanwhile, both FMLC samples with PG64-22 and PG70-22TR binders, obtained close E^* properties indicating similar behavior toward fatigue and rutting resistance.

With the aim of analyzing the permanent deformation, the second derivative of Francken model equation was set to zero, to get the curve inflection point known as the Flow Number (FN), at the end of the secondary stage. It is known that the secondary stage of permanent deformation accumulated within asphalt mixtures, presents a linear behavior characterized with both parameters used for rutting models in mechanistic analyses: “a” which is the intercept with the y-axis (axial permanent strain axis), and “b” equivalent to the slope. The secondary stage of permanent deformation was plotted in this study using two values of ε_p equal to 100 and 10,000 cycles. The mixtures with PG70-10 and PG64-22, showed the highest FN amongst LMLC and FMLC specimens, respectively, which was consistent with the E^* experiment results at 104°F (40°C). For a design traffic level between 3 and 10 million Equivalent Single Axle Load (ESALs), a minimum FN criterion of 190 is required, which was met as per the average FN of all the mixtures. However, it should be noted that some binder rheological properties such as $|G^*|/\sin \delta$, did not conform to the FN outcome due to the high energy stored within rubber particles, and their weak interaction with the aggregates at elevated temperatures (Castillo et al. 2018).

Furthermore, the authors established the interaction plot between the critical fracture energy and crack propagation, in order to assess the reflective cracking resistance. When the crack propagation rate exceeds 0.5, the evaluated mixture may experience a brittle behavior with low cracking resistance. Interestingly, all the FMLC and LMLC tested samples ranged between the limits that are not too soft to initiate cracking rapidly, nor too

brittle to propagate the cracks. Despite the low number of cycles to failure for the mix with PG70-10, this mixture got the highest critical fracture energy amongst all LMLC specimens. The highest number of cycles to failure was associated with the PG70-16R(RDP50) mix obtaining low crack propagation rate, which is capable of preventing cracking and stopping its propagation. On the other hand, the mix with PG70-28TR proved able to mitigate the propagation of reflective cracking after initiation, due to its lowest crack propagation rate, even though the same mixture experienced the minimum critical fracture energy, without exceeding the minimum criterion of 1.0 for HMA critical fracture energy. For the FMLC samples, the critical fracture energy was similar for both mixture types, however the PG70-22TR mix showed a slightly higher resistance by means of crack propagation rate parameter, while reaching the maximum number of cycles in the test prior to 93% load reduction. Considering the aforementioned three parameters of the overlay test, it can be concluded that TTR mixtures indicated superior resistance to reflective cracking, relative to HMA with neat asphalt binder.

The beam fatigue test outcome of FMLC specimens is plotted in **Figure 11** and emphasized on the greater fatigue resistance of PG70-22TR mix, reaching 9% more cycles to failure than the PG64-22 mix (Castillo et al. 2018).

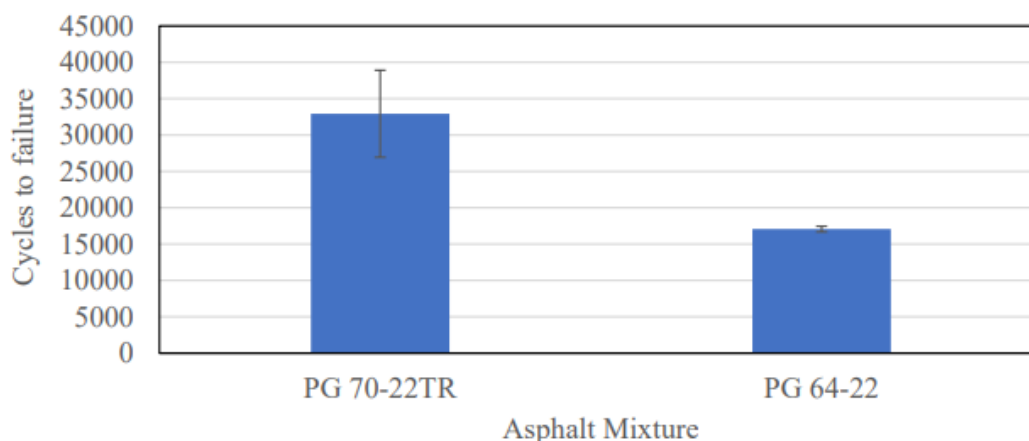


Figure 11. Cycles to failure for fatigue cracking for FMLC mixtures.

2.4. TTR Mixture Field Performance

As a part of Hajj et al. study, the research team investigated the field performance of modified asphalt mixtures based on I-80 demonstration project and I-40 test sections (Hajj et al. 2011).

I-80 Demonstration Project

A trial section of TTR asphalt binder (PG64-28TR) was constructed on I-80 east of Reno, Nevada during August 2008. This field section aimed to assess the field performance and constructability of dense graded asphalt mixtures with two different types of binders: polymer modified binder PG64-28NV, and tire rubber modified binder P64-28TR with 11% rubber dosage. In this NDOT project, 38 mm of the existing pavement was milled, overlaid with 63 mm, and followed by an 19 mm open graded friction course (Hajj et al. 2011). It is worth mentioning that the TR mixtures did not exhibit any specific problems during the construction phase. In general, the surveyed existing pavement was in good to very good condition, except for some low severity longitudinal construction crack, down

the centerline throughout the westbound length of the project. The two asphalt binders were sampled and verified for acceptance, to meet the required NDOT PG “plus” specifications for NV and TR asphalt binders, except for toughness and tenacity properties. Both asphalt mixtures were marinated using 1.5% hydrated lime by dry weight of aggregates, and used the same asphalt binder content and aggregate gradations.

The laboratory testing evaluated field mixtures sampled from the windrow, with respect to stiffness, rutting, Hveem stability, and moisture damage. The APA was performed at 64°C for rutting evaluation, whereas the dynamic modulus test was used to evaluate the stiffness of the mixtures. The laboratory evaluated properties of the two mixtures were very similar, while meeting the maximum rut depth of 8.0 mm at 64°C, a minimum dry tensile strength of 65 psi (448 kPa) at 25°C, and a minimum tensile strength ratio of 70%. Field condition survey was conducted by NDOT personnel 31 months after construction (March 2011), which did not reveal any distresses within both PG64-28TR and PG64-28NV sections. The overall pavement condition was good and uniform along the total length of both test sections evaluated as shown in **Figure 12** (Hajj et al. 2011).



Figure 12. I-80 test sections field performance: (a) PG64-28TR section; (b) PG64-28NV section (Picture courtesy of NDOT, March 2011).

I-40 Test Sections

In October 2008, the California Department of Transportation (Caltrans) constructed two test sections with two types of binders on I-40 near Essex, California (Hajj et al. 2011). The existing pavement showed several chunks coming out of the pavement along the length of the project, thus rated in a relatively bad condition. The binders used in his project consisted of PG64-28PM and PG64-28TR (11% rubber), and were verified to meet the Caltrans PG “plus” specifications for polymer modified and tire rubber modified asphalt binders. Both mixtures were designed with same aggregate gradations and OBC, with an average production binder content of 4.5% by dry weight of aggregates. Similar to I-80 NDOT project, the TR field sections did not cause any construction difficulties.

Field mixtures were sampled from the windrow at the paving site, and then evaluated at 60°C for rutting using the repeated shear constant height test (RSCH) and for fatigue resistance at 20°C through the flexural beam fatigue test. According to the RSCH test results, both mixtures with PG64-28PM and PG64-28TR, exhibited high rutting resistance with a slight improvement observed with the PG64-28TR relative to the PG64-28PM mixture. After 10,000 loading cycles, the PG64-28PM mixture resulted in 3.2% permanent shear strain at 60°C compared to 2.3% with the PG64-28TR mixture under the same testing conditions. In terms of fatigue cracking, the PG64-28TR mixture resulted in fatigue lives 4 to 18 times greater than the PG64-28PM mixture, indicating a superior fatigue resistance associated with the tire rubber modified mixture. Asphalt Institute (AI) personnel conducted a condition survey for both test sections shown during June 2010. As shown in **Figure 13**, both test sections with PG64-28PM and PG64-28TR asphalt binders were in

excellent pavement condition uniformly along their total length, without any major distresses reported after 20 months of service life (Hajj et al. 2011).



Figure 13. I-40 Test sections field performance: (a) PG64-28TR section; (b) PG64-28PM Section (Pictures courtesy of AI, June 2010)

Chapter 3. Experimental Plan

3.1. Methodology Approach

This thesis project entitled “Evaluation of Tire Rubber-Modified Asphalt Mixtures” focuses on evaluating the engineering properties and performance characteristics of Terminal Tire Rubber (TTR) asphalt mixtures relative to asphalt mixtures manufactured with neat and polymer-modified asphalt binders, in collaboration with U.S. Polyco of Reno, Nevada. Mix designs were performed for a single aggregate source with seven asphalt binders; 1.5% hydrated lime by dry weight of aggregates and 25% of RAP content. The mix designs were conducted following the Superpave standard method and evaluated using Tensile Strength Ratio (TSR) criteria for moisture sensitivity. Performance of AC mixtures was assessed by means of dynamic modulus master curve and resistance to; permanent deformation, reflective cracking, and fatigue cracking.

The flow chart presented in **Figure 14** shows the complete process that was implemented in this research to evaluate asphalt mixtures properties and characteristics and their impact on the predicted performance life of a flexible pavement.

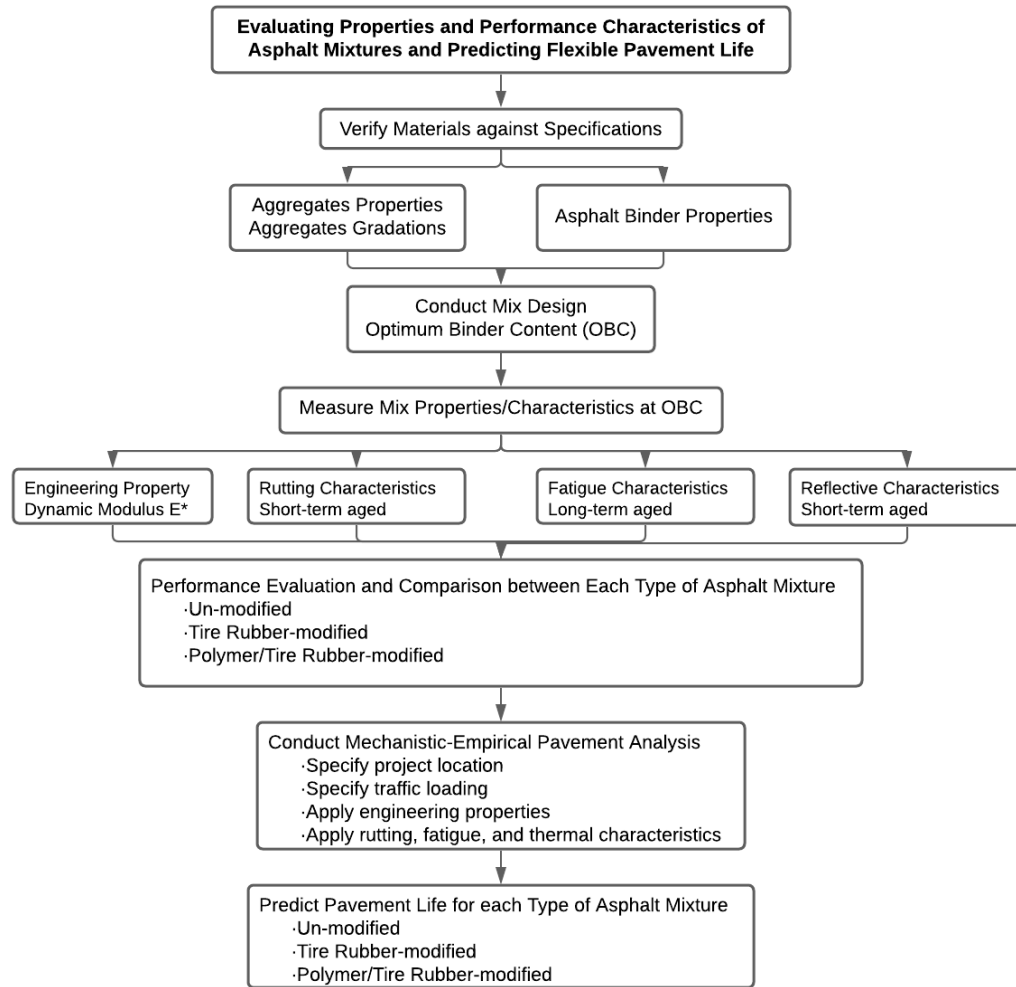


Figure 14. Flowchart of the mixtures evaluations and pavement life analysis.

3.2. Description of Test Methods

3.2.1. Mix Design

The Superpave methodology recommends a volumetric mix design procedure based on the use of the Superpave Gyratory Compactor (SGC), shown in **Figure 15**, and several volumetric properties of the mix at a target design air voids (AV) of 4% as specified in AASHTO M323; “Standard Specification for Superpave Volumetric Mix Design” (AASHTO M323-2017). The majority of State Highway Agencies (SHAs) have implemented the Superpave volumetric mix design procedure. **Table 2** and **Table 3** summarize the different compaction levels based on 20-year design traffic, and volumetric properties criteria as defined by Superpave volumetric mix design method in AASHTO R35; “Standard Practice for Superpave Volumetric Design for Asphalt Mixtures” and AASHTO M323, respectively (AASHTO R35-2017, AASHTO M323-2017).



Figure 15. Superpave Gyratory Compactor (SGC).

Table 2. Superpave Gyratory compaction effort (AASHTO R35-2017).

20-Year Design ESALs (million)	Compaction Parameters		
	$N_{initial}$	N_{design}	N_{max}
<0.3	6	50	75
0.3 to <3	7	75	115
3 to <30	8	100	160
≥ 30	9	125	205

Table 3. Superpave HMA design requirements (AASHTO M323-2017).

20-Year Design ESALs (Million)	Required Relative Density, %Gmm			Voids in Mineral Aggregate (VMA)						Voids Filled with Asphalt (VFA)	Dust-to-Binder Ratio (DP)
	N _{initial}	N _{design}	N _{max}	Nominal Maximum Aggregate Size, mm							
				37.5	25.0	19.0	12.5	9.5	4.75		
<0.3	≤91.5	96.0	≤98.0	11.0	12.0	13.0	14.0	15.0	16.0	70-80	0.6-1.2
0.3 to <3	≤90.5	96.0	≤98.0	11.0	12.0	13.0	14.0	15.0	16.0	65-75	0.6-1.2
3 to <10	≤89.0	96.0	≤98.0	11.0	12.0	13.0	14.0	15.0	16.0	65-75	0.6-1.2
10 to <30	≤89.0	96.0	≤98.0	11.0	12.0	13.0	14.0	15.0	16.0	65-75	0.6-1.2
≥30	≤89.0	96.0	≤98.0	11.0	12.0	13.0	14.0	15.0	16.0	65-75	0.6-1.2

In summary, asphalt mixtures are prepared at multiple asphalt binder contents and compacted in the SGC to the design compaction effort, N_{design}. The volumetric properties of the compacted samples are measured and plotted against the asphalt binder content (AC%) by total weight of mix (twm) as shown in **Figure 16**. Accordingly, the optimum binder content (OBC) is selected based on air voids of 4%, while meeting the remaining volumetric properties aforementioned in **Table 3**. The moisture sensitivity of the mixture is evaluated at OBC following AASHTO T283; “Standard Method of Test for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage” (AASHTO T283-2019). According to Superpave, the final mixture design must meet all required volumetric criteria at OBC specified in **Table 3** along with a minimum tensile strength ratio (TSR) of 80%.

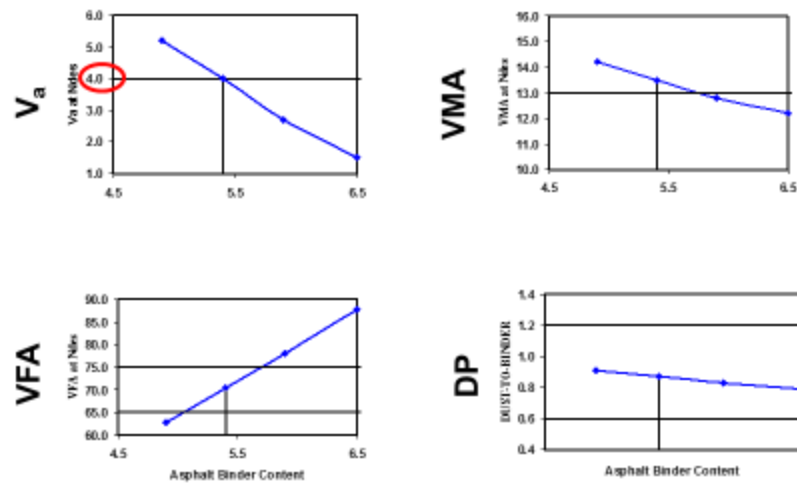


Figure 16. Selection of OBC based on typical volumetric properties from the Superpave mix design.

Resistance to Moisture Damage

The asphalt mixtures resistance to moisture damage were assessed at the mix design stage following AASHTO T283; “Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage” (AASHTO T283-2019). This evaluation consists of comparing the indirect tensile strength of six specimens, under compression mode at a rate of 2 inch/min, as briefly summarized below:

- The short-term aging consists of curing the loose mixture for 16 hours in an oven at 140°F (60°C)
- Samples are then compacted to $7 \pm 0.5\%$ air void to 6.0 inch diameter by 3.7 inch height (100x95mm) cylindrical specimens using the SGC
- Separate the compacted samples into two subsets with similar average air voids: unconditioned and moisture-conditioned samples

- Measure the dry tensile strength (TS) of the unconditioned group after proper conditioning for 2 hours at 77°F (25°C)
- Subject the moisture-conditioned samples to the following:
 - 70-80% saturation
 - Subject the saturated samples to one freeze-thaw cycle consisting of freezing at 0°F (-18°C) for 16 hours followed by 24 hours thawing at 140°F (60°C) prior to 2 hours at 77°F (25°C)
 - Measure the tensile strength after the freeze-thaw cycle at 77°F (25°C)
- The tensile strength ratio (TSR) is calculated as the ratio of the average of moisture-conditioned TS over the unconditioned TS times 100

3.2.2. Properties and Characteristics of Asphalt Mixtures

The evaluations of engineering properties and performance characteristics of asphalt mixtures are needed in order to predict the response of the flexible pavement under the combined actions of traffic loads and environment. All mixtures used in the evaluation of engineering properties and performance characteristics were short-term aged according to AASHTO R30; “Standard Practice for Mixture Conditioning of Hot Mix Asphalt (HMA)” which consisted of curing the loose mix prior to compaction for 4-hours in an oven at a temperature of 275°F (135°C) (AASHTO R30-2019). In addition to the short-term aging, the samples for fatigue cracking were long-term aged in an oven after compaction at 185°F (85°C) for 5-days. The following properties and characteristics of the asphalt mixtures were evaluated:

- Engineering property: Dynamic Modulus, E^*

- Resistance to rutting
- Resistance to reflective cracking
- Resistance to fatigue cracking

Dynamic Modulus, E^*

In order to evaluate the structural response of flexible pavement under multiple combinations of traffic loads, speed, and environmental conditions, the AASHTO Mechanistic-Empirical Design (ME-Design) uses the dynamic modulus master curve as the engineering property of the asphalt concrete layer. The E^* property of the various mixtures were evaluated as indicated in **Table 4** under various combinations of loading frequency and temperature in accordance with AASHTO T378; “Standard Method of Test for Determining the Dynamic Modulus and Flow Number for Asphalt Mixtures Using the Asphalt Mixture Performance Tester (AMPT)” (AASHTO T378-2017). Using the viscoelastic behavior of the asphalt mixture (i.e. interchangeability of the effect of loading rate and temperature) the master curves were developed in accordance with AASHTO R84; “Standard Practice for Developing Dynamic Modulus Master Curve for Asphalt Mixtures Using the Asphalt Mixture Performance Tester (AMPT)” (AASHTO R84-2017). The dynamic modulus tests were conducted on 4.0 inch diameter by 6.0 inch cylindrical (100x150mm) specimens at $7 \pm 0.5\%$ air void cored from the center of samples compacted in the SGC in accordance with AASHTO R83; “Standard Practice for Preparation of Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC)” (AASHTO R83-2017). In the dynamic modulus procedure, a specimen is subjected, at a specific test temperature to a controlled sinusoidal (haversine) compressive stress of various frequencies. The test is conducted without confining pressure. The applied

stresses and resulting axial strains are measured as a function of time and used to calculate the dynamic modulus and phase angle. **Figure 17** shows a picture of the AMPT equipment and a typical E^* master curve.

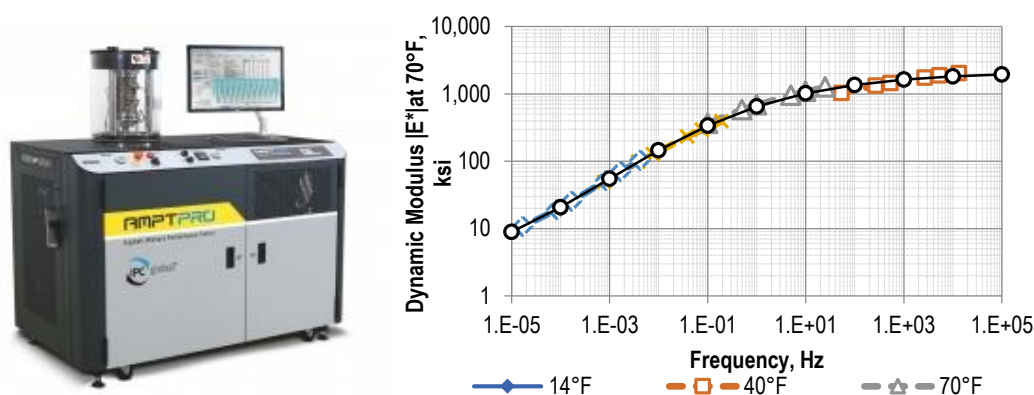


Figure 17. Asphalt mixture performance tester (AMPT) and a typical master curve.

Table 4. Recommended Testing Temperatures and Loading Frequencies (AASHTO T378-2017).

PG 58-XX and Softer		PG 64-XX and PG 70-XX		PG 76-XX and Stiffer	
Temperature , °C	Loading Frequencies , Hz	Temperature , °C	Loading Frequencies , Hz	Temperature , °C	Loading Frequencies , Hz
4	10, 1, 0.1	4	10, 1, 0.1	4	10, 1, 0.1
20	10, 1, 0.1	20	10, 1, 0.1	20	10, 1, 0.1
35	10, 1, 0.1, and 0.01	40	10, 1, 0.1, and 0.01	45	10, 1, 0.1, and 0.01

Resistance to Rutting

Rutting is caused by progressive movement of the asphalt mix under repeated loads. The rutting characteristics of the various asphalt mixtures were evaluated using the Repeated Load Triaxial (RLT) test shown in **Figure 18**, following the procedure outlined in the National Cooperative Highway Research Program (NCHRP) Project 9-30A; “Calibration

of Rutting Models for HMA Structural and Mix Design” (NCHRP Project 9-30A-2012). Rutting is a failure mode that occurs during the early pavement life, therefore all mixtures were evaluated at the short-term aging condition in accordance with AASHTO R30 (AASHTO R30-2019). The RLT test specimen consisted of a 4.0 inch diameter by 6.0 inch height cylindrical (100x150mm) specimen with $7.0 \pm 0.5\%$ air voids, cored from the center of a SGC sample of 6.0 inch diameter by 7.0 inch height cylindrical (150x180mm) specimen in accordance with AASHTO R83 (AASHTO R83-2017). The RLT test was conducted by applying a repeated deviator stress of 70 psi (482 kPa) and a static confining pressure of 10 psi (69 kPa). The deviator stress is applied through a pulse load with a duration of 0.1 second and unloading period of 0.9 second. The axial deformation after each pulse is measured and the axial resilient strain (ϵ_r) is calculated accordingly. In addition, the cumulative permanent strain (ϵ_p) is calculated and plotted with respect to the number of load cycles as shown in **Figure 19**. This relationship depicts three permanent deformation stages: primary, secondary, and tertiary. The specimen in the primary stage exhibits a rearrangement of the mixture structure due to initial traffic compaction causing a rapid increase in permanent strain with a decrease rate of plastic deformation. The secondary stage experiences a constant rate of change of the permanent strain with a lower rate of deformation. The final tertiary stage exhibits high rates of permanent strain associated with plastic or shear deformation under no volume change. The number of load repetitions at the start of the tertiary stage is defined as the Flow Number (FN).



Figure 18. RLT testing setup.

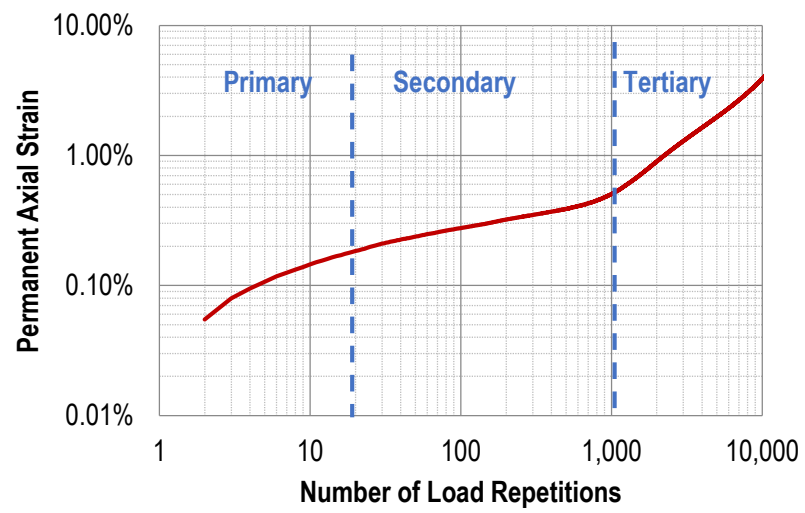


Figure 19. Relationship between permanent axial strain and load repetitions generated in the RLT.

The Francken mathematical model, expressed in Equation 1 is used to numerically model the permanent strain-loading cycle relationship incorporating the primary and secondary stages, with an exponential model to fit the tertiary stage.

$$\varepsilon_p(N) = A \times N^B + C \times (e^{D \times N} - 1) \quad (1)$$

Where $\varepsilon(N)$ is the permanent axial strain expressed in inch/inch (or mm/mm), N is the number of loading cycles, and A , B , C , and D are regression constants.

The RLT tests were conducted at the following three different temperatures according to NCHRP Project 9-30A: (1) 50% reliability PG high temperature minus 5°C, (2) 20°C, and (3) the middle temperature between the first two (NCHRP Project 9-30A-2012). Two test specimens were tested at each temperature for a total of six test specimens for each mixture. A rutting model for each mixture was developed following (2).

$$\frac{\varepsilon_p}{\varepsilon_r} = k_z \times 10^{k_{r1}} \times T^{k_{r2}} \times N^{k_{r3}} \quad (2)$$

Where ε_p is the permanent axial strain expressed in inch/inch (or mm/mm), ε_r is the resilient axial strain expressed in inch/inch (or mm/mm), N is the number of loading cycles, and T is the temperature of the asphalt mixture expressed in degree Fahrenheit (°F), k_{r1} , k_{r2} , and k_{r3} are experimentally determined coefficients, and K_z is the AC layer thickness adjustment coefficient defined in (3, (4, and (5. The k_{r3} factor is the slope within the steady-state or secondary stage, the k_{r1} is the intercept of the log-log relationship between the number of load applications and cumulative plastic strain, and the k_{r2} factor presents the effect of temperature on the intercept.

$$K_z = (C_1 + C_2 \times \text{depth}) \times 0.328196^{\text{depth}} \quad (3)$$

$$C_1 = -0.1039 \times h_{ac}^2 + 2.4868 \times h_{ac} - 17.342 \quad (4)$$

$$C_2 = 0.0172 \times h_{ac}^2 - 1.7331 \times h_{ac} + 27.428 \quad (5)$$

Where h_{ac} is the thickness of the total AC layer in inch, C_1 and C_2 are regression constants defined as a function of h_{ac} , and depth is the distance between the top of the AC layer and the computational point expressed in inch.

Resistance to Reflective Cracking

Reflective cracking is one of the primary form of distresses in AC overlays over flexible and rigid pavements. The mixtures resistance to reflective cracking was evaluated using the Texas overlay test (OT) in accordance with Tex-248-F procedure; “Overlay Test” (Tex-248-F-2019). The test simulates the horizontal opening and closing of existing cracks and joints underneath the new AC overlay. **Figure 20** illustrates the setup used in the Simple Performance Tester (SPT) machine to assess the susceptibility of the AC mixture to reflective cracking. The OT mixtures were subjected to short-term aging following AASHTO R30 (AASHTO R30-2019). The OT specimen shown in **Figure 21** consists of a 6 inch long by 3 inch wide and 1.5 inch thick (150x76x38mm) sample with $7.0 \pm 1.0\%$ air voids that is trimmed from a 6 inch diameter by 4.5 inch height (150x115mm) SGC sample. A minimum of three samples are needed per mixture. Once prepared, each sample is glued using epoxy on the two metallic plates shown in the setup. The test is conducted in a strain controlled mode until failure with a maximum displacement of 0.018 inch (0.46mm) at $77 \pm 1^\circ\text{F}$ ($25 \pm 0.5^\circ\text{C}$). The loading rate comprises of one cycle each 10 seconds, where the loading and unloading period is 5 seconds each. The mixture is evaluated in terms of three criteria: (1) number of cycles to failure, (2) critical fracture energy, and (3) the crack

propagation rate. Note that the number of cycles to failure is defined as the number of cycles to reach a 93% drop in initial load, which is measured from the first opening cycle, up to a maximum of 5,000 cycles.

The energy required to initiate crack is the critical fracture energy at the maximum peak load computed at the first loading cycle using (6. **Figure 22** illustrates the crack driving load function of the displacement of the first cycle. A negative load represents tension. The sample exhibits a hysteresis loop due to the tension load and unloading.

$$G_c = \frac{W_c}{b \times h} \quad (6)$$

Where G_c is the critical fracture energy expressed in lb.-in./in.² (kN-mm²), W_c is the fracture area hatched in **Figure 22** and expressed in lb.-in. (kN-mm), b is the specimen width: 3 inch (76.2 mm), and h is the specimen height: 1.5 inch (38.1 mm).



Figure 20. SPT overlay test setup.

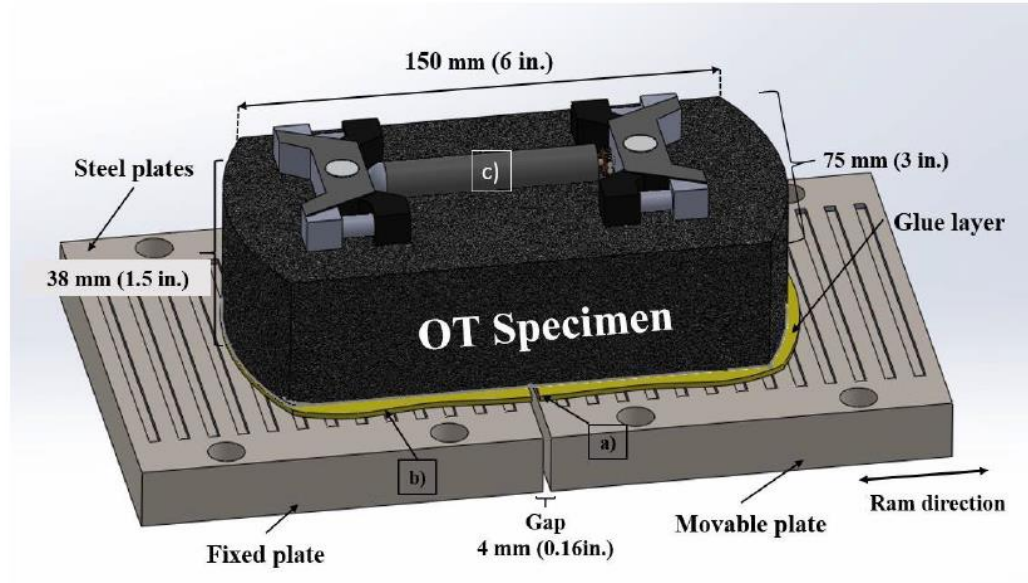


Figure 21. Schematic of the Texas Overlay Tester.

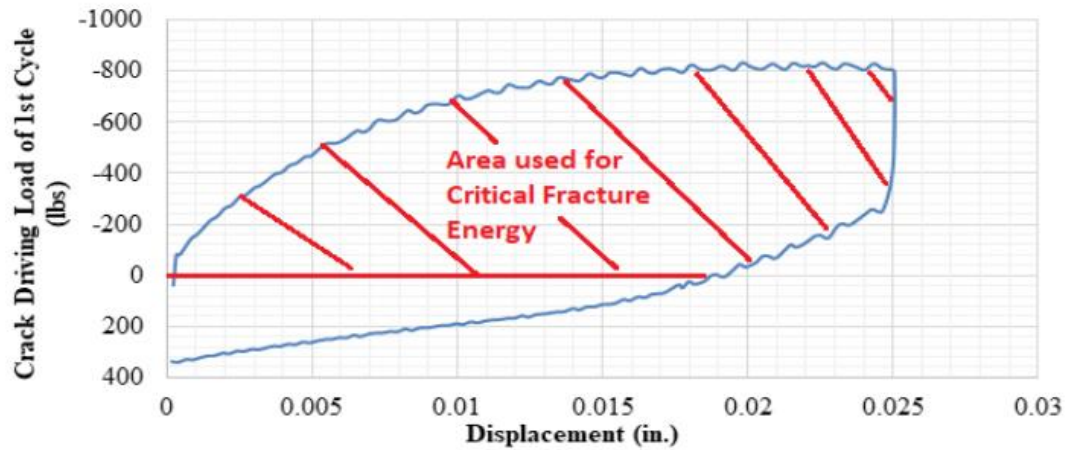


Figure 22. Portion of hysteresis loop needed to calculate the critical fracture energy of the first loading cycle

A polynomial function is used to fit the normalized load reduction curve function of the number of loading cycles to determine the crack propagation rate (CPR) and the crack resistance index (β) represented in (7).

$$NL = N^{CPR} = N^{(0.0075 \times \beta - 1)} \quad (7)$$

Where NL is the normalized load at each loading cycle expressed in lb (kN), N is the loading cycles, CPR is the crack propagation rate, and β is the crack resistance index.

In a nutshell, a mixture with good resistance to reflective cracking exhibits high number of cycles to failure, coupled with high critical fracture energy, and low crack propagation rate.

Resistance to Fatigue Cracking

After the first five years of its service life, the asphalt pavement experiences long-term aging and becomes more brittle with time. However, the asphalt mixture is expected to resist fatigue cracking, which is caused by repeated bending strains from heavy loads throughout pavement life under varying weather conditions. The resistance of the AC mixtures to fatigue cracking was evaluated using the flexural beam fatigue test described in AASHTO T321: “Standard Method of Test for Determining the Fatigue Life of Compacted Asphalt Mixtures Subjected to Repeated Flexural Bending” (AASHTO T321-2017). The mixtures for the fatigue test were short-term aged followed by long-term aging according to AASHTO R30 (AASHTO R30-2019). During the test, the 2.0x2.5x15 inch (50x64x380 mm) beam specimen is subjected to a 4-point bending with free rotation and horizontal translation at all load and reaction points. This configuration produces a constant bending moment over the center portion of the specimen. For the purpose of this research study, constant strain tests were conducted at different strain levels; using a repeated sinusoidal load at a frequency of 10 Hz, under multiple temperatures of 55, 70, and 85°F (13, 21, and 30°C).

Initial flexural stiffness is measured at the 50th load cycle. The normalized modulus (NM) is calculated as expressed in (8) and plotted with respect to the number of loading cycles.

Fatigue life or failure is defined as the number of cycles at which the NM reaches its peak (i.e., maximum value) as shown in **Figure 23**.

$$NM = \frac{S_i \times N_i}{S_0 \times N_0} \quad (8)$$

Where NM is the normalized modulus, N_0 is the initial loading cycle usually considered as 50th load cycle, S_0 is the initial flexural stiffness at initial loading cycle N_0 , N_i is the i th loading cycle, and S_i is the flexural stiffness at i th loading cycle N_i .

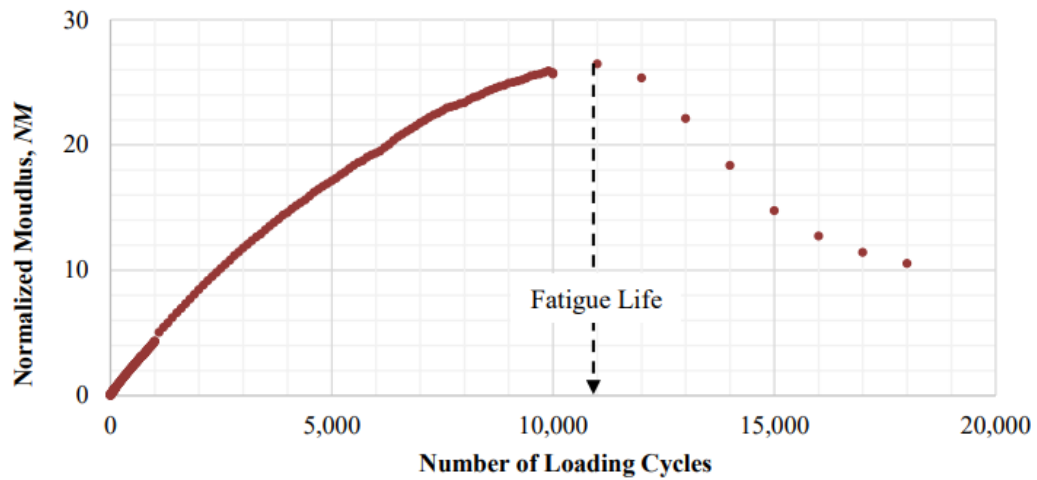


Figure 23. Normalized modulus with respect to number of loading cycles.

The second failure criterion defines fatigue life as the number of cycles corresponding to a 50% reduction in the initial stiffness. Multi-regression analysis of the fatigue curves at multiple strain levels and multiple temperatures leads to the development of the overall fatigue cracking model for each mixture at a specified reference temperature as presented in (9). **Figure 24** shows the schematics of flexural beam fatigue and typical fatigue curve for asphalt mixtures.

$$N_f = k_{f1} \times \left(\frac{1}{\varepsilon_t}\right)^{k_{f2}} \times \left(\frac{1}{E_{AC}}\right)^{k_{f3}} \quad (9)$$

Where N_f is the fatigue life expressed as number of load repetitions to fatigue damage, ε_t is the applied tensile strain expressed in inch/inch (mm/mm), E_{AC} is the dynamic modulus of the asphalt mixture at 10 Hz expressed in psi, k_{f1} , k_{f2} , and k_{f3} are experimentally determined coefficients.

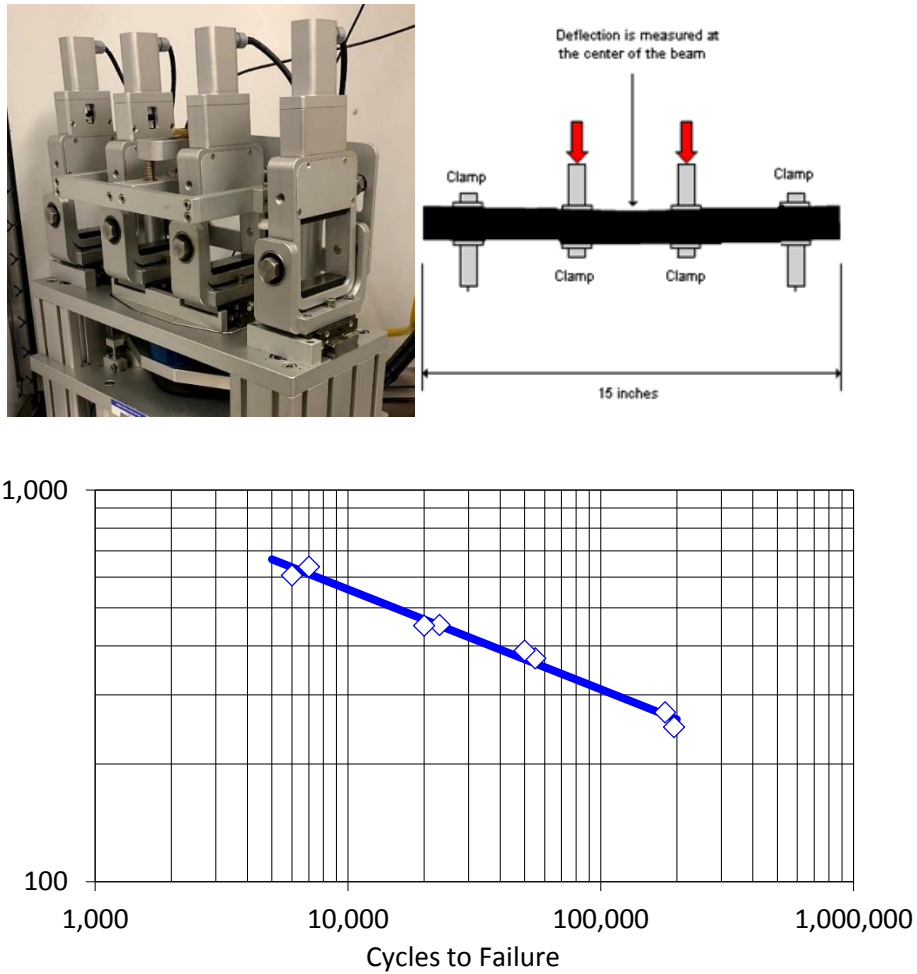


Figure 24. Flexural beam fatigue test and typical fatigue curve.

Chapter 4. Materials

Asphalt binder and aggregates are the main components for an asphalt concrete mixture as shown in **Figure 25**. Aggregates in the mixture shall be mixed with neat or modified asphalt binder and must be fully coated at the appropriate mixing temperature. The aggregates sizes range from 1.0 inch (25 mm) to less than 75 microns. For more sustainability and cost effectiveness, some portion of the asphalt binder and aggregates can be replaced by reclaimed asphalt pavement (RAP) material, which come from grinding deteriorated asphalt pavements. In addition, anti-strip additives may be used as needed which can be either liquid anti-strip or solid such as hydrated lime or portland cement.



Figure 25. Asphalt mixture.

4.1. Asphalt Binders

The most commonly used asphalt binder specification in the U.S. is the Superpave Performance Grading (PG) system. The PG relies on rheological properties of the asphalt binder to identify its performance under the prevailing environmental conditions at a specific project location. The final grade of the asphalt binder is in the form of PGxx-yy, where xx indicates the highest pavement temperature and -yy indicates the lowest

pavement temperature, in degrees Celsius, under which the asphalt binder is expected to provide good performance. The latest version of the PG system is specified in AASHTO M320; “Standard Specification for Performance-Graded Asphalt Binder” (AASHTO M320-2017). In this study, the PG of some asphalt binders will be followed by a letter “R” denoting that the asphalt binder is modified with tire rubber or by an “XR” meaning that the asphalt binder is modified with polymer and tire rubber, in both cases the extension will be followed by the percent of tire rubber used. **Table 5** lists the different types of asphalt binders evaluated in this study.

Table 5. Asphalt binders evaluated in the research.

Binder ID	Condition	PG	Mixing Temperature Range (°F)	Compaction Temperature Range (°F)
PG64-22	Neat Binder	PG64-22	295 – 315	275 - 300
PG64-22R	10% TR	PG64-22	295 – 315	275 - 300
PG64-22R	20% TR	PG64-22	295 – 315	275 - 300
PG64-22R (RDP28)	28% TR	PG64-22	290 – 315	280 - 295
PG70-22XR	10% TR + PM	PG70-22	310 – 325	275 - 310
PG70-22XR	20% TR + PM	PG70-22	310 – 325	275 - 310
PG70-16XR (RDP28X)	28% TR + PM	PG70-16	295 – 320	275 - 300

PM: Polymer-modified

TR: Tire Rubber

Table 6 summarizes the Superpave PG properties and grades of the asphalt binders used in this research. The data presented in **Table 6** show the outcome of all the binders evaluated.

A close examination of the data in **Table 6** leads to the following unique observation: the addition of only tire rubber to the asphalt binders, led to a noticeable drop with respect to the base binder high temperature properties with the increase of tire rubber percentage.

Additionally, a slight decrease occurred in the low temperature without affecting the final binder PG. On the other hand, the addition of tire rubber to the polymer modified (PM) asphalt binders bumped the high PG from a 64 to 70. The increase of tire rubber percentage resulted in increasing the high temperature properties while downgrading the low temperature properties. The low grade was kept at -22 with 10 and 20% TR whereas with 28% TR, it dropped from a -22 to -16. Moreover, the addition of 20 and 28% TR increased the mass loss after short-term aging, which violated the Superpave specifications. The impact of this behavior of the tire rubber-modified on the properties of mixtures will be further investigated in the later parts of the experiment.

Table 6. Superpave PG of binders used in the mix designs and mixtures testing.

Property/Test Conditions	Un-modified		Tire Rubber-modified				Polymer/Tire Rubber-modified				
	PG64-22		PG64-22R				PG70-22XR			PG70-16XR	
	Base	Specs	10% TR	20% TR	28% TR	Specs	10% TR	20% TR	Specs	28% TR	Specs
Flash Point, (°C)	326	> 230	300	283	267	> 230	306	292	> 230	277	> 230
Rotational Viscosity, (Pa.s)	0.491	≤ 3.0 @ 135°C	0.553	0.654	0.862	≤ 3.0 @ 135°C	1.072	1.149	≤ 3.0 @ 135°C	2.173	≤ 3.0 @ 135°C
Dynamic Shear Rheometer on Original, G*/sinδ, 10rad/sec, (KPa)	1.81	≥ 1.00 @ 64°C	1.56	1.41	1.20	≥ 1.00 @ 64°C	1.11	1.37	≥ 1.00 @ 70°C	1.66	≥ 1.00 @ 70°C
Rolling Thin Film Oven (RTFO), mass loss, (%)	0.14	≤ 1.00	0.80	1.39	1.88	≤ 1.00	0.77	1.40	≤ 1.00	1.96	≤ 1.00
Dynamic Shear Rheometer on RTFO-aged, G*/sinδ, 10rad/sec, (KPa)	4.71	≥ 2.20 @ 64°C	4.71	4.80	4.610	≥ 2.20 @ 64°C	2.64	3.35	≥ 2.20 @ 70°C	5.56	≥ 2.20 @ 70°C
Dynamic Shear Rheometer on PAV-aged, G* sinδ, 10rad/sec, KPa	4785	≤ 5000 @ 22°C	3935	4470	4450	≤ 5000 @ 25°C	3890	4200	≤ 5000 @ 16°C	4735	≤ 5000 @ 25°C
Bending Beam Rheometer on PAV-aged, S, 60sec, MPa	145	≤ 300 @ -12°C	174	189	180	≤ 300 @ -12°C	123	148	≤ 300 @ -12°C	109	≤ 300 @ -6°C
Bending Beam Rheometer on PAV-aged, m-value, 60sec	0.323	≥ 0.300 @ -12°C	0.31	0.312	0.328	≥ 0.300 @ -12°C	0.335	0.319	≥ 0.300 @ -12°C	0.357	≥ 0.300 @ -6°C

4.2. Aggregates

Aggregates make-up approximately 95% by total weight of the asphalt mix (twm). Therefore, their size and physical/engineering properties are highly critical to the overall performance of asphalt mixtures and the associated service life of flexible pavements. In general, dense-graded, durable, and tough aggregates are highly desirable for the construction of asphalt concrete mixtures with superior performance.

Four virgin and two RAP stockpiles were used to fabricate AC mixtures in this study. The bin percentages and gradation for each stockpile used in the research are tabulated in **Table 7** along with the hydrated lime used to treat virgin aggregates. Additionally, the 0.45 power curve of each stockpile is plotted in **Figure 26**. Both RAP stockpiles were subjected to centrifuge extraction as per AASHTO T164; “Standard Method of Test for Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)” (AASHTO T164-2018). Following to the extraction process, the calculated asphalt contents of the 3/8” and #4 RAP stockpiles were 2.9% and 6.3%, respectively. Afterward, the recycled binder was recovered for further PG testing and rheological properties, whereas the extracted aggregates gradations were verified using wet sieve analysis as per AASHTO T11; “Materials Finer Than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing” and AASHTO T27; “Sieve Analysis of Fine and Coarse Aggregates” (AASHTO T11-2020, AASHTO T27-2020). The various aggregate stockpiles were combined accordingly, to generate the aggregates blend for further physical properties testing.

The Superpave mix design system provides general specifications for aggregates used in the production of asphalt mixtures (AASHTO M323-2017). The required specifications

include fractured faces and flat/elongated evaluated for coarse aggregates (retained on #4 sieve), and fine aggregates angularity and sand equivalent for fine aggregates (passing #4 sieve). It is worth mentioning that these properties were not examined for each stockpile separately, but rather evaluated for the virgin aggregates portion of the blend.

In terms of gradation, the Superpave system provides broadband specifications for upper/lower limits on few sieve sizes depending on the nominal maximum size of the aggregate (NMA) as presented in **Table 8**. The NMA is defined as one size larger than the first sieve that retains more than 10% of aggregate. It should be mentioned that the hydrated lime was incorporated in the blend mix gradation, and was not considered as a mineral filler.

Table 7. Gradations of aggregate stockpiles.

Product	3/4" AGG	1/2" AGG	3/8" AGG	Washed Sand	3/8" RAP	#4 RAP	Lime
Bin %	5.0%	12.0%	16.5%	40.4%	15.0%	10.0%	1.1%
25mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	40.0	99.8	100.0	100.0	99.9	100.0	100.0
9.5mm (3/8")	5.5	64.2	99.7	100.0	84.4	100.0	100.0
4.75mm (#4)	1.0	1.1	19.2	99.9	32.2	95.6	100.0
2.36mm (#8)	0.8	0.7	1.7	85.4	19.6	78.2	100.0
1.18mm (#16)	0.7	0.6	0.8	55.7	15.4	59.2	100.0
0.60mm (#30)	0.7	0.6	0.7	33.6	12.8	44.6	100.0
0.30mm (#50)	0.6	0.6	0.6	13.6	10.1	31.3	100.0
0.15mm (#100)	0.6	0.6	0.6	3.8	7.6	22.0	99.0
0.075mm (#200)	0.5	0.5	0.5	1.6	5.3	14.5	86.8

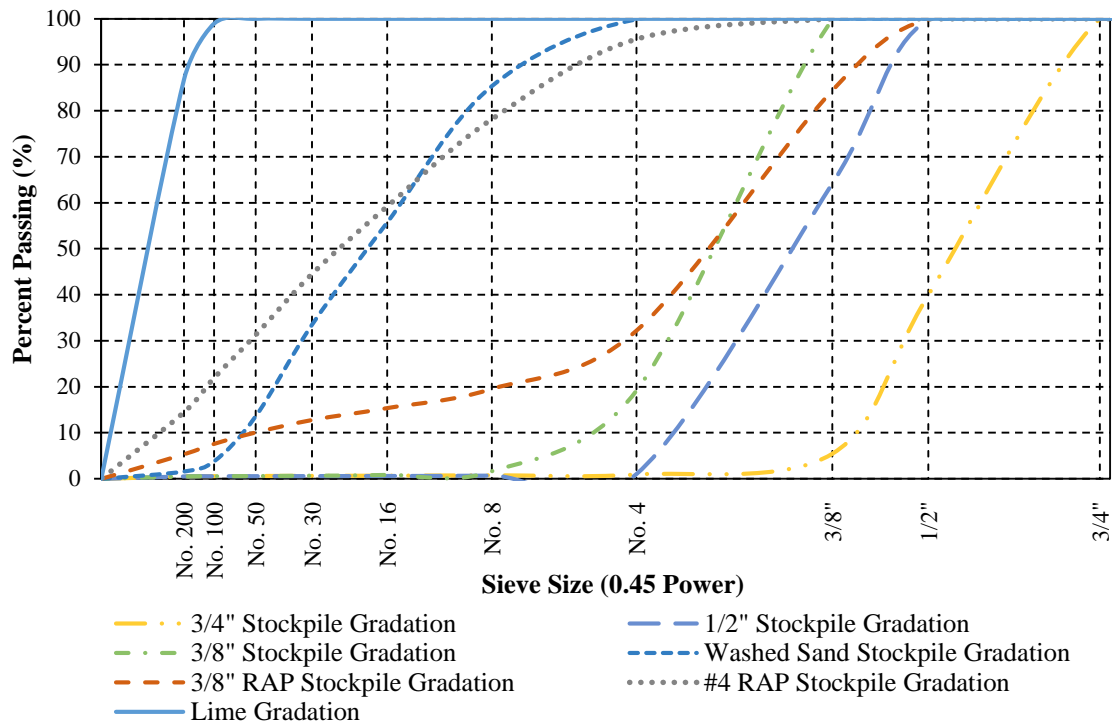


Figure 26. Gradations of aggregate stockpiles.

Table 8. Aggregate gradation control points.

NMAS, mm	37.5 mm		25.0 mm		19.0 mm		12.5 mm		9.5 mm	
Sieve Size, mm	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
50.0	100	-	-	-	-	-	-	-	-	-
37.5	90	100	100	-	-	-	-	-	-	-
25.0	-	90	90	100	100	-	-	-	-	-
19.0	-	-	-	90	90	100	100	-	-	-
12.5	-	-	-	-	-	90	90	100	100	-
9.5	-	-	-	-	-	-	-	90	90	100
4.75	-	-	-	-	-	-	-	-	-	90
2.36	15	41	19	45	23	49	28	58	32	67
1.18	-	-	-	-	-	-	-	-	-	-
0.075	0	6	1	7	2	8	2	10	2	10

Chapter 5. Mix Designs of Evaluated Mixtures

As stated in Chapter 4, virgin aggregates, RAP materials, and modified asphalt binders were used to establish seven AC mix designs. This chapter presents in detail the properties of aggregates used, the mix designs developed, along with the moisture susceptibility check on the mixtures.

5.1. Aggregate Properties

Some aggregate properties identify the suitability of the source for Superpave mix design, namely; resistance to abrasion, soundness, and deleterious materials. The Los Angeles abrasion test is used to assess the aggregate ability resist crushing, degradation, and disintegration in order to produce a high quality AC mix (AASHTO T96-2019). The soundness test determines whether the aggregates are durable and less likely to weather in the field under the action of freeze-thaw cycling (AASHTO T104-2020). Additionally, the deleterious materials test identifies materials that might negatively impact the quality of the AC mix (AASHTO T112-2017).

5.1.1. Consensus Aggregate Properties

Coarse Aggregate Angularity (CAA)

CAA is an indication of the ability of the coarse portion of the aggregate to interlock within the AC mix. AASHTO T335: “Standard Method of Test for Determining the Percentage of Fracture in coarse aggregate” is used to determine the angularity of coarse aggregates, by visually inspecting the fractured faces of each particle (AASHTO T335-2013). The combined sieve fracture method is adopted for this laboratory experiment. A minimum sample of 700 g, as per 12.5 mm NMAS, retained on sieve No.4 is washed and then dried.

For a traffic of 7 million ESALs, a minimum of 85% of one fractured face and a minimum of 80% of two or more fractured faces is required as shown in **Table 9** as per AASHTO M323 (AASHTO M323-2017). **Table 10** summarizes the test outcome conducted on two replicates, which both met the minimum requirement.

Table 9. Superpave requirement for coarse aggregate angularity.

Design ESALs ^a (Million)	Fractured Faces, Coarse Aggregate, ^c % Minimum	
	Depth from Surface	
	≤100 mm	>100 mm
<0.3	55/-	-/-
0.3 to <3	75/-	50/-
3 to <10	85/80 ^b	60/-
10 to <30	95/90	80/75
≥30	100/100	100/100

^a The anticipated project traffic level expected on the design lane over a 20-yr period. Regardless of the actual design life of the roadway, determine the design ESALS for 20 yr.

^b 85/80 denotes that 85 percent of the coarse aggregate has one fractured face and 80 percent has two or more fractured faces.

^c This criterion does not apply to 4.75-mm nominal maximum size mixtures.

Table 10. CAA test results.

Sample	Mass of sample, g	Mass of particles with one or more crushed faces, g	Mass of particles with two or more crushed faces, g	Mass of particles with non-crushed faces, g	Percent of the one or more crushed faces, %	Percent of the two or more crushed faces, %
1	801	795	795	0	99	99
2	798	796.6	796.6	0	100	100
Average Percentages					100	100

Fine Aggregate Angularity (FAA)

FAA is an indication of the ability of the fine portion of the aggregate to interlock within the AC mix. The test indirectly measures the angularity of fine aggregate through the determination of air voids in the uncompacted sample as stated in AASHTO T304:

“Standard Method of Test for Uncompacted Void Content of Fine Aggregate” (AASHTO T304-2017). The more air voids, the more angular are the aggregates. Following method A in AASHTO T304, 190 g of dried aggregates are sampled from sieve no. 16, 30, 50, and 100 (AASHTO T304-2017). For 7 million ESALs, the minimum FAA requirement must be 45% as shown in the specification **Table 11** (AASHTO M323-2017). **Table 12** shows the results of the experiment for two replicates with the average percentage slightly above the minimum requirement.

Table 11. Superpave requirements for fine aggregate angularity.

Design ESALs (Million)	Uncompacted Void Content of Fine Aggregate, % Minimum	
	Depth from Surface	
	≤100 mm	>100 mm
<0.3	^d	-
0.3 to <3	40 ^e	40
3 to <10	45	40
10 to <30	45	40
≥30	45	45

^d For 4.75-mm nominal maximum aggregate size mixtures designed for traffic levels below 0.3 million ESALS, the minimum Uncompacted Void Content is 40.

^e For 4.75-mm nominal maximum aggregate size mixtures designed for traffic levels equal to or above 0.3 million ESALS, the minimum Uncompacted Void Content is 45.

Table 12. FAA test results.

Sample	Run	Container Volume, ml	Net mass of fine Aggregate in the container, g	Bulk Specific Gravity of fine aggregate	Percent of Uncompacted Voids, %
1	1	99.5	137.1	2.565	46.3
	2	99.5	136.5	2.565	46.5
2	1	99.5	132.0	2.565	48.3
	2	99.5	132.3	2.565	48.2
Average Percentages					47.3

Flat and Elongated Particles (FEP)

Flat and elongated particles have more tendency to break during production and compaction. Therefore, an excessive amount of flat or elongated particles can be harmful to AC mixes, which may affect the final gradation and negatively the voids in mineral aggregates (VMA) and workability. According to ASTM D4791: “Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate”, flat and/or elongated particles are identified for coarse aggregate with length to width ratio of 5:1 as per Superpave requirement (ASTM D4791-2019, AASHTO M323-2017). A maximum limit of 10% of the total weight of the aggregates is allowed for 7 million ESALs as shown in **Table 13**. Two samples of minimum 2000 g each, is needed for a 12.5 mm NMAS mix. A total of 100 particles retained on each sieve larger than or equal to No.4 sieve are chosen randomly and tested separately. For the No.4 sieve, the 100 particles chosen randomly were less than 10% of the sample mass hence, this sieve was disregarded. Accordingly, the test is only conducted on 1/2” and 3/8” sieves as summarized in **Table 14**.

Table 13. Superpave requirements for flat and elongated particles.

Design ESALs (Million)	Flat and Elongated^c, % Maximum
<0.3	-
0.3 to <3	10
3 to <10	10
10 to <30	10
≥30	10

^c This criterion does not apply to 4.75-mm nominal maximum size mixtures.

Table 14. FEP test results.

Sample	Weight of sample	No. of Particles	Percent Flat, %	Percent Elongated, %	Percent Flat and Elongated, %	Percent Neither Flat nor Elongated, %
Retained on Sieve 1/2", sample 1	2100	100	0	1	0	99
Retained on Sieve 1/2", sample 2	2140	100	0	2	0	98
Average percentage retained on Sieve 1/2", %			0	2	0	99
Retained on Sieve 3/8", sample 1	2100	100	0	1	0	99
Retained on Sieve 3/8", sample 2	2140	100	0	1	0	99
Average percentage retained on Sieve 3/8", %			0	1	0	99

Sand Equivalent Test (SE)

The sand equivalent test quantifies the amount of clay content in the fine portion of the aggregates. Clay content affects the aggregate-binder bonding and increase the possibility of stripping. Clay content should be low to assure a good bonding in the AC mix. A minimum of 45% sand equivalent is set by the Superpave for 7 million ESALs as shown in the **Table 15** below (AASHTO M323-2017).

Table 15. Superpave requirements for sand equivalent test.

Design ESALs (Million)	Sand Equivalent, % Minimum
<0.3	40
0.3 to <3	40
3 to <10	45
10 to <30	45
≥30	50

Aggregates passing No.4 sieve are used in this test, in accordance with AASHTO T176: "Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the

Sand Equivalent Test” (AASHTO T176-2017). Two distinguished layers are formed which are the clay reading and the sand reading (measured using a weighted foot assembly), after adding a flocculation solution to the sample and agitating it well using a mechanical shaker. The sand equivalent is the percentage ratio of the sand reading to the clay reading. **Table 16** summarizes the results of two SE tests.

Table 16. SE test results.

Sample	Sand Reading (inches)	Clay Reading (inches)	Sand Equivalent (%)
1	4.5	5.0	90.0
2	4.6	5.1	90.2
Average Sand Equivalent Values (%)			90.1

Table 17 summarizes the measured aggregate properties along with the Superpave specifications for aggregates used in the production of asphalt mixtures. The aggregates used in this research met all the Superpave specifications.

Table 17. Aggregate properties and Superpave specifications.

Property	Aggregate Properties	Superpave Specification
Percent Crushed (Coarse Agg.) - 1 Fractured Face, %	100	85% Min
Percent Crushed (Coarse Agg.) - 2 Fractured Faces, %	100	80% Min
Fine Aggregate Angularity, %	47.3	45% Min
Sand Equivalent, %	90.1	45% Min
Flat and Elongated Particles (by wt @ 5:1), %	1	10% Max

5.1.2. Blend Aggregate Gradation

Two sieve analyses were conducted on the virgin aggregates blend and on the extracted aggregates from the 3/8" RAP and #4 RAP stockpiles to check the final aggregates blend gradation. The aggregates gradation was proved by carrying out a washed sieve analysis on two samples of mixed aggregate to get the amount of material passing No.200 sieve and a dry sieve analysis is then conducted to determine the particle size distribution. The gradation for the virgin aggregate blend along with the RAP stockpiles and the hydrated lime are shown in **Table 18**. It should be mentioned that the gradation of the hydrated lime is not performed but instead given by the manufacturer. **Table 19** presents the gradation of the combined aggregates blend. The required Superpave upper/lower limits and the gradation of the aggregates used in this research are shown in **Figure 27**.

Table 18. Gradation of the virgin aggregate blend, RAP stockpiles, and lime.

Product	Virgin Aggregate Blend	3/8" RAP	#4 RAP	Lime
Bin %	73.9%	15.0%	10.0%	1.1%
25mm (1")	100.0	100.0	100.0	100.0
19mm (3/4")	100.0	100.0	100.0	100.0
12.5mm (1/2")	95.9	99.9	100.0	100.0
9.5mm (3/8")	87.7	84.4	100.0	100.0
4.75mm (#4)	59.1	32.2	95.6	100.0
2.36mm (#8)	47.2	19.6	78.2	100.0
1.18mm (#16)	30.8	15.4	59.2	100.0
0.60mm (#30)	18.6	12.8	44.6	100.0
0.30mm (#50)	7.7	10.1	31.3	100.0
0.15mm (#100)	2.4	7.6	22.0	99.0
0.075mm (#200)	1.1	5.3	14.5	86.8

Table 19. Combined blend gradation with Superpave specifications.

Aggregate Gradation			
Nominal Maximum Aggregate Size, mm			
Sieve Size	% Passing	Superpave 12.5mm	
		Min	Max
37.5 mm (1 1/2")	100	-	-
25.0 mm (1")	100	-	-
19.0 mm (3/4")	100	100	-
12.5 mm (1/2")	97	90	100
9.5 mm (3/8")	88.6	-	90
4.75 mm (No. 4)	59.2	-	-
2.36 mm (No. 8)	46.7	28	58
1.18 mm (No. 16)	32.1	-	-
0.6 mm (No. 30)	21.3	-	-
0.3 mm (No. 50)	11.4	-	-
0.15 mm (No. 100)	6.2	-	-
0.075 mm (No. 200)	4	2	10

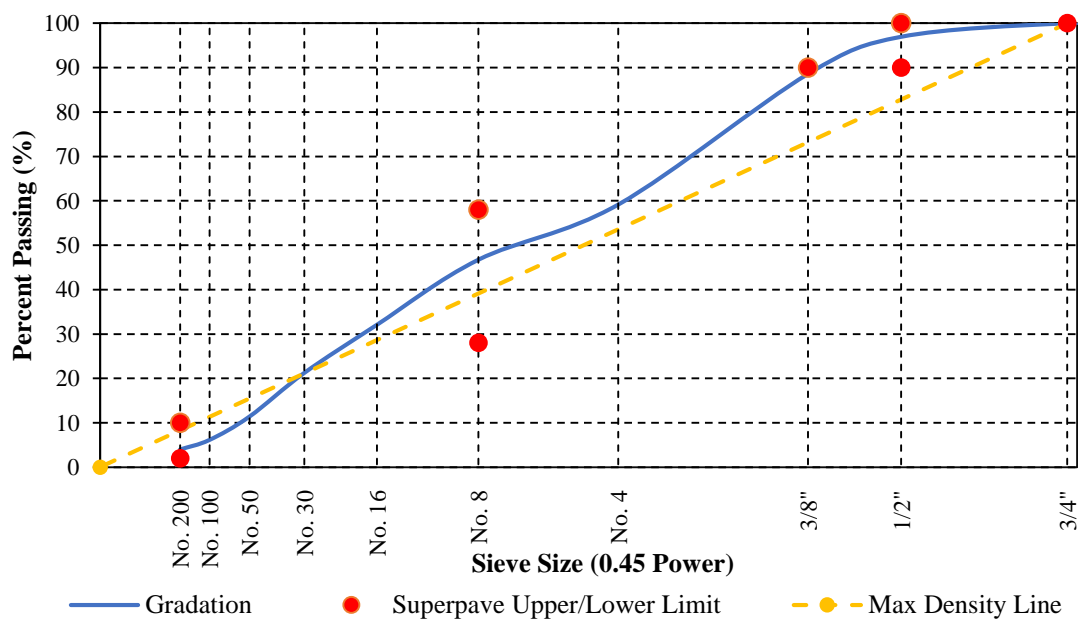


Figure 27. Aggregate gradation meeting the Superpave specifications.

5.1.3. Specific Gravities

Specific Gravity is the ratio of the weight of a given volume of aggregate to the weight of an equal volume of water. Three measured weights are used to calculate the specific gravities: underwater, saturated surface dry (SSD), and air dry. The types of specific gravity calculated using the measured weights, include: bulk specific gravity, SSD bulk specific gravity, and apparent specific gravity in addition to the water absorption. Specific gravity tests were performed on the coarse (retained on the 4.75 mm sieve) and on the fine portions (passing the 4.75 mm sieve) of the virgin aggregates blend, 3/8" RAP, and #4 RAP stockpiles. It should be noted that for the #4 RAP stockpile, only fine aggregate specific gravity was performed. The lime specific gravity was assumed at 2.800 according to the National Lime Association (National Lime Association-2007).

Coarse Aggregate Specific Gravity

According to AASHTO T85: "Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate", a minimum mass of 2000 g based on 12.5 mm NMAS of dried coarse aggregate are soaked for 15 to 19 hours in water, then using a pre-damped towel the mass was dried to reach SSD condition (no shiny faces on the aggregates), and finally the mass under water is reported at $73.4 \pm 3^{\circ}\text{F}$ ($23.0 \pm 1.7^{\circ}\text{C}$) (AASHTO T85-2015). Thereafter, the dry mass can be taken, once the sample is dried overnight. The specific gravities and absorption of coarse aggregates are summarized in **Table 20** for the virgin aggregates blend and 3/8" RAP.

Table 20. Specific gravities and absorption of coarse aggregates.

	Virgin Aggregates Blend	3/8" RAP
Dry Bulk coarse SG	2.619	2.557
Apparent coarse SG	2.771	2.736
Absorption, %	2.1	2.6

Fine Aggregate Specific Gravity

According to AASHTO T84: “Standard Method of Test for Specific Gravity and Absorption of Fine Aggregate”, 6% water by DWA are added to 500 g of fine aggregates and left for 15 to 19 hours (AASHTO T84-2017). The cone test is performed to check for SSD condition (SSD is reached when the sample slightly collapses after cone removal). The 500 g SSD fine mass is added to a pycnometer, distilled water is added and constant agitation is maintained for 15 to 20 minutes. The mass of the pycnometer, aggregate and water is determined. The oven dry mass is recorded once the sample is dried overnight. **Table 21** below summarizes the specific gravities and absorption of fine aggregates for the virgin aggregates blend, 3/8” RAP, #4 RAP, and lime.

Table 21. Specific gravities and absorption of fine aggregates.

	Virgin Aggregates Blend	3/8" RAP	#4 RAP	Lime
Dry Bulk fine SG	2.565	2.568	2.552	2.800
Apparent fine SG	2.766	2.730	2.728	2.800
Absorption, %	2.8	2.3	2.5	-

Blend Specific Gravity

Virgin Aggregates have 59.1% fine aggregates (passing #4 sieve) with average $G_{sb} = 2.565$ and 40.9% of coarse aggregates with average $G_{sb} = 2.619$, therefore the virgin aggregates blend specific gravity is calculated as per the following equation:

$$G_{sb, \text{ virgin agg}} = \frac{100}{\left(\frac{59.1}{2.565}\right) + \left(\frac{40.9}{2.619}\right)} = 2.587$$

The 3/8" RAP stockpile has 32.2% fine aggregates with $G_{sb} = 2.568$ and 67.8% of coarse aggregates with average $G_{sb} = 2.557$, therefore the RAP stockpile specific gravity is calculated as per the following equation:

$$G_{sb, 3/8'' \text{ RAP}} = \frac{100}{\left(\frac{32.2}{2.568}\right) + \left(\frac{67.8}{2.557}\right)} = 2.561$$

Combining 73.9% of virgin aggregates with 15% of 3/8" RAP, 10% #4 RAP, and 1.1% lime, the total specific gravity of the blend is computed as the following:

$$G_{sb, \text{blend}} = \frac{100}{\left(\frac{73.9}{2.587}\right) + \left(\frac{15}{2.561}\right) + \left(\frac{10}{2.552}\right) + \left(\frac{1.1}{2.800}\right)} = 2.582$$

Similarly, the apparent SG of the blend is calculated to be 2.759.

5.2. Mix Design, Volumetric Properties, and Moisture Susceptibility (TSR)

Figure 28 and

Table 22 summarize the optimum binder contents of the various mixtures while **Table 23** to **Table 29** summarize the detailed mix designs for the asphalt mixtures that were evaluated in this study. A review of the mix design data indicates the following:

- The selected design air voids for all mixtures ranged between 4.2 and 4.4%.
- The OBC for mixtures with the base binder and with the two binders with 10%TR are similar. The OBC increases with the increase of tire rubber percentage. The two mixtures with 20%TR showed a difference of 0.1% in the OBC, and the mixtures with 28%TR achieved the same OBC.

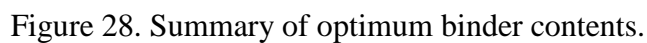
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Table 23. Mix design for the PG64-22 Base Binder mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	305	AVTS
Compaction Temperature, °F	288	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.3	-
Air Voids, % TWM	4.2	4
VMA, %	14.2	14 Min
VFA, %	71	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.1	≤ 89.0
% Gmm at N _{max} at OBC, %	97.5	≤ 98.0
Gmm at OBC	2.442	-
Pbe at OBC, %	4.42	-
Unconditioned Tensile Strength @77F, psi	183	-
Conditioned Tensile Strength @77F, psi	156	-
Tensile Strength Ratio @77F, %	85.4	80 Min

Table 24. Mix design for the PG64-22R, 10%TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	305	AVTS
Compaction Temperature, °F	288	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.3	-
Air Voids, % TWM	4.3	4
VMA, %	14.1	14 Min
VFA, %	69	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.0	≤ 89.0
% Gmm at N _{max} at OBC, %	97.4	≤ 98.0
Gmm at OBC	2.449	-
Pbe at OBC, %	4.31	-
Unconditioned Tensile Strength @77F, psi	162	-
Conditioned Tensile Strength @77F, psi	126	-
Tensile Strength Ratio @77F, %	78.1	80 Min

Table 25. Mix design for the PG64-22R, 20% TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	305	AVTS
Compaction Temperature, °F	288	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.55	-
Air Voids, % TWM	4.3	4
VMA, %	14.3	14 Min
VFA, %	70	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.2	≤ 89.0
% Gmm at N _{max} at OBC, %	97.4	≤ 98.0
Gmm at OBC	2.447	-
Pbe at OBC, %	4.44	-
Unconditioned Tensile Strength @77F, psi	178	-
Conditioned Tensile Strength @77F, psi	136	-
Tensile Strength Ratio @77F, %	76.4	80 Min

Table 26. Mix design for the PG64-22R, 28%TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	303	AVTS
Compaction Temperature, °F	288	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.5	-
Air Voids, % TWM	4.4	4
VMA, %	13.9	14 Min
VFA, %	69	65 - 75
Dust Proportion, P _{0.075} /P _{be}	1	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	87.6	≤ 89.0
% Gmm at N _{max} at OBC, %	96.8	≤ 98.0
Gmm at OBC	2.459	-
Pbe at OBC, %	4.23	-
Unconditioned Tensile Strength @77F, psi	200	-
Conditioned Tensile Strength @77F, psi	144	-
Tensile Strength Ratio @77F, %	71.9	80 Min

Table 27. Mix design for the PG 70-22XR, 10%TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	318	AVTS
Compaction Temperature, °F	293	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.3	-
Air Voids, % TWM	4.3	4
VMA, %	14	14 Min
VFA, %	69	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.4	≤ 89.0
% Gmm at N _{max} at OBC, %	97.5	≤ 98.0
Gmm at OBC	2.451	-
Pbe at OBC, %	4.27	-
Unconditioned Tensile Strength @77F, psi	153	-
Conditioned Tensile Strength @77F, psi	130	-
Tensile Strength Ratio @77F, %	84.7	80 Min

Table 28. Mix design for the PG70-22XR, 20% TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	318	AVTS
Compaction Temperature, °F	293	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.45	-
Air Voids, % TWM	4.3	4
VMA, %	14.5	14 Min
VFA, %	70	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.2	≤ 89.0
% Gmm at N _{max} at OBC, %	97.4	≤ 98.0
Gmm at OBC	2.441	-
Pbe at OBC, %	4.5	-
Unconditioned Tensile Strength @77F, psi	171	-
Conditioned Tensile Strength @77F, psi	141	-
Tensile Strength Ratio @77F, %	82.4	80 Min

Table 29. Mix design for the PG70-16XR, 28%TR mixture.

Property	Value	Superpave Specifications
Hydrated Lime, %	1.5	-
Mixing Temperature, °F	308	AVTS
Compaction Temperature, °F	288	AVTS
N _{initial}	8	8
N _{design}	100	100
N _{max}	160	160
Aggregate Bulk SG (blend), G _{sb}	2.582	-
Optimum Binder (OBC), % TWM	5.5	-
Air Voids, % TWM	4.2	4
VMA, %	14	14 Min
VFA, %	70	65 - 75
Dust Proportion, P _{0.075} /P _{be}	0.9	0.6 - 1.2
% Gmm at N _{initial} at OBC, %	88.2	≤ 89.0
% Gmm at N _{max} at OBC, %	97.4	≤ 98.0
Gmm at OBC	2.453	-
Pbe at OBC, %	4.32	-
Unconditioned Tensile Strength @77F, psi	224	-
Conditioned Tensile Strength @77F, psi	175	-
Tensile Strength Ratio @77F, %	78.2	80 Min

Figure 29 and **Figure 30** compare the unconditioned/moisture-conditioned TS and TSR properties of the evaluated mixtures, respectively. The whiskers on the bars in **Figure 29** represent the 95% confidence interval of the measured values. Overlap in the confidence intervals indicates statistically similar values. Examination of the resistance to moisture damage data presented in **Figure 29** and **Figure 30** leads to the following observations:

- The PG64-22 Base, PG70-22XR with 10 and 20%TR mixtures met the Superpave specifications for moisture damage of a TSR \geq 80%. The other mixtures did not meet the specification even with the 1.5% hydrated lime but still held a TSR above 70%.

- The addition of 10% TR to the base binder and to the polymer modified base binder decreased both the unconditioned and moisture-conditioned TS. However, as the rubber percentage increased beyond 10%, both unconditioned and moisture-conditioned properties increased.
- The increase of the tire rubber content in the asphalt binder showed a decrease in the TSR of the mixture; the moisture-conditioned TS is not increasing proportionally with the increase in the unconditioned TS.
- The addition of polymer to the tire rubber modified asphalt binder displayed a higher TSR compared to the mixtures modified with tire rubber only.

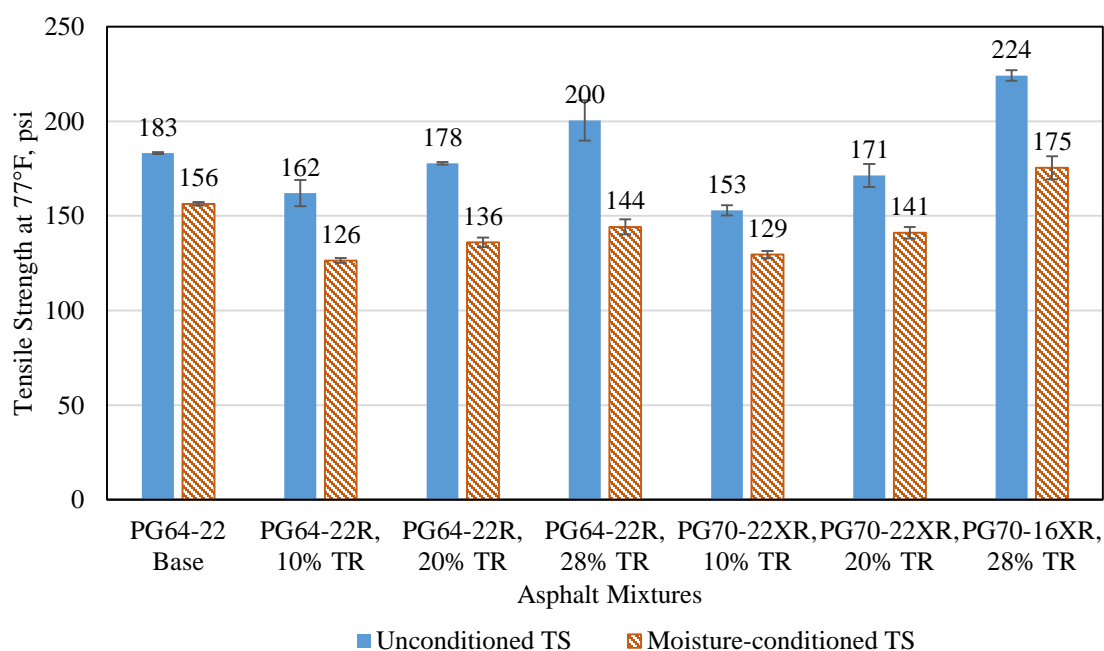


Figure 29. Unconditioned and moisture-conditioned tensile strength properties of the various mixtures.

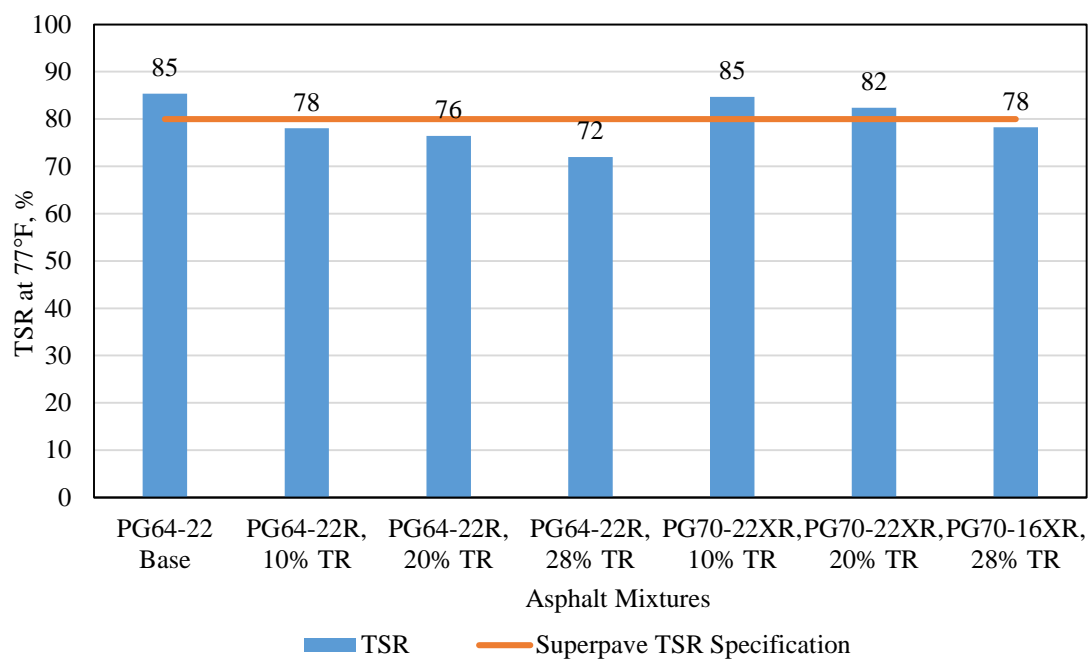


Figure 30. Tensile strength ratios of the various mixtures.

Chapter 6. Properties of Evaluated AC Mixtures

6.1. Dynamic Modulus

Figure 31 and **Figure 32** compare the E^* master curves of the evaluated mixtures at 68°F (20°C). It should be noted that even-though the master curves are presented at 68°F (20°C), due to the viscoelastic behavior of the asphalt mix (as discussed earlier), the E^* values at low frequencies are analogous to E^* values at high temperatures while the E^* values at high frequencies are analogous to E^* values at low temperatures. The master curves data in **Figure 31** and **Figure 32** indicate that the tire rubber mixtures exhibit slightly higher E^* property compared to the mixture with the base binder over the entire range of loading frequency and temperature. It should be noted that the x-axis in both figures is a log-scale, which indicates that any small difference in the curves represents a significant change in the modulus value. The higher E^* property indicates stronger and more stable mix and leads to lower stresses and strains generated in the asphalt pavement under a given loading and environmental conditions.

In addition to assessing the E^* master curves, specific values of the E^* at certain combinations of temperature and loading frequency are also of interest. For this analysis the E^* values at a loading frequency of 10 Hz and temperatures of 104°F (40°C) and 68°F (20°C) were selected. The loading frequency of 10 Hz was selected since it represents a truck traveling at 60 mph (97 kph) while the 104 and 68°F (40 & 20°C) temperatures were selected since they represent the critical temperature for rutting and fatigue, respectively. **Figure 33** and **Figure 34** compare the E^* values of the evaluated mixtures at 10 Hz and temperatures of 104 and 68°F (40 & 20°C), respectively.

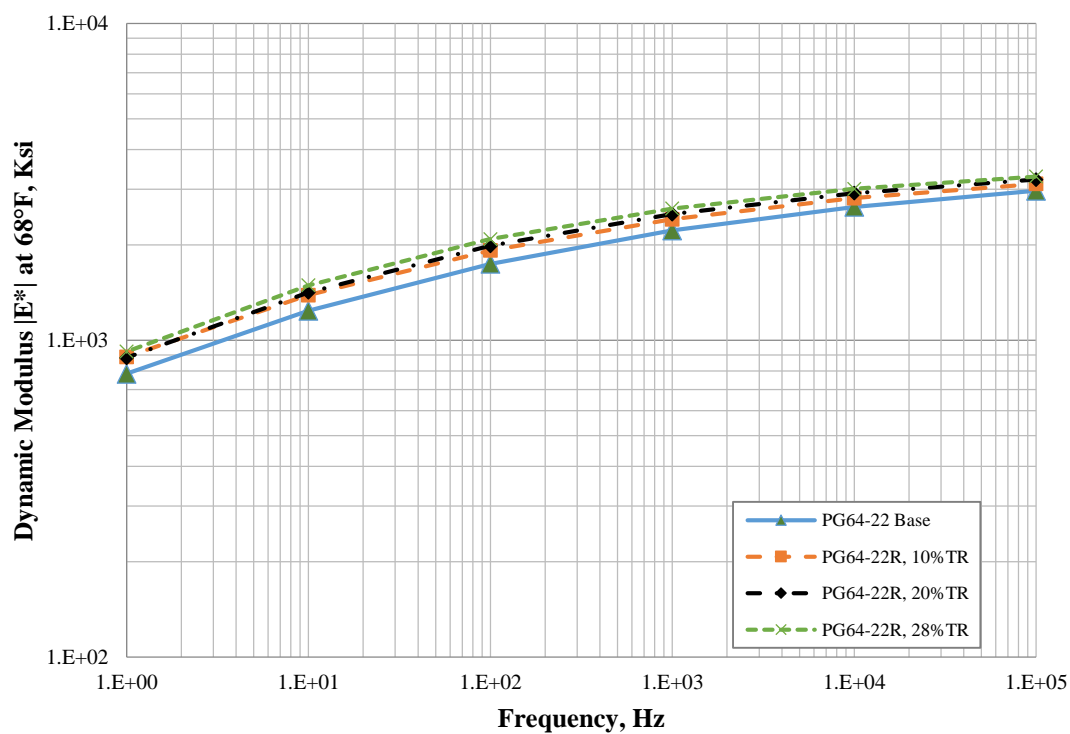


Figure 31. Dynamic modulus master curves for the tire rubber modified mixtures.

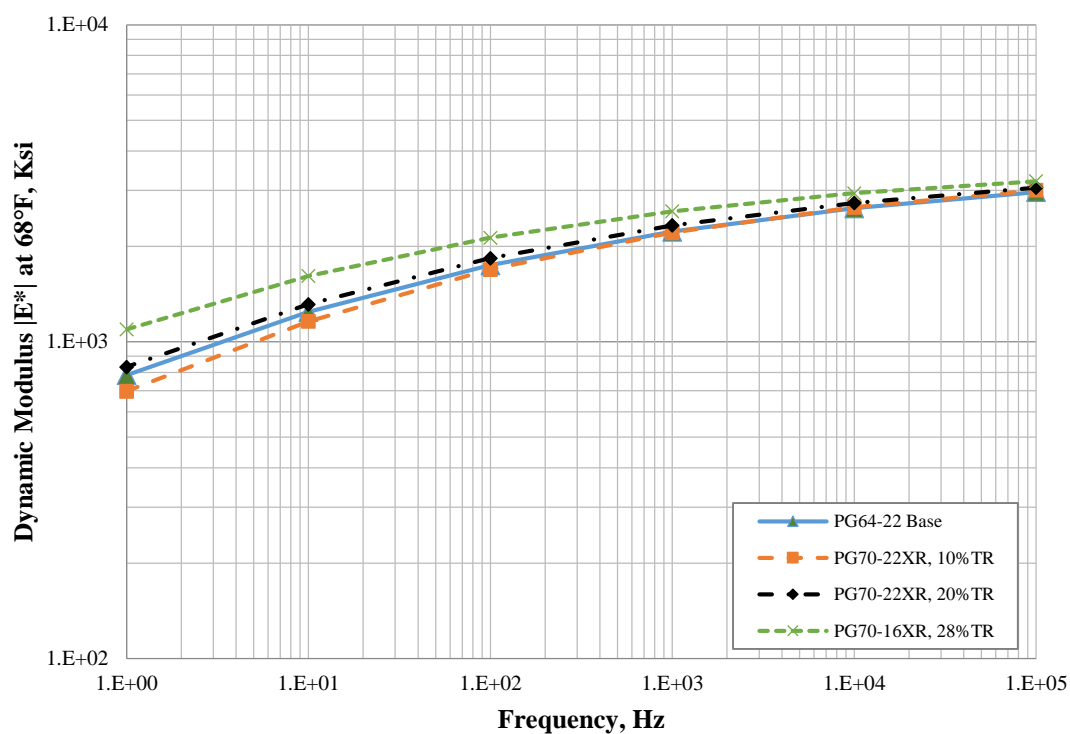


Figure 32. Dynamic modulus master curves for the polymer/tire rubber modified mixtures.

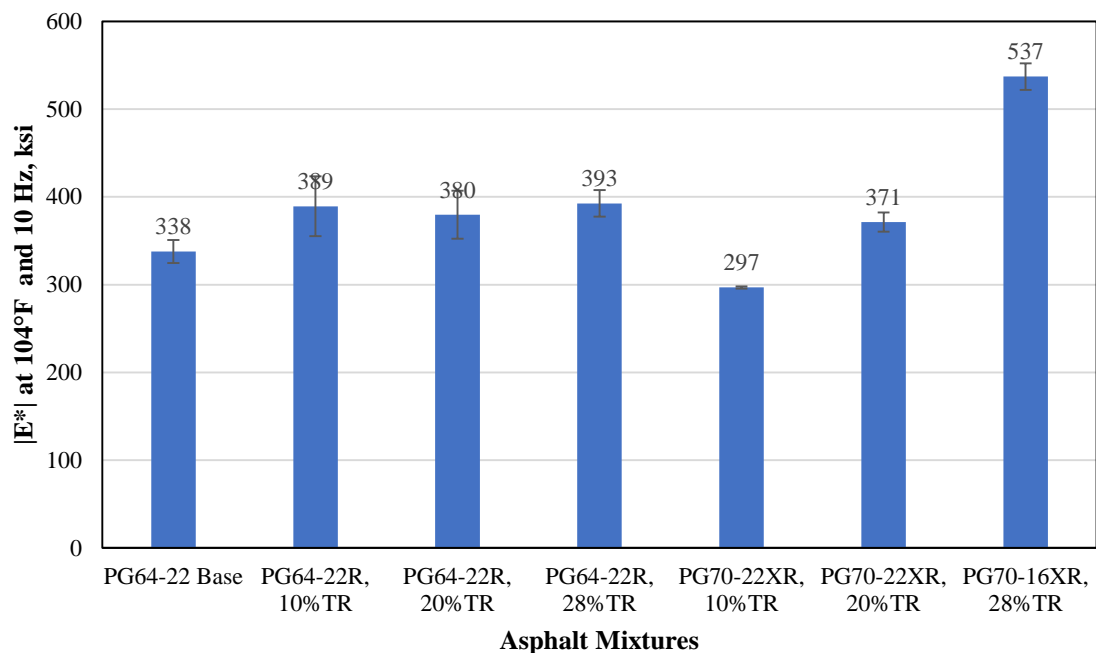


Figure 33. Dynamic modulus properties for rutting analysis.

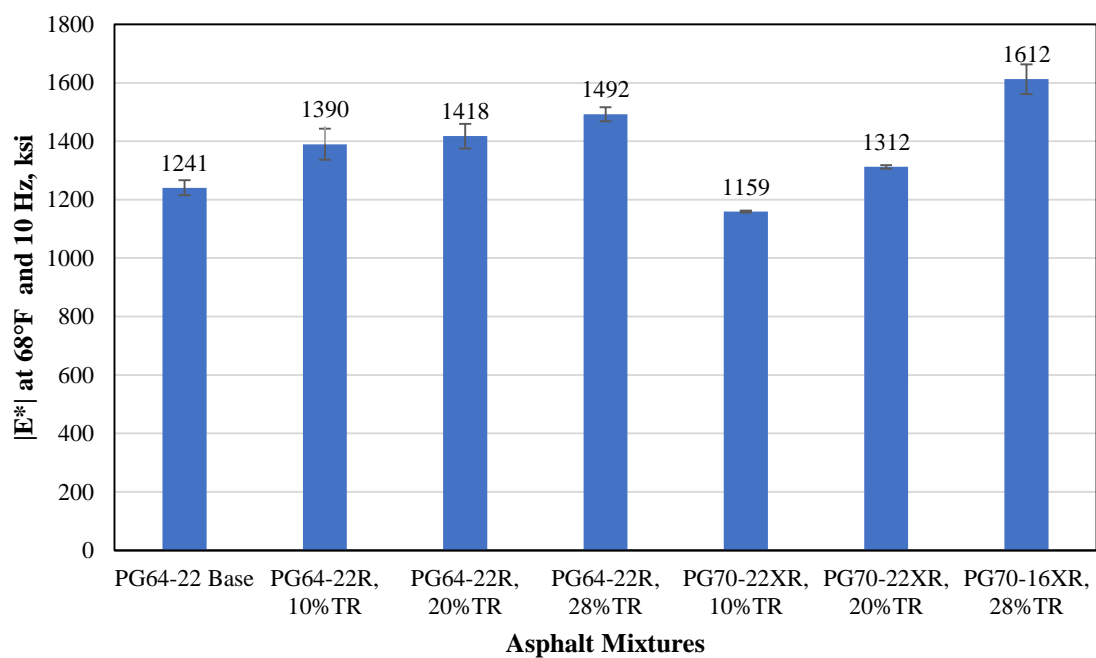


Figure 34. Dynamic modulus properties for fatigue analysis

Examination of the dynamic modulus data presented in **Figure 33** and **Figure 34** leads to the following observations:

- At the 104°F (40°C) temperature, the dynamic modulus property was significantly increased with the addition of TR in the mixtures, which makes the mixtures highly resistant to rutting.
- Adding 10, 20 or 28% TR to the base asphalt binder resulted in the same dynamic modulus increase at 104°F (40°C), from 338 ksi to 389 ksi, 380 ksi, and 393 ksi (2330 to 2682 MPa, 2620 MPa, and 2710 MPa), respectively.
- The addition of polymer to the mixture with 10% TR resulted in a decrease in the dynamic modulus from 338 ksi to 297 ksi (2330 MPa to 2048 MPa), which makes the mix more susceptible to rutting and jeopardize the mixture's performance during hot weather.
- As the rubber percentage increased beyond 10%, the dynamic modulus of the polymer/tire rubber-modified mixtures increased from 297 ksi to 371 ksi, and 537 ksi (2048 to 2558 until 3702 MPa) for tire rubber percentages of 10, 20, and 28% TR, respectively at the 104°F (40°C) temperature.
- The addition of TR significantly increased the dynamic modulus property of the mixtures at the 68°F (20°C) temperature.
- Modifying the base asphalt binder with 10 or 20% TR resulted in the same dynamic modulus increase, from 1241 ksi to 1390 ksi and 1418 ksi (8556 to 9584 MPa and

9777 MPa) at 68°F (20°C), respectively; while modifying it with 28% TR, it increased from 1241 ksi to 1492 ksi (8556 to 10287 MPa).

- The addition of polymer to the mixture with 10% TR resulted in a decrease in the dynamic modulus, which makes the mix more flexible and able to sustain more loading at intermediate temperature.
- The dynamic modulus of the polymer/tire rubber-modified mixtures increased from 1159 ksi to 1312 ksi, and 1612 ksi (7991 to 9046 until 11114 MPa) for tire rubber percentage of 10, 20, and 28% TR, respectively at the 68°F (20°C) temperature.
- It can be noted that both the polymer/tire rubber-modified mixtures of PG70-22XR with 10 and 20%TR resulted in a lower dynamic modulus than the tire rubber-modified mixtures of PG64-22R with 10 and 20%TR at 68°F (20°C).

6.2. Permanent Deformation Model (RLT)

According to the low deformation observed at 68°F (20°C), the test was rather run at 86°F (30°C) in order to get a better fitted model. **Figure 35** through **Figure 37** compare the measured flow numbers for the different mixtures. The FN test specifies a maximum number of load repetitions of 20,000 and a maximum permanent vertical strain of 5%; the test is stopped once any of the two limits is reached even-though the mix does not experience tertiary flow.

Close examination of the flow numbers data presented in **Figure 35 – Figure 37** leads to the following observations:

- None of the evaluated mixtures experienced any flow at the test temperature of 86°F (30°C), while almost all of the mixtures exhibited flow at the test temperatures of 103.1 and 138.2°F (39.5 and 59°C).
- Based on the 95 percent confidence intervals, the addition of 10, 20, and 28% tire rubber to the base binder resulted in a statistically similar increase in the flow number at the 103.1°F (39.5°C). Similarly, adding SEC polymer to the 10 and 20% tire rubber modified mixtures resulted in an increase in the flow number compared to the Base mixture but similar flow number compared to the tire rubber modified mixtures. On the other hand, the PG70-16XR, 28%TR including SEC polymer and 28% tire rubber did not experience any flow.
- The PG70-16XR, 28%TR including SEC polymer and 28% tire rubber with the highest dynamic modulus among all mixes, achieved the highest flow number equivalent to 2848 at 138.2°F (59°C). Despite the fact that the addition of 28% TR bumped the OBC by 0.2%, the flow number was increased 5.5 times compared to the PG64-22 base binder which will offer significantly more resistance to rutting at the elevated pavement temperature.
- With the exception of the PG70-16XR mixture with 28%TR, all mixtures exhibited statistically similar flow numbers at the 138.2°F (59°C) test temperature, which is represented by the overlapping of the confidence intervals.

The concept of the rutting model is to relate the permanent axial strain (ϵ_p) within the AC layer to the axial resilient strain (ϵ_r) within the AC layer, the temperature within the AC

layer, and the number of load repetitions. The ε_p represents the unrecoverable axial strain within the AC layer due to the application of each load cycle. Multiplying the ε_p by the thickness of the AC layer leads to the rutting generated within the AC layer due to the application of each load cycle. The ε_r represents the recoverable axial strain within the AC layer due to the application of each load cycle as calculated from the M-E analysis of the flexible pavement structure. **Table 30** summarizes the coefficients of the rutting models developed for each mixture.

Table 30. Rutting models coefficients for all mixtures.

Rutting Models Coefficients	PG64-22 Base	PG64-22R, 10%TR	PG64-22R, 20%TR	PG64-22R, 28%TR	PG70-22XR, 10%TR	PG70-22XR, 20%TR	PG70-16XR, 28%TR
k_{r1}	-8.8553	-5.9462	-7.4943	-5.7050	-7.9390	-8.3122	-2.4005
k_{r2}	4.2112	2.8374	3.5430	2.6610	3.8024	3.9851	1.0500
k_{r3}	0.4547	0.3916	0.4223	0.4164	0.4184	0.4252	0.3584
R^2	0.94	0.81	0.91	0.93	0.88	0.91	0.98

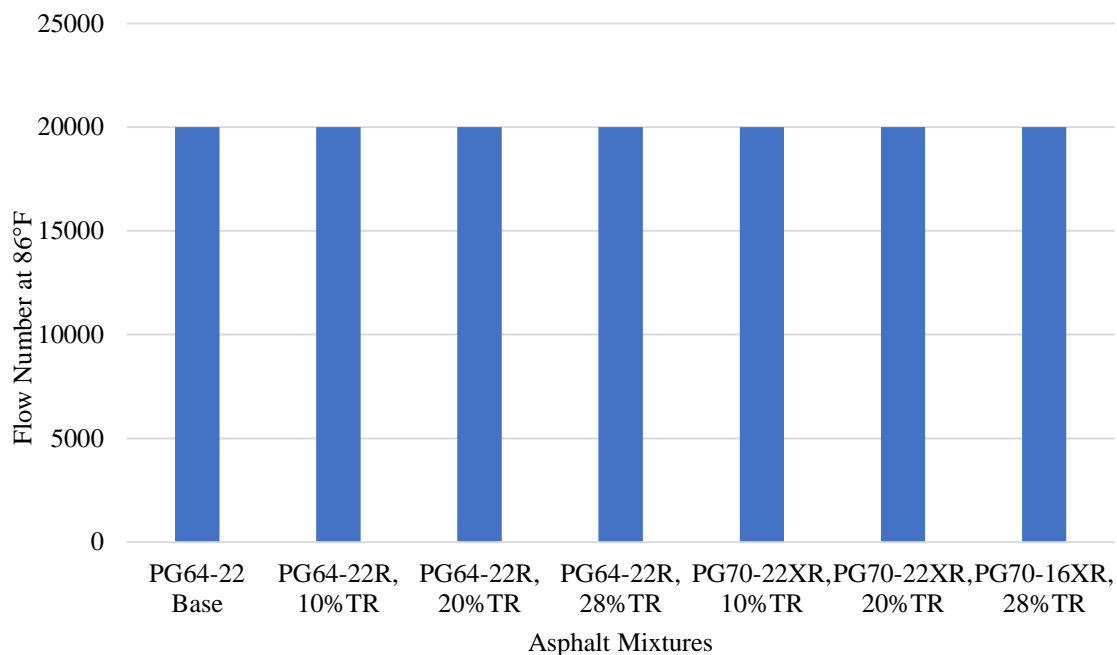


Figure 35. Flow number of all mixtures at 86°F (30°C).

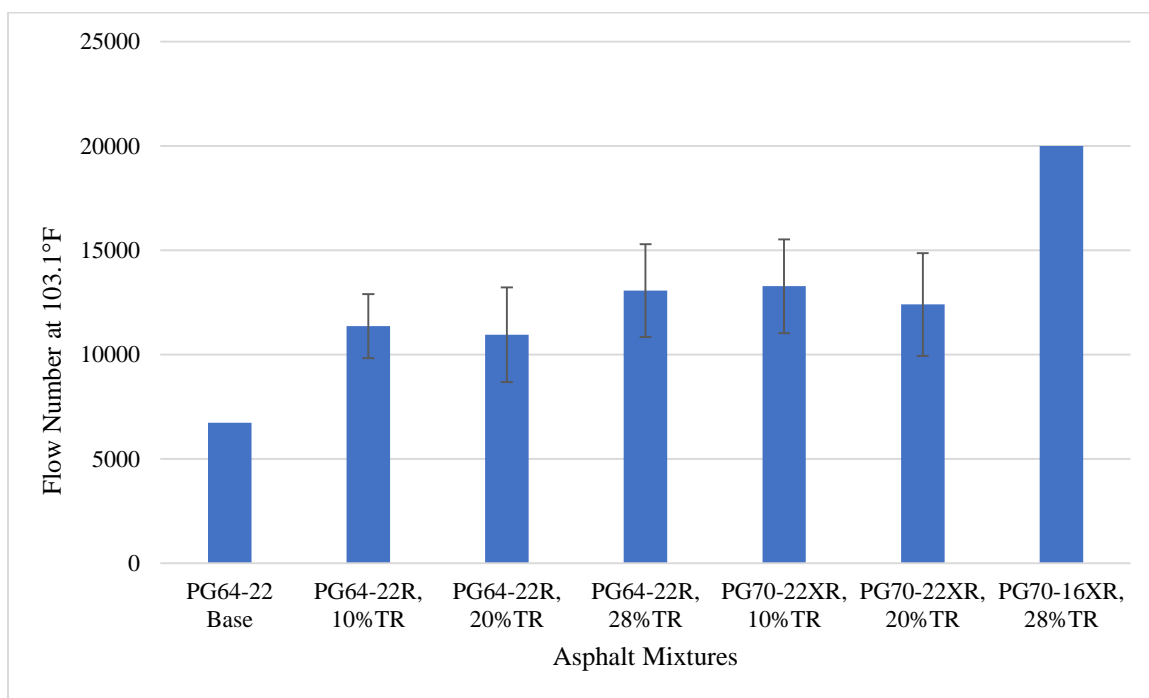


Figure 36. Flow number of all mixtures at 103.1°F (39.5°C).

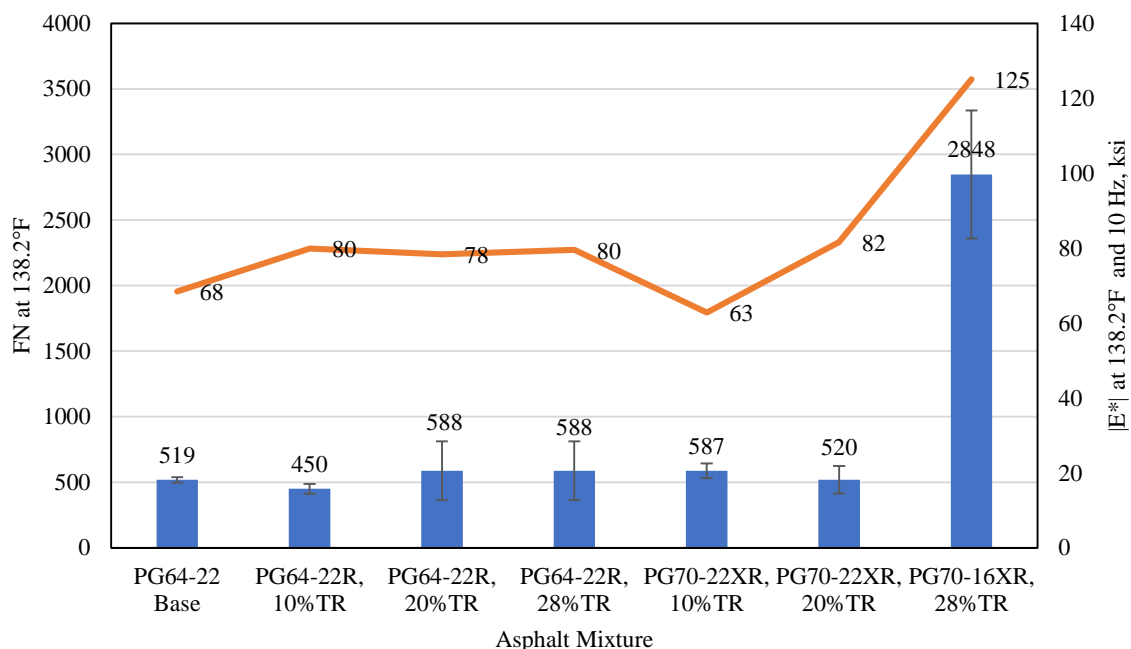


Figure 37. Flow number and dynamic modulus of all mixtures at 138.2°F (59°C).

Figure 38 and Figure 39 compare the fitted permanent deformation models at 103.1°F (39.5°C), for the tire rubber modified mixtures and TR modified mixtures with SEC, respectively. The lower the permanent deformation curve, the higher the resistance of the mixture to rutting within the AC layer. A close examination of the fitted permanent deformation models presented in **Figure 38**, **Figure 39**, and **Table 30** leads to the following observations:

- The PG64-22 Base binder showed the steepest and highest model among all mixtures, implying the least rutting resistance.
- Similar to the findings of the FN analysis, the PG70-16XR with 28%TR has the lowest permanent deformation model, which indicates higher resistance to rutting within the AC layer.

- Consistent with the FN analysis, the fitted rutting models were similar for all the investigated mixtures except for the PG70-16XR, 28%TR.
- The PG70-16XR, 28%TR, with superior rutting behavior, has the lowest fitted parameter k_{r2} , which may imply relative low temperature susceptibility.
- Adding 20 and 28%TR, without any polymer modification, improved the rutting behavior of the base mixture similar to the addition of 10%TR which may be also related to the slight increment in OBC.

It should be noted that the value of ϵ_r is a function of the E^* property of the mixture. Therefore, the calculated ϵ_p 's maybe significantly different due to the influence of the E^* property on the calculated ϵ_r . The impact of the interaction among materials properties and pavement responses will be examined in the M-E analysis section of this thesis.

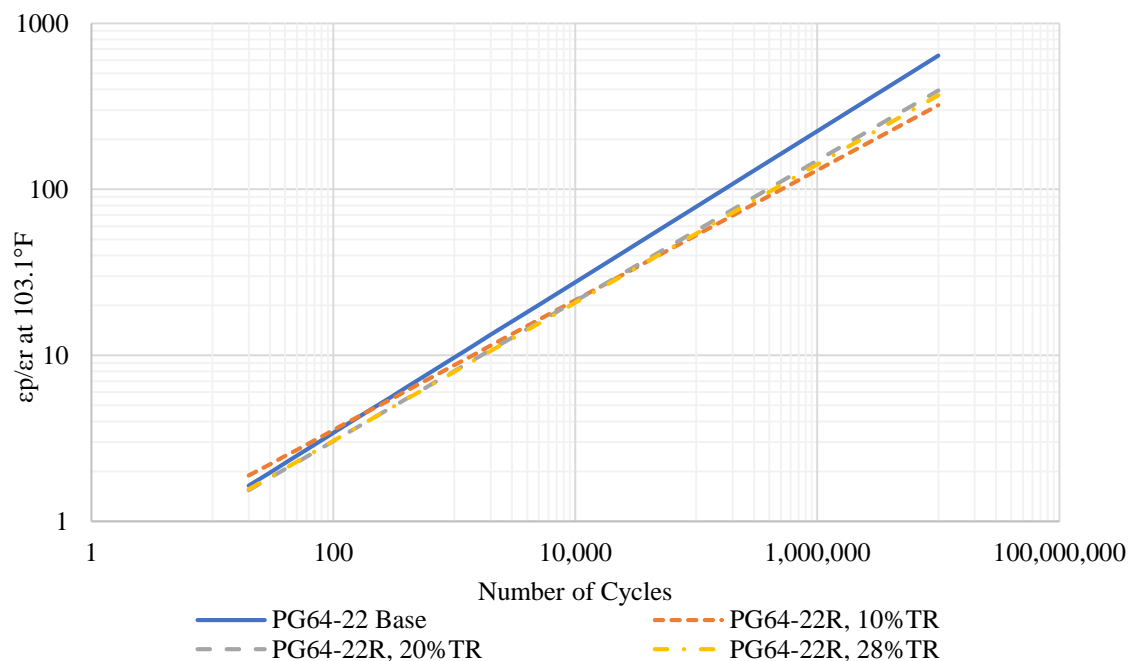


Figure 38. Rutting models for tire rubber modified mixtures at 103.1°F (39.5°C).

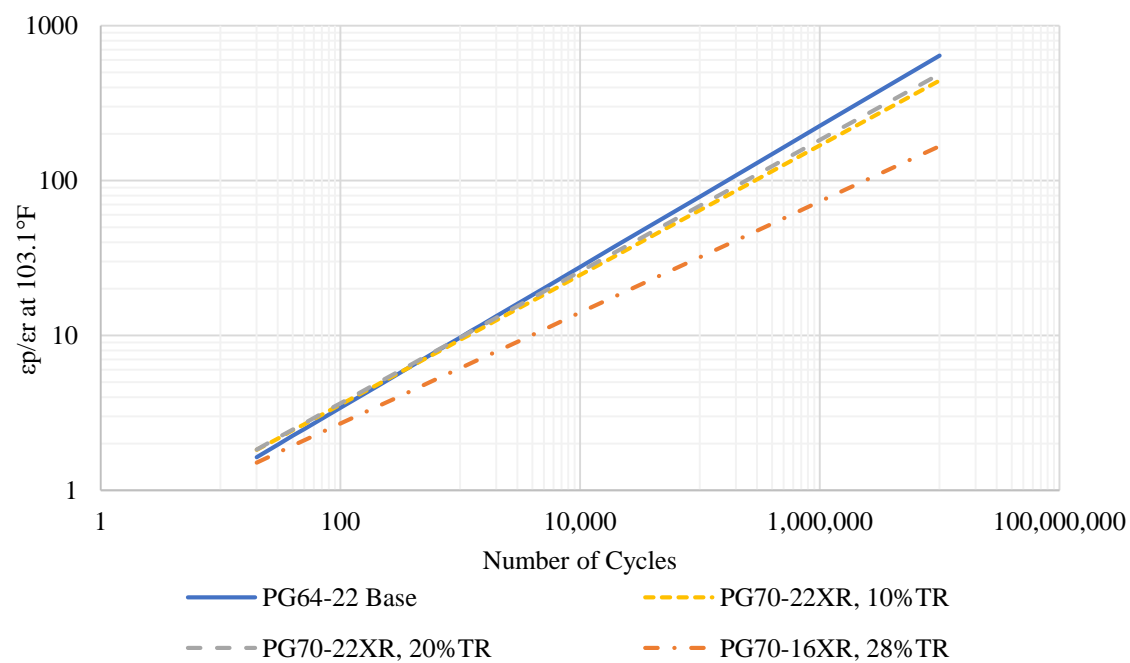


Figure 39. Rutting models for polymer/tire rubber modified mixtures at 103.1°F (39.5°C).

6.2.1. Rutting Models Statistical Analysis

With the aim of statistically evaluating the impact of tire rubber as well as polymer/tire rubber modified asphalt mixtures, an analysis of variance (ANOVA) was conducted among the seven mixtures. It should be mentioned that corresponding dummy variables were introduced separately to simulate the effect of tire rubber added at different amounts, coupled or not with SEC modification. **Table 31** shows the ANOVA statistical results from the regression of all mixtures compared to the Base mixture at all different temperatures.

It can be inferred that adding 10, 20, and 28% TR to the Base mixture, based on the P-values of 0.034, 0.013, and 0.003, respectively, at 95% confidence level, did significantly increase the rutting resistance of the Base mixture.

The PG70-22X, 10%TR mixture showed similar results compared to the Base mixture based on the P-value = 0.186 which is higher than 0.05, followed by the PG70-22XR, 20%TR with a P-value of 0.029.

Interestingly the highest significance was assigned to the PG70-16XR, 28%TR exhibiting the lowest P-value of 0.0002. This observation was consistent with the previous findings of the FN and fitted rutting models analyzed in the above section.

Table 31. ANOVA results.

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-6.5740	0.2631	-24.9833	0.0000	-7.0910	-6.0571
log(T)	3.1557	0.1284	24.5791	0.0000	2.9035	3.4079
log(N)	0.4124	0.0069	59.6230	0.0000	0.3988	0.4260
64-22R,10%TR	-0.0868	0.0408	-2.1296	0.0337	-0.1669	-0.0067
64-22R,20%TR	-0.1018	0.0408	-2.4964	0.0129	-0.1819	-0.0217
64-22R,28%TR	-0.1222	0.0408	-2.9966	0.0029	-0.2023	-0.0421
70-22XR,10%TR	0.0540	0.0408	1.3250	0.1858	-0.0261	0.1341
70-22XR,20%TR	0.0888	0.0408	2.1785	0.0298	0.0087	0.1689
70-16XR,28%TR	-0.1557	0.0408	-3.8180	0.0002	-0.2358	-0.0756

Figure 40 and **Figure 41** present an example of the regression rutting models corresponding to PG64-22R, 28% Tr and PG70-16XR, 28% TR, respectively along with the high and low 95% confidence interval. It can be clearly seen that the lower and upper 95% CI limits did not overlap with the Base mixture, however a higher shift was noticed for the 28%TR with SEC modifier.

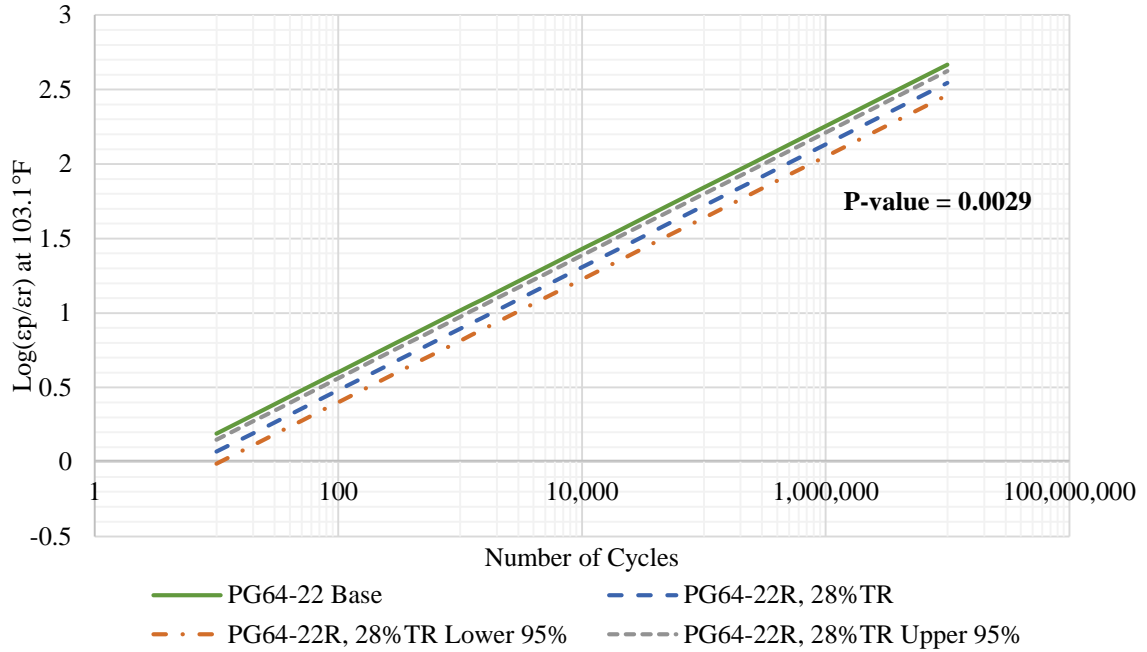


Figure 40. Confidence interval and regression rutting model of the Base and the PG64-22R, 28% TR mixtures.

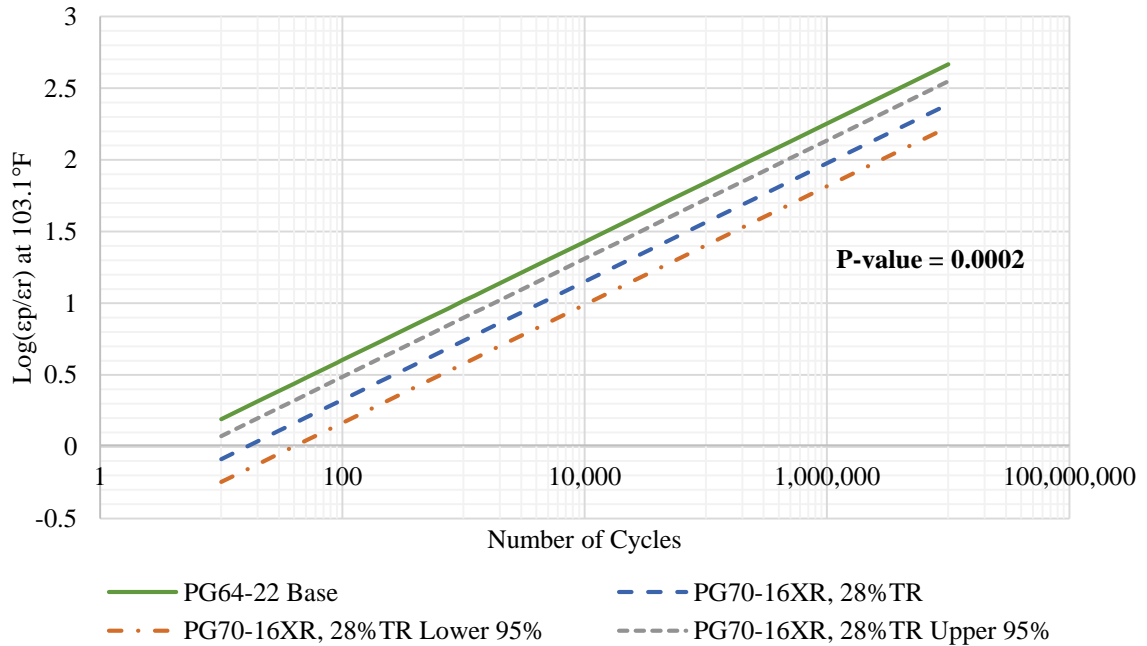


Figure 41. Confidence interval and regression rutting model of the Base and the PG70-16XR, 28% TR mixtures.

6.3. Reflective Cracking Assessment (Texas Overlay)

The resistance to reflective cracking of the seven AC mixtures were evaluated according to the Texas Overlay test previously detailed in section 3.2.2, with respect to the three parameters: critical fracture energy, crack propagation rate, and the number of cycles to failure.

Figure 42 represents the critical fracture energy obtained for all evaluated mixtures along with the corresponding 95 confidence intervals. Consistent with the results of the dynamic modulus at intermediate temperature, the PG70-16XR, 28%TR mixture with the highest stiffness achieved the highest critical fracture energy equivalent to 3.09 lb.-in/in². Interestingly, this is the only mixture with a fracture energy significantly different from all other mixtures, as per the 95 confidence intervals. All the remaining mixtures showed similar values for the critical fracture energy ranging from 2.31 to 2.48 lb.-in/in², while noting that most of these mixtures exhibited similar E* values.

Despite the increase in G_c of the PG70-16XR, 28%TR, this mixture was associated with the highest crack propagation rate (CPR) among all mixtures equivalent to 0.43 as per **Figure 43**. Using the 95 percentile confidence intervals in **Figure 43**, it can be inferred that adding only tire rubber was not able to produce a statistically significant difference in the CPR as compared to the Base mixture. On the other hand, coupling the tire rubber with the polymer was able to show a significant difference from the Base mixture where the 10%TR with SEC decreased the CPR value by 11% denoting a better resistance to crack propagation. However, adding 20 and 28% TR with SEC increased the CPR by 8 and 16%,

respectively compared to the control mixture, implying a notable counter effect of adding high tire rubber percentages.

As shown in **Figure 44**, it is worth mentioning that the number of cycles to failure resulted in higher variability compared to the analyzed G_c and CPR. Moreover, the trend observed with the number of cycles to failure was inversely proportional to the CPR where the greatest CPR in the PG70-16XR, 28%TR, revealed minimum number cycles to failure of 93. The PG64-22R, 28%TR and the PG70-22XR, 10%TR showed a significant improvement in number of cycles to failure up to 765, along with their reduced CPR. Surprisingly, the same aforementioned counter effect of adding 20 and 28%TR with SEC was roughly observed in the number of cycle to failure compared to the Base mixture.

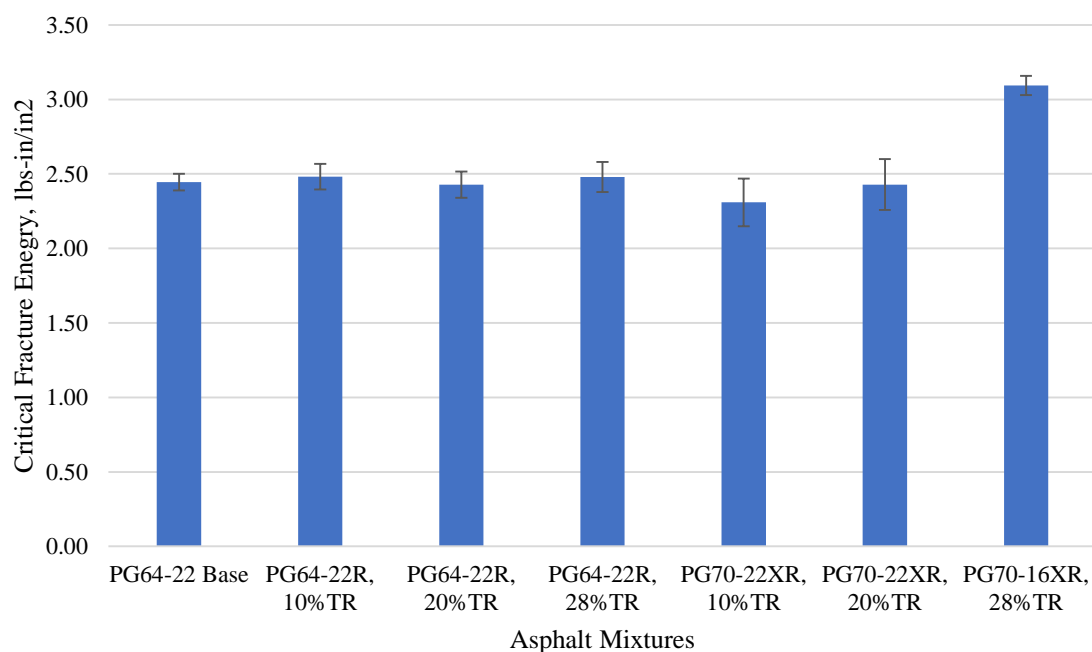


Figure 42. Critical fracture energy results for all mixtures.

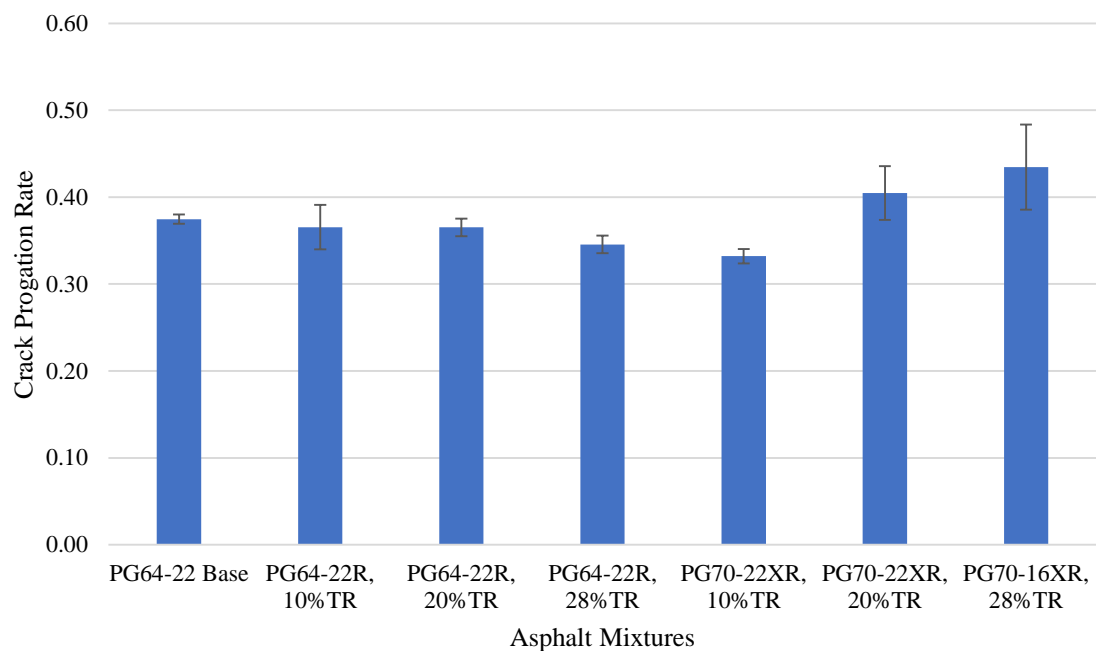


Figure 43. Crack propagation rate results for all mixtures.

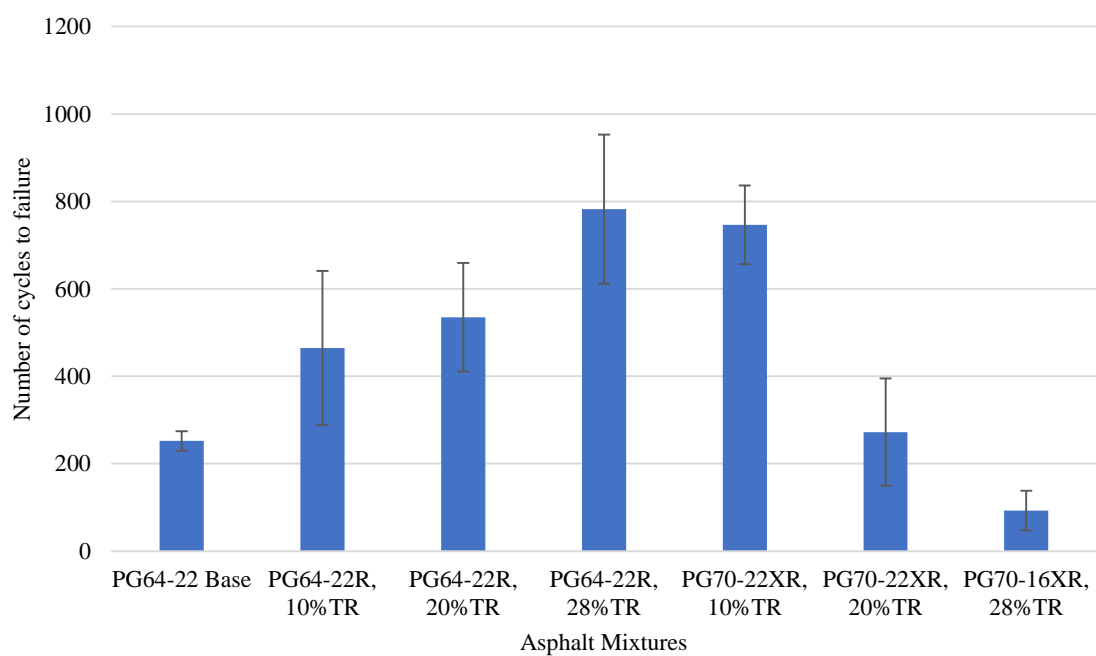


Figure 44. Number of cycles to failure results for all mixtures.

For better understanding the mixtures resistance to reflective cracking, a design interaction plot involving the G_c and CPR is employed in this study, as presented in **Figure 45**. This plot capture the mixture resistance to crack initiation and crack proagation using G_c and CPR, respectively. In other words, the greater the G_c , the higher the energy the AC mixture will require to initiate the crack. On the other hand, the higher the absolute value of CPR, the quicker the crack will progress through the AC specimen, which may jeopardize the cracking life for that AC mixture.

The subsequent task was to set acceptance limits to the G_c and CPR with the aim of balancing the fracture and fatigue properties of the AC mixtures based on the proposed parameters. The maximum (upper) and minimum (lower) limit of 85 (586) and 200 psi (1,379 kPa), respectively, defined by TxDOT for the indirect tensile (IDT) strength of an acceptable mix were used followed by a favorable correlation between the IDT strength and G_c . Accordingly, Garcia et al. (2018) proposed the preliminary lower and upper limits of 1 (7) and 3 lb-in/in² (21 kPa) for G_c .

Furthermore, a CPR of 0.47 is the current acceptance limit relative to 300 number of cycles to failure. Hence, to delineate the crack-resistant and crack-susceptibility of AC mixtures, a preliminary acceptance limit of 0.50 is proposed. Based on these acceptance limits, a “favorable” AC mixture will be located within the green shaded area in **Figure 45** where G_c falls between 1 (7) and 3 lb-in/in² (21 kPa) and the CPR is limited to a maximum of 0.5. Subsequently, the interactive plot can be categorized into several quadrants as per the afformentioned described parameters:

- Tough-crack resistant: Good cracking resistance during crack initiation (tough) and low crack propagation (flexible).
- Tough-crack susceptible: AC mixtures with good resistance to crack initiation (tough) but susceptible to crack propagation (brittle).
- Soft-crack resistant: Susceptible to crack initiation (soft) but good resistance to attenuate the propagation of the crack (flexible).
- Soft-crack susceptible: AC mixtures with significantly poor resistance to crack initiation and propagation.

The interactive plot outcome in **Figure 45** confirms that all mixtures except the PG70-16XR, 28%TR fell within the desirable shaded area of a mixture resistant to crack initiation and crack propagation. Whereas, the PG70-16XR, 28%TR with its noticeable previously observed toughness (i.e. stiffness) slightly exceeded the upper limit for critical fracture energy by 0.1 lb-in/in², indicating a probable brittle behavior. However, this mixture is still able to resist the mechanism of crack propagation with a CPR value of 0.43.

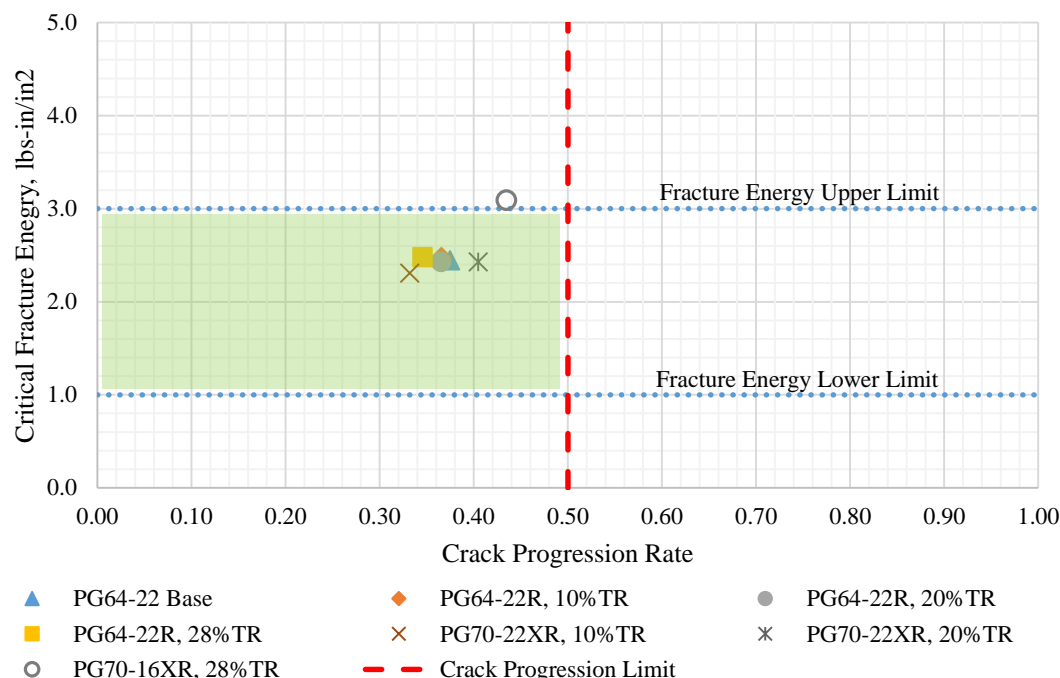


Figure 45. Interactive chart for the Texas overlay test.

6.4. Mechanistic Analysis

6.4.1. Concept of Mechanistic Analysis

Mechanistic analysis covers the determination of the responses of the flexible pavement structure to the loads imparted by heavy vehicles and their impact on pavement life. The flexible pavement structure responses to heavy loads include compression, shear, and bending stresses within the AC layer and compression stresses throughout the unbound layers. The generated stresses in all directions within each layer are coupled with corresponding strains and deformations.

Since this study conducted the evaluation of AC mixtures, the mechanistic analysis will focus on the pavement responses generated within the AC layer. As presented in earlier sections, the asphalt mixtures resistances to rutting were evaluated in the laboratory under

a strain-controlled mode of testing. Therefore, the mechanistic analysis will determine the compression strains within the AC layer and evaluate their impact on pavement life. **Figure 46** presents a schematic of the mechanistic analysis of a flexible pavement structure subjected to heavy traffic loads. The ϵ_r represents the compression strain within the AC layer while the ϵ_t represents the bending strain at the bottom of the AC layer. As discussed earlier the ϵ_r is directly related to the rutting of the AC layer while the ϵ_t is directly related to the fatigue cracking of the AC layer. The impacts of the calculated compression and bending strains on pavement life are assessed through the rutting and fatigue cracking models of the asphalt mixture used in the AC layer.

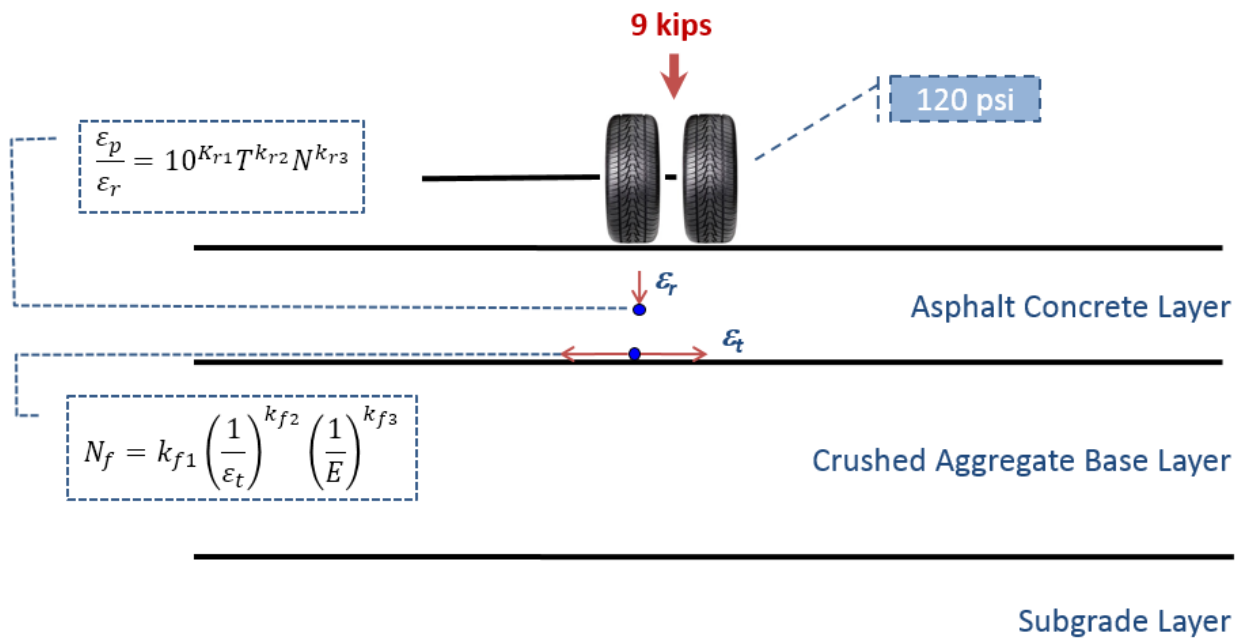


Figure 46. Schematic of the mechanistic analysis of flexible pavement structure.

Under a given traffic load and fixed properties of the unbound layers (i.e., base and subgrade), the magnitudes of ϵ_r and ϵ_t are significantly impacted by the E^* property of the asphalt mixture while their impacts on pavement life are significantly impacted by the coefficients of the rutting and fatigue cracking models of the asphalt mixture.

The main advantage of the mechanistic analysis is its ability to combine the engineering property of the asphalt mixture (E^*) with its rutting and fatigue cracking characteristics to determine the true impact of traffic loads on pavement life. A simple comparison of the rutting models of two asphalt mixtures only assesses the relative behavior of the mixtures without any indication on their relative impacts on pavement life.

The next section summarizes a full mechanistic analysis which combines the engineering properties of the mixtures with their rutting performance characteristics to assess the full impact on the flexible pavement performance life.

6.4.2. Comparative Mechanistic Analysis

This part of the study evaluated the impact of the type of asphalt mixture used in the construction of the AC layer on the performance life of the flexible pavement. The following process is used to conduct the comparative mechanistic analyses:

- Identify two flexible pavement structures: thin and thick.
 - Thin
 - 4 inches AC layer ($\nu = 0.42$)
 - 8 inches CAB layer ($E = 30,000$ psi, $\nu = 0.40$, damping ratio = 5%)

- Subgrade ($E = 8,000$ psi, $\nu = 0.40$, damping ratio = 5%)
- Thick
 - 6 inches AC layer ($\nu = 0.42$)
 - 12 inches CAB layer ($E = 30,000$ psi, $\nu = 0.4$, damping ratio = 5%)
 - Subgrade ($E = 8,000$ psi, $\nu = 0.40$, damping ratio = 5%)
- Use the seven type of asphalt mixtures evaluated in this study in the construction of the AC layer of each flexible pavement structure.
 - PG64-22 Base
 - PG64-22R, 10%TR
 - PG64-22R, 20%TR
 - PG64-22R, 28%TR
 - PG70-22XR, 10%TR
 - PG70-22XR, 20%TR
 - PG70-16XR, 28%TR
- Use the mix-specific engineering properties (E^*) and rutting model determined in this research to represent each of the seven asphalt mixtures.
- Subject each of the 14 flexible pavement structures (2 structures x 7 mixtures) to a legally loaded 18-wheeler.

- Determine the ϵ_r at the middle of the AC layer for each of the 14 flexible pavement structures under the driving tandem axle of the legally loaded 18-wheeler traveling at 60mph (96 kph) without any braking and traveling at 10mph (16kph) with braking.
- The responses of the flexible pavement structures are determined with the 3D-Move Pavement Analysis Software (www.wrsc.unr.edu) developed by Siddharthan et al. (1998). The 3D-Move model is based on the dynamic analysis of the flexible pavement structure. It uses the E^* master curve to describe the viscoelastic behavior of the AC layer. The short-term aged E^* master curves measured in this research for each of the evaluated 7 mixtures are used for the rutting life analysis using 3D-Move.
- Incorporate the determined ϵ_r at the middle of the AC layer into the rutting model of each mixture to calculate the ϵ_p at a temperature of 103.1°F (39.5°C). Set the rutting failure criteria within the AC layer at 0.25 inch (6.25mm) and solve for the rutting life (N_r). *Note: $Rut\ Depth = \epsilon_p \times H_{AC}$*

Table 32 summarizes the results of the comparative rutting mechanistic analyses. The ratio of the rutting represents the life offered by the modified mixture over the life offered by the Base mixture. The rutting life was limited to a maximum of 100 million and the life ratio was limited to a maximum of 10. These limits were imposed to account for the fact that, in practice, the pavement structure would eventually experience non-structural failures beyond the 100 million load repetitions and life ratio of 10.

The mechanistic analyses were conducted for a two pavement structures; thin and thick to evaluate the performance of the evaluated mixtures over a range of pavement designs. The pavement structures were loaded with a legally loaded 18-wheeler tractor-trailer combination under two travel conditions: a) free rolling at 60 mph (96kph) with no-braking and b) slowing down at 10 mph (16kph) with braking. The free rolling represents the loading condition on access-controlled highway pavement while the slowing down represents the loading condition on urban street or off-ramp pavement with traffic lights.

Figure 47 presents the load distributions among the various axles of the 18-wheeler at the free rolling and braking conditions. It can be seen that under the free rolling condition the vertical loads are distributed evenly among the various axles without any development of the horizontal loads at the tire pavement interface. In the case braking, there is a significant re-distribution of the vertical loads among the various axles and the development of significant horizontal loads at the tire pavement interface. The horizontal loads at the tire pavement interface significantly increase the shear and vertical stresses/strains within the AC layer and represent the main cause of accelerated failures in rutting and shoving at intersections on urban streets and on off-ramps.

Close examination of the mechanistic analyses data at 103.1°F (39.5°C) in **Table 32** leads to the following observations:

- The braking condition significantly increased the vertical strain at the middle of the AC layer for both the Base and all modified mixtures for both pavement structures.

- The PG64-22 Base mixture cannot withstand the braking action of the 18-wheeler by more than 0.15 and 0.32 million repetitions, for both the thin and thick pavement structures respectively.
- Under breaking condition, the rutting behavior of the mixtures solely modified with tire rubber improved based on the rutting life ratio ranging from 2.8 to 4.3, and 3.0 to 4.2 in case of thin and thick pavement, respectively.
- Under no-breaking condition, the rutting behavior of the mixtures solely modified with tire rubber improved based on the rutting life ratio ranging from 3.7 to 5.8, and 3.7 to 5.9 in case of thin and thick pavement, respectively.
- In both breaking and no-breaking conditions, adding 10 and 20% TR combined with SEC modification was not able to increase the rutting life ratio by more than 2.2 and 2.4 for thin and thick pavement structures respectively.
- Interestingly, the PG70-16XR, 28%TR exhibited a rutting life ratio higher than 10 compared to the Base mixture under all evaluated conditions of breaking and no-breaking for thin and thick pavement structures.

Table 32. Summary of the comparative rutting mechanistic analyses of the various mixtures.

Pavement	Speed (mph)	Mixture	Rutting @ 103.1°F (39.5°C)		
			ϵ_r (micron)	N_r (million)	Rutting Life Ratio
Thin 4"-AC 8"-CAB	60 No-Braking	PG64-22	99.876	0.61	
		PG64-22R, 10%TR	83.757	3.50	5.8
		PG64-22R, 20%TR	85.201	2.25	3.7
		PG64-22R, 28%TR	80.415	2.95	4.9
		PG70-22XR, 10%TR	106.39	0.99	1.6
		PG70-22XR, 20%TR	86.734	1.32	2.2
		PG70-16XR, 28%TR	63.685	42.63	>10
Thin 4"-AC 8"-CAB	10 Braking	PG64-22	191.18	0.15	
		PG64-22R, 10%TR	164.2	0.63	4.3
		PG64-22R, 20%TR	175.02	0.41	2.8
		PG64-22R, 28%TR	163.74	0.54	3.7
		PG70-22XR, 10%TR	222.78	0.17	1.2
		PG70-22XR, 20%TR	171.08	0.27	1.8
		PG70-16XR, 28%TR	122.51	6.87	>10
Thick 6"-AC 12"-CAB	60 No-Braking	PG64-22	105.05	1.16	
		PG64-22R, 10%TR	91.244	6.77	5.9
		PG64-22R, 20%TR	91.509	4.30	3.7
		PG64-22R, 28%TR	85.254	5.86	5.1
		PG70-22XR, 10%TR	114.17	1.91	1.6
		PG70-22XR, 20%TR	89.712	2.74	2.4
		PG70-16XR, 28%TR	68.383	91.23	>10
Thick 6"-AC 12"-CAB	10 Braking	PG64-22	189.33	0.32	
		PG64-22R, 10%TR	172.14	1.34	4.2
		PG64-22R, 20%TR	174.26	0.93	3.0
		PG64-22R, 28%TR	171.8	1.09	3.4
		PG70-22XR, 10%TR	223.84	0.38	1.2
		PG70-22XR, 20%TR	179.17	0.54	1.7
		PG70-16XR, 28%TR	118.71	19.58	>10

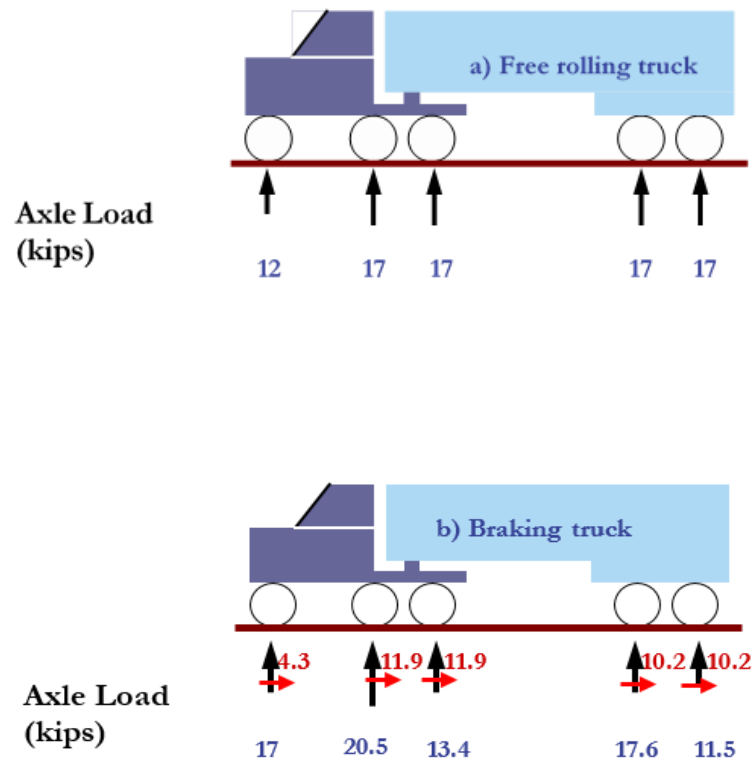


Figure 47. Distributions of axle loads for 18-wheeler at free rolling and braking conditions.

Chapter 7. Summary, Findings, and Recommendations

This scope of this presented study aimed to evaluate the performance properties of tire rubber-modified asphalt mixtures based on the data generated from an extensive laboratory experiment previously detailed in the above sections. The latest technologies were used to evaluate properties and characteristics of asphalt mixtures that are critical to their resistance to the various distresses. Based on the analysis of the data generated from the laboratory evaluations of the Base and modified mixtures and the pavement performance data estimated by the mechanistic comparative analyses, the following conclusions can be drawn:

1. The modified asphalt binders with 20 and 28% TR with or without SEC modifier (PG64-22R, 10 and 20% TR and PG70-22XR, 10 and 20% TR) did not meet the Superpave Performance Grade in terms of mass loss percentage.
2. The PG70-22XR, 10% TR and the PG70-22XR, 20% TR asphalt binders showed significantly lower aging susceptibility among all evaluated asphalt binders including the base binder as shown by its significantly lower properties after the short-term aging in the RTFO and the long-term aging in the PAV.
3. The addition of 10, 20, 28% TR to the base binder did not change the final grade, whereas the addition of SEC modifier with 10 and 20% TR did bump the high grade from 64 to 70 while keeping the same low PG.
4. Adding 28% TR with SEC induced additional stiffness to the asphalt binder where the final binder grade switched from PG70-22 to PG70-16, hence degrading the intermediate temperature.

5. The virgin aggregates used in this research met all the Superpave specifications in term of CAA, FAA, FEP, and SE.
6. The OBC increases with higher tire rubber percentage which is credited to the increase of the rotational viscosity.
7. All evaluated mixtures met the Superpave volumetric criteria, including VMA, VFA, and DP.
8. All mixtures included hydrated lime at the rate of 1.5 percent by dry weight of aggregates.
9. The PG64-22 Base, PG70-22XR with 10 and 20% TR mixtures met the Superpave specification for moisture damage of a $TSR \geq 80\%$. The other mixtures did not meet the specification even with the 1.5% hydrated lime but still held a TSR above 70%.
10. The addition of 10% TR to the base binder and to the polymer modified base binder decreased both the unconditioned and moisture-conditioned TS. However, as the rubber percentage increased beyond 10%, both unconditioned and moisture-conditioned properties increased.
11. The increase of the tire rubber content in the asphalt binder showed a decrease in the TSR of the mixture; the moisture-conditioned TS is not increasing proportionally with the increase in the unconditioned TS.
12. The addition of polymer to the tire rubber modified asphalt binder displayed a higher TSR compared to the mixtures modified with tire rubber only.

13. The dynamic modulus property was significantly increased with the addition of TR in the mixtures while noting that adding 10, 20 or 28% TR to the base asphalt binder resulted in the same dynamic modulus increase.
14. The addition of polymer to the mixture with 10% TR resulted in a decrease in the dynamic modulus, which makes the mix more susceptible to rutting and jeopardize the mixture's performance during hot weather, however making the mixture more flexible and able to sustain more loading at intermediate temperature.
15. As the rubber percentage increased beyond 10%, the dynamic modulus of the polymer/tire rubber-modified mixtures increased.
16. It can be noted that both the polymer/tire rubber-modified mixtures of PG70-22XR with 10 and 20%TR resulted in a lower dynamic modulus than the tire rubber-modified mixtures of PG64-22R with 10 and 20%TR at 68°F (20°C).
17. None of the evaluated mixtures experienced any flow at the test temperature of 86°F (30°C), while almost all of the mixtures exhibited flow at the test temperatures of 103.1 and 138.2°F (39.5 and 59°C).
18. The addition of 10, 20, and 28% tire rubber to the base binder resulted in a statistically similar increase in the flow number at the 103.1°F (39.5°C).
19. Adding SEC polymer to the 10 and 20% tire rubber modified mixtures increased the flow number of the Base mixture, similarly to the increase observed with tire rubber modified mixtures.
20. The PG70-16XR, 28%TR including SEC polymer and 28% tire rubber did not experience any flow at 86°F and 103.1°F (30°C and 39.5°C), while achieving the

highest flow number at 138.2°F (59°C) which will offer significantly more resistance to rutting.

21. The PG64-22 Base binder showed the steepest and highest model among all mixtures, implying the least rutting resistance at 103.1°F (39.5°C).
22. Similar to the findings of the FN analysis, the PG70-16XR with 28%TR has the lowest permanent deformation model, which indicates higher resistance to rutting within the AC layer.
23. The PG70-16XR, 28%TR, with superior rutting behavior, got the lowest fitted parameter k_{r2} , which may imply relative low temperature susceptibility.
24. The PG70-16XR, 28%TR mixture with the highest stiffness achieved the highest critical fracture energy in the Texas overlay test. All the remaining mixtures showed similar values for the critical fracture energy, while noting that most of these mixtures exhibited similar E^* values.
25. Despite the increase in G_c of the PG70-16XR, 28%TR, this mixture was associated with the highest crack propagation rate (CPR) among all mixtures
26. Adding only tire rubber was not able to produce a statistically significant difference in the CPR as compared to the base mixture.
27. Coupling the tire rubber with the polymer was able to show a significant difference from the Base mixture where the 10%TR with SEC decreased the CPR value denoting a better resistance to crack propagation.
28. Adding 20 and 28% TR with SEC increased the CPR by 8 and 16%, respectively compared to the Base mixture, implying a notable counter effect of adding high tire rubber percentages on reflective cracking.

29. The trend observed with the number of cycles to failure was inversely proportional to the CPR where the greatest CPR in the PG70-16XR, 28%TR.
30. The PG64-22R, 28%TR and the PG70-22XR, 10%TR showed a significant improvement in number of cycles to reflective cracking failure up to 765, along with their reduced CPR.
31. Adding 20 and 28%TR with SEC showed a counter effect in the number of cycle to reflective cracking failure compared to the base mixture.
32. The reflective cracking interactive plot confirms that all mixtures except the PG70-16XR, 28%TR fell within the desirable area of a resistant mixture toward crack initiation and crack propagation.
33. The PG70-16XR, 28%TR with its noticeable previously observed toughness (i.e. stiffness) slightly exceeded the upper limit for critical fracture energy, indicating a probable brittle behavior while keeping a CPR lower than 0.5.
34. The braking condition significantly increased the vertical strain at the middle of the AC layer for both the Base and all modified mixtures for both pavement structures.
35. The PG64-22 Base mixture cannot withstand the braking action of the 18-wheeler by more than 0.15 and 0.32 million repetitions, for both the thin and thick pavement structures respectively.
36. Under braking condition, the rutting behavior of the mixtures solely modified with tire rubber improved based on the rutting life ratio ranging from 2.8 to 4.3, and 3.0 to 4.2 in case of thin and thick pavement, respectively.

37. Under no-breaking condition, the rutting behavior of the mixtures solely modified with tire rubber improved based on the rutting life ratio ranging from 3.7 to 5.8, and 3.7 to 5.9 in case of thin and thick pavement, respectively.
38. In both breaking and no-breaking conditions, adding 10 and 20% TR combined with SEC modification was not able to increase the rutting life ratio by more than 2.2 and 2.4 for thin and thick pavement structures respectively.
39. Interestingly, the PG70-16XR, 28%TR exhibited a rutting life ratio higher than 10 compared to the Base mixture under all evaluated conditions of breaking and no-breaking for thin and thick pavement structures.

According to all the summarized findings and conclusion generated from the detailed laboratory experiments and mechanistic analysis for the investigated mixtures, the below recommendation can be drawn:

1. The terminal tire rubber asphalt binder is recommended for further pavement application due to its noticeable homogeneity during testing and ease of pumping without any segregation.
2. The lime percentage shall be increased in order to meet the minimum TSR requirement as per Superpave.
3. The PG70-22XR, 10%TR mixture would be the best alternative for overlay application due to its low CPR value and high number of repetitions in terms of reflective cracking in addition to its minimal aging susceptibility observed on the RTFO aged binder.

4. Following to its outstanding stiffness, rutting performance, and high rutting life ratio compared to the base, the PG70-16XR, 28%TR mixture is recommended for heavy traffic volume roads.
5. The additional stiffness induced by incorporating tire rubber into the mixtures shall be evaluated with further testing than conventional PG system, along with new specifications tightened to tire rubber modified asphalt binders.
6. For the aim to get rutting models for these particular high grades, RLT testing is recommended to be run at 86, 104, and 122°F (30, 40, 50°C).
7. Examine the PG70-16XR, 28%TR with respect to fatigue cracking in order to make sure that the high stiffness did not compromise its fatigue life.
8. Examine the fatigue life of the PG70-22XR, 10%TR due to its superior resistance in reflective cracking, low stiffness, minimal aging, and lowest intermediate temperature.
9. The Base binder modified with only SEC should be further evaluated with the aim of adequately assessing the relative impact (stiffness) attributed to the TR and SEC modification separately.

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City of Reno Notice of Appeal Form

Please complete this form to appeal a decision made by a City official, a hearing examiner, or the Planning Commission.

To be considered complete, the appeal must: (1) be in writing; (2) provide information addressing all of the items below; (3) be accompanied by the required appeal fee adopted by the City Council; and, (4) submitted to the City Clerk's Office or emailed to cityclerk@reno.gov.

An incomplete form will be returned to you, and may result in a delay in scheduling your appeal.

In addition, all appeals must be filed within the applicable period of limitations. For example, an appeal of a Planning Commission decision must be submitted to the City Clerk's Office within ten business days after the date of filing of notice of the decision with the City Clerk. (The City Clerk's Office maintains a list of common periods of limitations available upon request.)

Untimely appeals will be rejected by the City Clerk, and any appeal fees paid will be returned.

1. Type of Appeal (please select only one)

RMC: Title 18 Code

- ☐ Planning Commission Decision
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- ☐ Minor Deviation
- ☒ Minor Conditional Use Permit
- ☐ Site Plan Review
- ☐ Administrative Interpretation

RMC: Administrative Code

- ☐ Code Enforcement Citation
- ☐ Business License
- ☐ Building Permit
- ☐ Sign Permit
- ☐ Other:

MVP24-00012

2. Appellant Information:

Appellant Name: Judy Covert and concerned residents

Authorized Representative: Same

Address: 10105 Gold Mine Drive, Reno, NV 89521

Telephone No.: 775-772-0749

Email Address: thecoverts@charter.net

3. Brief description of the action, decision, or order being appealed. (Please reference the project name, address, case number, citation number, or permit number, as applicable. Attach additional sheets, as necessary.)

City of Reno Decision for a Minor Conditional Use Permit Case No. MUP24-00012
Approving "Life Church Primary School"
APN 145-020-17 March 15, 2024.
10300 Rio Wrangler Parkway, Reno, NV 89521

4. Describe in detail how the action, decision, or order being appealed impacts you or your property, as applicable. (Attach additional sheets, as necessary.)

Legal findings cannot be met for Minor Conditional Use Permit

5. Describe in detail the reason(s) why the action, decision, or order being appealed should be reversed, modified or set aside. (Attach additional sheets, as necessary.)

Legal findings cannot be met for Minor Conditional Use Permit

6. Please identify and attach all documentation/evidence that you would like considered supporting your appeal. (Attach additional sheets, as necessary.)

Legal findings cannot be met on infrastructure.

7. Relief or action sought. (Attach additional sheets, as necessary.)

MUP24-00012 denied by City Council.

Appellant or Authorized Representative

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Judy Covert

☒ By checking this box, I agree information is complete and I have authority to sign this form.

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	<div><div>Total Cash\$0.00</div><div>Total Check\$100.00</div><div>Total Charge\$0.00</div><div>Total Wire\$0.00</div><div>Total Other\$0.00</div><div>Total Remitted\$100.00</div><div>Change\$0.00</div><div>Total Received\$100.00</div></div>	
	<div>PAID</div> <div>MAR 26 2024</div> <div>CITY OF RENO</div>	
	Total Amount:	\$100.00

Customer Copy

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Printed by: Roman, Lorena

Page 1 of 1

03/26/2024 11:06:59 AM



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1 E First Street
2nd Floor
Reno, NV 89501
775-334-2030
CityClerk@reno.gov

For Office Use: Date Stamp

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MAR 25 2024

CITY CLERK

City of Reno Notice of Appeal Form

Please complete this form to appeal a decision made by a City official, a hearing examiner, or the Planning Commission.

To be considered complete, the appeal must: (1) be in writing; (2) provide information addressing all of the items below; (3) be accompanied by the required appeal fee adopted by the City Council; and, (4) submitted to the City Clerk's Office or emailed to cityclerk@reno.gov.

An incomplete form will be returned to you, and may result in a delay in scheduling your appeal.

In addition, all appeals must be filed within the applicable period of limitations. For example, an appeal of a Planning Commission decision must be submitted to the City Clerk's Office within ten business days after the date of filing of notice of the decision with the City Clerk. (The City Clerk's Office maintains a list of common periods of limitations available upon request.)

Untimely appeals will be rejected by the City Clerk, and any appeal fees paid will be returned.

1. Type of Appeal (please select only one)

RMC: Title 18 Code

- ☐ Planning Commission Decision
- ☐ Hearing Examiner Decision
- ☐ Minor Deviation
- ☒ Minor Conditional Use Permit
- ☐ Site Plan Review
- ☐ Administrative Interpretation

RMC: Administrative Code

- ☐ Code Enforcement Citation
- ☐ Business License
- ☐ Building Permit
- ☐ Sign Permit
- ☐ Other: _____

2. Appellant Information:

Appellant Name: Washoe County School District

Authorized Representative: Kyle Chisholm, School Planner

Address: 14101 Old Virginia Road, Reno, NV 89521

Telephone No.: (775) 789-3810

Email Address: kyle.chisholm@washoeschools.net

3. Brief description of the action, decision, or order being appealed. (Please reference the project name, address, case number, citation number, or permit number, as applicable. Attach additional sheets, as necessary.)

Administrative approval of Case No. MUP24-00012 (LifeChurch Primary School) Minor Conditional Use Permit (MUP) & Site Plan Review (SPR) applications.
APN: 145-020-17

4. Describe in detail how the action, decision, or order being appealed impacts you or your property, as applicable. (Attach additional sheets, as necessary.)

WCSD is the owner of an immediately adjacent and active High School (Damonte Ranch) that will be negatively impacted by this decision. The Zoning Administrator has erred in approving this application as it's inconsistent with many Master Plan policies and legal findings required for the applications. Specifically, the administrator has not properly conditioned, or required the applicant to provide required sidewalks along the McCauley Ranch Blvd. frontage (a public street) in accordance with RMC 18.04.502, or the necessary pedestrian crossings for the development. As a collaborative agency partner, WCSD made formal comments requesting such improvements, which appear to have been disregarded. The absence of such improvements, especially along the frontage of a new K-8 school, will result in negative impacts to the neighborhood, community, and the existing school. MUP findings #2-6, SPR findings #1-5, and general criteria #1-4 cannot be made and therefore needs further review by the Council.

In addition, there are general concerns regarding traffic and timing of certain RTC improvements noted in the reports.

5. Describe in detail the reason(s) why the action, decision, or order being appealed should be reversed, modified or set aside. (Attach additional sheets, as necessary.)

As stated above, the lack of pedestrian infrastructure presents a public safety issue for students and the general public and forces pedestrians to use an infeasible route along the Damonte Ranch High School frontage to access the proposed site. This is infeasible and impractical.

6. Please identify and attach all documentation/evidence that you would like considered supporting your appeal. (Attach additional sheets, as necessary.)

Attached are WCSD's formal comments on this case, specifically comments #1-2 were not adequately addressed and don't meet code. Additional information will be provided during the public hearing.

7. Relief or action sought. (Attach additional sheets, as necessary.)

Council should add a condition of approval to require that the applicant provide plans demonstrating the necessary sidewalk infrastructure and pedestrian crossings along McCauley Ranch Blvd will be in place at time of permit.

Appellant or Authorized Representative

Signature (Print Name):

Kyle Chisholm

☒ By checking this box, I agree information is complete and I have authority to sign this form.

For Office Use:

Hearing Date: 4/24/2024

Hearing Time: 6:00pm

Hearing Location: Reno City Council

☐ Via Zoom (Link emailed to information indicated above at least 5 business days prior to hearing)

Received by: 



Washoe County School District

425 East Ninth Street * P.O. Box 30425 * Reno, NV 89520-3425
Phone (775) 348-0200 * Fax (775) 348-0304 * www.washoeschools.net

Board of Trustees: Beth Smith, President * Diane Nicolet, Vice President * Joe Rodriguez, Clerk
Jeff Church * Adam Mayberry * Colleen Westlake * Alex Woodley * Susan Enfield, Ed.D., Superintendent

Kyle Chisholm, School Property Planning Manager
14101 Old Virginia Rd.
Reno, NV 89521-8912
(775) 789-3810

December 13, 2023

City of Reno, Development Services Dept.
Attn: Jeff Foster, Associate Planner
PO Box 1900
Reno, NV 89505

Dear Mr. Foster,

The Washoe County School District (WCSD) respectfully submits the following comments and/or concerns in regards to the application for a Minor Conditional Use Permit (Case No. MUP24-00012 "LifeChurch Primary School"):

WCSD has strong concerns over the additional traffic potentially generated by this project and the impacts it will have to the existing Damonte Ranch High School (DRHS) operations. Specifically, the traffic study provided demonstrates that the traffic levels at the Rio Wrangler/McCauley Ranch intersection are already poorly functioning and as a result of the project will reach a LOS F. The traffic study mentions an all-way-stop (AWS) will be necessary at this intersection but states that it will be "further analyzed" upon full buildout of the project. This is unsatisfactory as the phasing and timing of the project is not guaranteed and this improvement is needed now. WCSD requests that this AWS be conditioned and required to be installed prior to completion of any expansion and the first phase of the project.

Also, the DRHS's two existing driveways along McCauley ranch and the existing Rio Wrangler/Yee Haw Way will be negatively impacted with the addition of this project. The traffic study does not recommend any improvements to either of these intersections. City Engineering staff should analyze and vet the proposed function of these driveways to ensure no negative impacts to DRHS will occur.

Further, the logic stated in the traffic study regarding the 30 minute staggered bell times between the new and existing schools and associated traffic counts appears to be inaccurate. First, the recommended bell times of "8:15-9:15 AM and 3:15-4:14 PM" do not provide for said 30 minute staggering. DRHS's current bell times are 8:00 AM and 2:30 PM. Further, most of the parent traffic arrives at least 20-30 minutes before bell time for pick-up and drop-off so there is still substantial overlap between the schools. WCSD recommend the project be conditioned to require bell times of 9:00 AM & 3:30 PM to ensure adequate staggering and to allow parents exiting after bell times reduced congestions. Also, the proposed school should be required to use their primary access point at Yee Haw for pick-up and drop-off traffic so as not to conflict with DRHS's two existing driveways along McCauley Ranch.

Thank you for your time and attention to this matter. Please contact me should you have any questions or want to discuss further.

Sincerely,

Kyle Chisholm



**WASHOE COUNTY
SCHOOL DISTRICT
POLICE DEPARTMENT**
425 East Ninth Street □ P.O. Box 30425



MEMO

To: Kyle Chisholm, School Property Planning Manager
From: Officer Robbie Pape, Safe Routes Coordinator
Jennifer Iveson, Safe Routes Coordinator
RE: Life Church – Damonte
Date: 12/12/2023

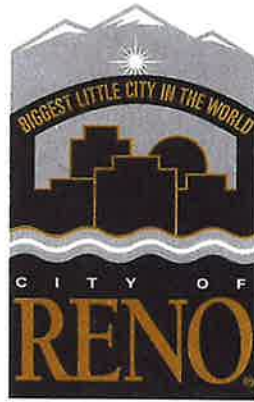
In review of the Life Church application, Safe Routes to School anticipates a large volume of traffic using both Rio Wrangler Parkway and McCauley Ranch Blvd to include the joining intersection. To mitigate the upcoming dangers, Safe Routes recommends the following improvements and pedestrian safety measures. These measures will assist the overall safety of both motorists and pedestrians traveling to and from Damonte Ranch High School and the Life Church School. See attached diagram.

1. Crosswalks in front of proposed southeast exit/entrance on McCauley.
2. Sidewalk installation on McCauley in front of the proposed Life Church School.
3. Additional Crosswalk at McCauley and Rio Wrangler.
4. All way-controlled stop at Rio Wrangler Parkway and McCauley Ranch Blvd.
5. Use primary egress/ingress on Yee Haw way for pick-up & drop-off activities.

Respectfully,

Officer Robbie Pape
Jennifer Iveson
Program Coordinators, SRTS
rcpape@washoeschools.net
jennifer.iveson@washoeschools.net
(775) 348-0288

Mike Railey, AICP
Planning Manager
Development Services Department
P. O. Box 1900
Reno, NV 89505
(775) 393-1047



March 15, 2024

FILED THIS DATE
3/15/2024
BY: BA
CITY CLERK

LifeChurch
Scott Rhoda
P.O. Box 18711
Reno, NV 89511

Re: Minor Conditional Use Permit Case No. MUP24-00012 (LifeChurch Primary School)
APN: 145-020-17
Ward: 2

Dear Mr. Rhoda:

The Development Services Department has completed the review of your request for a minor conditional use permit to allow for development of 1) a $\pm 44,351$ square foot primary school in the Single-Family Residential 3 units per acre (SF-3) zone, and 2) a primary school adjacent to residentially zoned property. The ± 10.2 acre project site is located on the eastern side of Rio Wrangler Parkway $\pm 1,725$ feet south of its intersection with Steamboat Parkway. The subject site has a Master Plan land use designation of Single-Family Neighborhood (SF). Based on the materials you have submitted, as modified in the conditions of approval, the project conforms to the findings as required by the Reno Municipal Code (RMC) 18.08.304(e) and 18.08.604(e) and is not expected to have an adverse impact on the area. The Administrator hereby approves the requested minor conditional use permit (MUP), Case No. MUP24-00012, subject to the following conditions (all conditions shall be met to the satisfaction of Development Services staff, unless otherwise noted):

1. The project shall comply with all applicable City codes, plans, reports, materials, etc., as submitted, in addition to previous conditions of approval from Case No. LDC15-00034. In the event of a conflict between said plans, reports, materials and City codes, City codes in effect at the time the application is submitted shall prevail.
2. The applicant shall apply for a building permit for the first phase of the project within 36 months of the date of approval of the minor conditional use permit application and maintain validity of that permit, or the minor conditional use permit approval shall be null and void.

3. Prior to issuance of each building permit or business license, the applicant shall attach a copy of this approval letter. The approval letter shall accompany a narrative that describes how the requested permit or license addresses each of the conditions of approval herein.
4. The applicant, developer, property owner, or business proprietor, as applicable, shall continuously maintain a copy of this approval letter on the project site during the construction/operation of the project/business. The approval letter shall be posted or made readily available upon demand by City staff.
5. Prior to issuance of a building permit associated with this project, the applicant shall apply for a minor modification to LDC15-00034 to remove the ±58,470 square foot worship center from the approval along with the office/meeting room building revision to the site plan approved under Minor Modification #2.
6. Signage shall be consistent with LDC15-00034 Condition 7 (as modified by Minor Modification #1) with the addition of one (1) additional 20 square foot indirectly illuminated wall sign on the west or south elevation.
7. Hours of construction, including grading, shall be limited to between the hours of 7:00 a.m. and 6:00 p.m., Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday. There shall be no construction on Sundays. This condition shall not apply to dust control or storm water management operations. A note to this effect shall be placed on the title sheet of all building permit plan sets. A sign with the approved construction hours shall be posted on site for the full duration of construction activities. If the construction hours need to be varied for the pouring of concrete slabs, interior construction hours or other modifications, a plan detailing the construction operations and provisions to minimize impacts on nearby residences shall be submitted to the satisfaction of the Administrator.
8. Each year the school shall ensure that start and end bell times are separated by a minimum of one (1) hour from bell times for Damonte Ranch High School.
9. The school shall notify parents of the intended onsite drop-off/pick-up during enrollment and through regular reminders. The enrollment process shall include an onsite drop-off/pick-up agreement.
10. Prior to issuance of a business license for the school, the applicant shall relocate the existing school zone flashing structure located on Rio Wrangler Parkway north of Damonte Ranch High School to a new location north of Yee Haw Way, to the satisfaction of City of Reno Public Works.

Summary: The subject ±10.2 acre site is located on the east side of Rio Wrangler Parkway between Yee Haw Way on the north and McCauley Ranch Boulevard on the south (**Exhibit A**). The site currently contains a church (comprised of child development center and gymnasium buildings), parking lot, lawn and playground, and a small structure remaining from the previous commercial dog kennel operation (to be demolished). The proposed minor conditional use permit would allow for development of a primary school in the SF-3 zone and adjacent to residentially zoned property. Key project issues include: 1) project design/code compliance, 2) compatibility with surrounding uses, and 3) traffic/access. With the recommended conditions of approval, the proposed project appears to meet code standards, addresses the applicable findings, and enhances educational opportunities in the community. Staff recommends approval, subject to all conditions listed in this decision letter.

Background: LifeChurch was established in 2006 and began meeting at Damonte Ranch High School in 2008. The church acquired the front ±2.9 acre property on Rio Wrangler Parkway in 2007 and the remaining ±7.3 acres (three parcels to the east) several years later. The eastern three parcels, which previously had commercial dog kennels, were zoned Large-Lot Residential - 2.5 acres (LLR-2.5). In July 2014, a zone change to Single-Family Residential - 15,000 square feet (SF-15) for these parcels was approved by the City Council (LDC14-00035).¹

A special use permit (SUP) for the church campus was approved by the Planning Commission in February 2015 (LDC15-00034).² The 2015 SUP allowed for a ±104,339 square foot church campus constructed in phases over 15 years, consisting of four major buildings around a “great” lawn – a Kids Life child development center building (a child care center for up to 120 children, which also provides Sunday school rooms), a gymnasium/administrative office building (a dual auditorium and gymnasium facility for church services and community functions), a youth building (middle and high school students), and a 1,500 seat worship center (with ancillary meeting and music rooms). To date, two buildings have been completed (child development center and gymnasium buildings) along with the great lawn and playground. The church has six years to apply for building permits to complete the remaining elements from the SUP approval.

Discussion: Per RMC 18.03.206 Table 3-1 (Table of Allowed Uses), a primary school is allowed in the SF-3 zone with approval of a MUP, subject to the use-specific standards listed in RMC 18.03.303(b)(3).³ Per RMC 18.08.602(b)(2)(d), a site plan review (SPR) is triggered for a

¹ SF-15 changed to SF-3 in the recent zoning code update.

² Two minor modifications to the SUP have been approved. Minor Modification #1 (August 28, 2020) clarified the allowable directions a wall sign could face under Condition 7. Minor Modification #2 (April 19, 2021) amended the approved site plan to allow for the southeastern portion of the property to be used as an office and meeting room space for the church in place of the choir building on the original site plan. Specifically, an addition was proposed to an existing building from the previous kennel operation; the proposed square footage was less than half of the choir building, and the total building square footage would not exceed the ±104,339 square feet approved for the entire church complex.

³ Assembly Bill 87 required consistent development standards for building heights, setbacks, landscaping, and parking for all schools in Washoe County. To ensure design consistency between jurisdictions, local government staff agreed that school development should be processed administratively and without discretionary review to

primary school adjacent to residentially zoned properties. MUPs are required to determine the appropriateness of certain land uses and SPRs determine the appropriateness of certain site designs. Both entitlements are administrative decisions and, based on ADM23-00032 (Combination of Site Plan Review and Minor Conditional Use Permit Applications), the two applications may be bundled into one MUP since the required findings of the MUP comprehensively address both land use and design components.

Analysis:

Project Design/Code Compliance: The project involves demolition of a small building remaining from the previous commercial dog kennel operation in the southeast portion of the site. A new $\pm 44,351$ square foot, two story primary school building and parking lot are proposed on approximately four acres of the undeveloped eastern portion of the parcel (**Exhibit B**). The proposed school would serve grades kindergarten through 8th grade, with two classrooms for each grade. The building is planned to be constructed in two phases depending on funding; the intent is to have the school enrollment increase as the facility itself grows.⁴ At buildout, the facility would serve up to 360 students with up to 18 classrooms, art and music rooms, cafeteria and kitchen, and two fenced playgrounds (**Exhibit C**).⁵

The proposed school is located in the same general location as the previously approved worship center, which is significantly larger. The footprint and total floor area of the school are $\pm 23,360$ square feet and $\pm 44,351$ square feet, respectively, as compared to a $\pm 40,180$ square foot footprint and $\pm 58,470$ square foot total floor area for the worship center. **Condition 5** is included to require removal of the worship center from the SUP approval (along with the office/meeting room building under Minor Modification #2) if the applicant moves forward with construction of the school.

establish a school use in certain zones or for residential adjacency. Subsequently, TXT14-00003 (School Zoning) was approved by the City Council on March 26, 2014.

⁴ **Phase 1A:** Utilizes the upstairs of the existing Kids Life building for grades K-3 in the first few years while the Phase 1 school building is under construction. It is anticipated that this initial phase will have ~80 students.

Phase 1B: Contains the first phase of construction of the school building, which includes six (6) classrooms, temporary cafeteria, and offices. Depending on enrollment, the upstairs classrooms in the existing Kids Life building may continue to be used. It is anticipated that this phase can accommodate ~140 students. A fenced playground area will be constructed with this phase. The first phase school building totals $\pm 20,520$ square feet.

Phase 2: Expands the school to formalize a cafeteria and kitchen, 12 additional classrooms, art and music rooms. An additional fenced playground will be constructed. At buildout, this phase will accommodate up to 360 students total. The second phase of the school building totals $\pm 23,831$ square feet.

⁵ The building floorplans and elevations are the ultimate goal of the church to build. Due to rising construction costs and the church's reliance on fundraising, they may utilize mobile classrooms in lieu of the building, either temporarily or permanently. Per RMC 18.03.303(b)(3), the architectural elements of mobile classrooms shall complement existing building(s). A maximum of three mobile classrooms are allowed without a site plan review for residential adjacency provided they are removed within five years of placement. Alternatively, continued use of mobile classrooms beyond five years can be reviewed through a site plan review process (TXT12-00013).

The applicant requested project signage to be held to RMC signage standards in residential zoning districts (RMC 18.05.113). Specifically, code would allow a six foot monument sign (likely located at the east driveway on McCauley Ranch Boulevard) and a 20 square foot wall sign (either located on the west or south elevation), both of which could have indirect illumination only. Monument and wall signage was approved under the SUP/Minor Modification #1 and some of the allotted monument signs have not been installed. **Condition 6** is included to require signage consistent with LDC15-00034 Condition 7 (as modified by Minor Modification #1) with the addition of one (1) additional 20 square foot indirectly illuminated wall sign on the west or south elevation, as allowed by code.

Specific design considerations regarding site layout, building design, access, and other improvements were reviewed against development standards for the SF-3 zoning district. As presented in the application materials, the proposed development generally complies with zoning code standards for: streets, utilities, and services (RMC Chapter 18.04 Article 5); access, connectivity, and circulation (RMC Chapter 18.04 Article 6); off-street parking and loading (RMC Chapter 18.04 Article 7); landscaping, buffering, screening, and fencing (RMC Chapter 18.04 Article 8); site and building standards for residential districts (RMC Chapter 18.04 Article 9); exterior lighting (RMC Chapter 18.04 Article 13); residential adjacency (RMC Chapter 18.04 Article 14); and the use-specific standards [RMC 18.03.303(b)(3)]. Final compliance with specific code requirements in RMC Chapter 18.04 and LDC15-00034 conditions of approval will be verified by City staff at the time of building permit review (**Condition 1**).

Compatibility with Surrounding Uses: Immediate surrounding land uses include single-family residences, a public high school, and open space. The land uses surrounding the site are summarized in the table below.

Adjacent Properties		
	Zoning	Use
North	PUD, LLR-2.5	Single-family detached
East	SF-3	Single-family detached
South	PUD	Damonte Ranch High School
West	PUD	Open space

Since the church use is established, this compatibility analysis is based on the potential impacts of replacing the approved worship center component with the proposed primary school and associated design elements, including the height and massing of the proposed building.

Primary schools are typically located in residential neighborhoods as they are considered complementary uses. The hours of operation of a primary school are generally less impactful than other nonresidential uses adjacent to residentially zoned property. The school is not allowed to operate between the hours of 11:00 p.m. and 6:00 a.m. Permissible noise levels shall not exceed the nighttime and daytime limits specified in RMC 18.04.1408 when the site is in

operation. Due to the proximity of this site to residential uses, construction hours will be limited to reduce potential noise impacts on residents (**Condition 7**).

On the north and east sides of the parcel, RMC 18.04.808(b) requires a six-foot high solid masonry wall with five feet of landscaping adjacent to it with a minimum of one evergreen tree planted every 30 linear feet and a minimum three shrubs planted per tree. LDC15-00034 Condition 6 requires a larger 15 foot wide landscape buffer in these areas. The existing walls and landscape buffers that were installed with development of the church use will remain.

Per RMC 18.03.303(b)(3), school building heights are non-restricted provided that one foot of setback is provided for every foot of building height adjacent to residentially zoned property. The building will be separated from the adjacent residential property line to the east with a ± 160 foot setback with parking, drive aisles, and the existing landscape buffer.

Per RMC 18.04.101(c)(2), structures that exceed 35 feet in height shall not cast a shadow on residentially zoned property between the hours of 10:00 am and 2:00 pm on December 21st. The proposed 35-foot building height will not create shadowing concerns on adjacent single-family properties to the east given the separation distance and elevation difference.

Per RMC 18.04.1407(a), lighting from a nonresidential property shall not create greater than 0.5-foot candle of spillover light at a property line of any single-family zoned property like the parcels to the east. This will be achieved by lighting location and fixture shielding. Light standards will comply with the 18 foot height limit adjacent to residentially zoned properties.

Given all the above, the proposed use is generally compatible with existing land uses in the area.

Parking: Parking and access are provided consistent with the SUP, with modifications to address necessary loading and circulation for school drop-off/pick-up. Parking is provided east of the school building, which will serve both the school and future church growth. While code provides required minimums for the various uses proposed, the church has found that, due to having multiple services on Sundays that overlap, their parking demand is significantly higher than code minimums. As such, parking has been maximized to allow for future church growth. The church campus has 179 parking spaces currently and 234 spaces are proposed for a total of 413 spaces, which exceeds the required amount for the church use based on code, Institute of Transportation Engineers, and church observations. Since the church use is the highest parking generator and the school parking demands are not on the same schedule as the church, sufficient onsite parking for all uses is provided.

Traffic, Access and Circulation: A traffic impact study was prepared for the project. The project is projected to generate 364 AM peak hour trips (PHT), 216 PM PHT, and 1,480 daily trips. In the existing year analysis scenarios with and without the project, all the study intersections, including the site access intersections, McCauley Ranch Boulevard/Rio Wrangler Parkway, Yee Haw Way/Rio Wrangler Parkway, and Yee Haw Way/Desert Way would operate within policy

levels of service (LOS) with no improvements required. To minimize traffic impacts during existing peak hours, start and dismissal times for the school will be separated by a minimum of one hour from Damonte Ranch High School start and end bell times (**Condition 8**).

A roundabout is programmed to be constructed by the Regional Transportation Commission (RTC) at the McCauley Ranch Boulevard/Rio Wrangler Parkway intersection in the next five years. In the future year analysis scenarios with the roundabout in place, all the study intersections, including the site access intersections, McCauley Ranch Boulevard/Rio Wrangler Parkway, Yee Haw Way/Rio Wrangler Parkway, and Yee Haw Way/Desert Way would operate within overall policy LOS. The individual left turn movement at the Yee Haw Way approach to the Rio Wrangler Parkway intersection in the future plus project AM peak hour would deteriorate to LOS E, however the overall intersection would still function at LOS A (within policy standards). The McCauley Ranch Boulevard roundabout would provide modest operational improvement to this movement at the Yee Haw Way/Rio Wrangler Parkway intersection by creating longer gaps in traffic along Rio Wrangler Parkway (per RTC's South Meadows Multimodal Study).

Access for the school drop-off/pick-up is designed to enter the site at the eastern driveway (full access) on McCauley Ranch Boulevard and exit via the western driveway (exit only) on McCauley Ranch Boulevard (**Exhibit D**). Vehicles will queue through the parking lot, leading to the loading zones provided along the drive aisle east of the church and school buildings, as well as on the south side of the school. The onsite circulation route includes $\pm 1,500$ linear feet of stacking/circulation and ± 460 linear feet of dedicated drop-off/pick-up curb. Additionally, a walkway has been provided through the parking lot leading to the school entrance to allow parents to park and walk their students to the entrance. If offsite drop-off/pick-up parking on adjacent streets becomes an issue during operation of phase 1 of the school, the City may notify the school to address the issue and if not addressed before construction of phase 2, then signs regulating parking on adjacent streets may be required to be installed with phase 2 development. **Condition 9** requires the school to inform parents about onsite drop-off/pick-up with an enrollment agreement.

The existing school zone flashing structure located on Rio Wrangler Parkway north of Damonte Ranch High School will be relocated to the north of Yee Haw Way so that the existing school zone would be expanded to include the proposed school (**Condition 10**).

Master Plan Conformance: The subject site has a Master Plan land use designation of Single-Family Neighborhood (SF) and is located within an Outer Neighborhood per the Structure Plan Framework of the Reno Master Plan. As proposed and with the recommended conditions, the project is in conformance with the following applicable Master Plan goals and policies:

- GP 1.2C: Existing Businesses
- GP 1.5D: Education
- GP 5.2J: Safe Routes to School

- GP 6.7D: Lifelong Learning
- N-G.18: School Sites

Public and Stakeholder Engagement: The proposed project was reviewed by various City divisions and partner agencies. Comments received were incorporated into this report as necessary (**Exhibit E**). A public notice was sent out to all property owners within 750 feet of the project and public notice signs were posted on the property. One support letter and over 20 comments in opposition were received (**Exhibit F**). While some concerns addressed zoning and potential blocking of views, the near universal concerns expressed in these comments are about traffic and traffic-related issues, which are addressed through project design, operational parameters, and conditions of approval.

Legal Requirements:

RMC 18.08.304(e)	Approval Criteria Applicable to all Applications
RMC 18.08.604(e)	Minor Conditional Use Permit - Findings

General Review Criteria and Considerations:

General Review Criteria: The decision-making body shall review all development applications for compliance with the applicable general review criteria stated below.

- 1) Consistency with the Reno Master Plan. The proposed development shall be consistent with the Reno Master Plan. The decision-making authority:
 - a. Shall weigh competing plan goals, policies, and strategies; and
 - b. May approve an application that provides a public benefit even if the development is contrary to some of the goals, policies, or strategies in the Reno Master Plan.
- 2) Compliance with Title 18. The proposed development shall comply with all applicable standards in this Title, unless the standard is lawfully modified or varied. Compliance with these standards is applied at the level of detail required for the subject submittal.
- 3) Mitigates Traffic Impacts. The project mitigates traffic impacts based on applicable standards of the City of Reno and the Regional Transportation Commission.
- 4) Provides Safe Environment. The project provides a safe environment for pedestrians and people on bicycles.
- 5) Rational Phasing Plan. If the application involves phases, each phase of the proposed development contains all of the required streets, utilities, landscaping, open space, and other improvements that are required to serve or otherwise accompany the completed phases of the project, and shall not depend on subsequent phases for those improvements.

Minor Conditional Use Permit: In addition to meeting the criteria in Section 18.08.304(e), *Approval Criteria Applicable to all Applications*, the following findings shall be made prior to granting a minor conditional use permit:

- 1) The proposed location of the use is in accordance with the objectives of this Title and the purpose of the zoning district in which the site is located;
- 2) The proposed land use and project design is compatible with surrounding development;

- 3) The proposed land use and project design is consistent with applicable development standards;
- 4) Public services and facilities are available to serve the project, or will be provided with development;
- 5) The characteristics of the use as proposed and as may be conditioned are reasonably compatible with the types of use permitted in the surrounding area; and
- 6) The granting of the minor conditional use permit will not be materially detrimental to the public health, safety, or welfare. The factors to be considered in evaluating this application shall include:
 - a. Property damage or nuisance resulting from noise, smoke, odor, dust, vibration, or illumination; and
 - b. Any hazard to persons and property.

Appeal of Administrative Decision: This administrative decision may be appealed to the City Council by the applicant, the Mayor or a City Council Member, or any person who is "aggrieved" by the action or inaction. An appeal (together with fees) must be filed with the City Clerk within 10 business days starting on the day after written notice of the action is filed with the City Clerk. The City Clerk's Office is located on the 2nd floor of Reno City Hall located at One East First Street, Reno, Nevada.

This approval letter has not been issued in lieu of a permit. You are responsible for obtaining the appropriate permit(s) associated with this project and a copy of this letter must be attached to any such application.

Sincerely,



Mike Railey, AICP, Planning Manager
Development Services Department

MUP24-00012 (LifeChurch Primary School) – JAF


xc: Wood Rodgers
Andy Durling
1361 Corporate Boulevard
Reno, NV 89502

Mikki Huntsman, City Clerk
Bob Flores, Building and Safety Manager
Michael Mischel, P.E., Engineering Manager

AREA MAP

MUP24-00012

(LifeChurch
Primary School)

Subject Site ► 

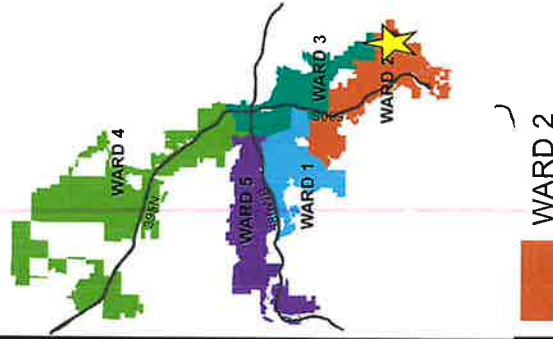
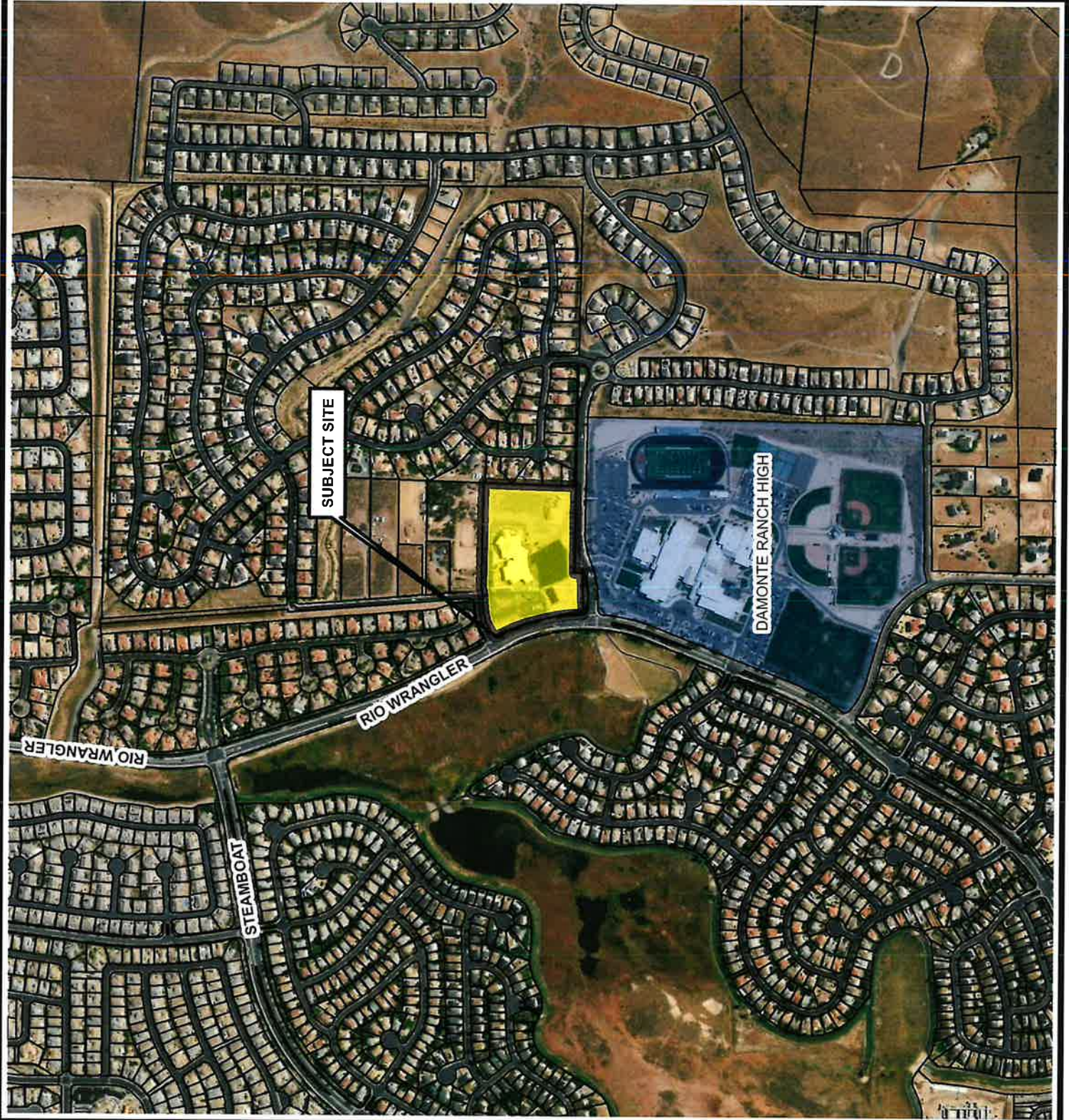


Exhibit A. Case Maps




The information here is approximate and is intended for display purposes only.
Date: December 2023
Scale: 1 inch = 800 feet

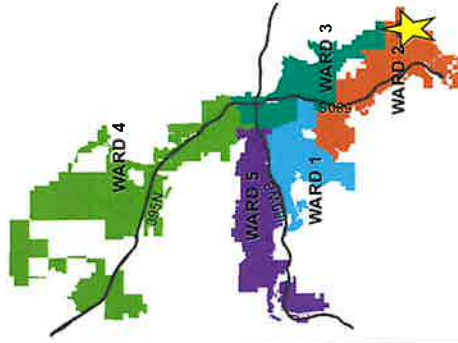


VICINITY MAP

MUP24-00012

(LifeChurch
Primary School)

Subject Site ► 



WARD 2



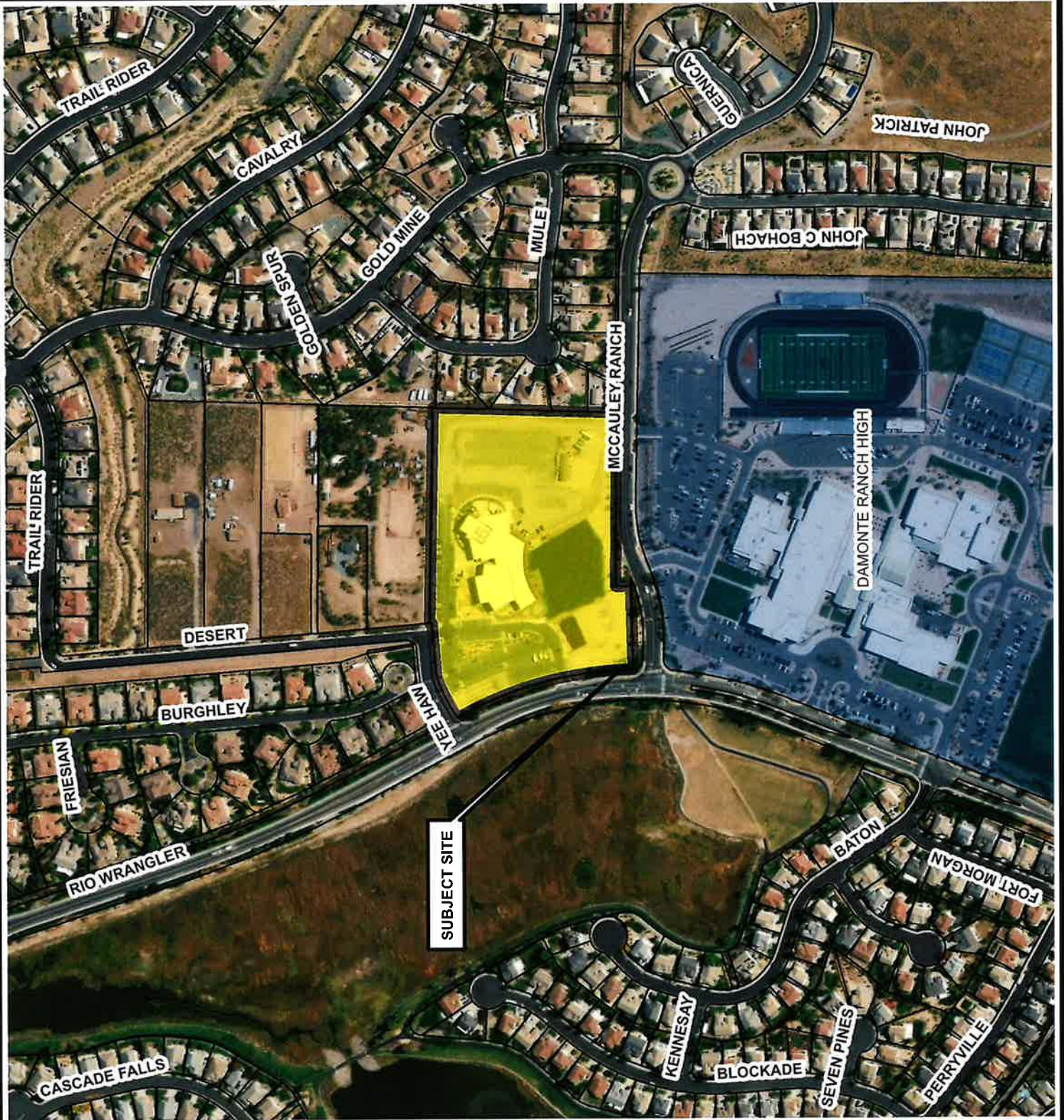
Development
Services
Department



The information herein
is approximate and
is intended for display
purposes only.

Date: December 2023

Scale: 1 inch = 400 feet




ZONING MAP

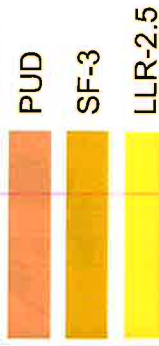
MUP24-00012

(LifeChurch
Primary School)

ZONING = SF-3

Subject Site ► 

Zoning Designations

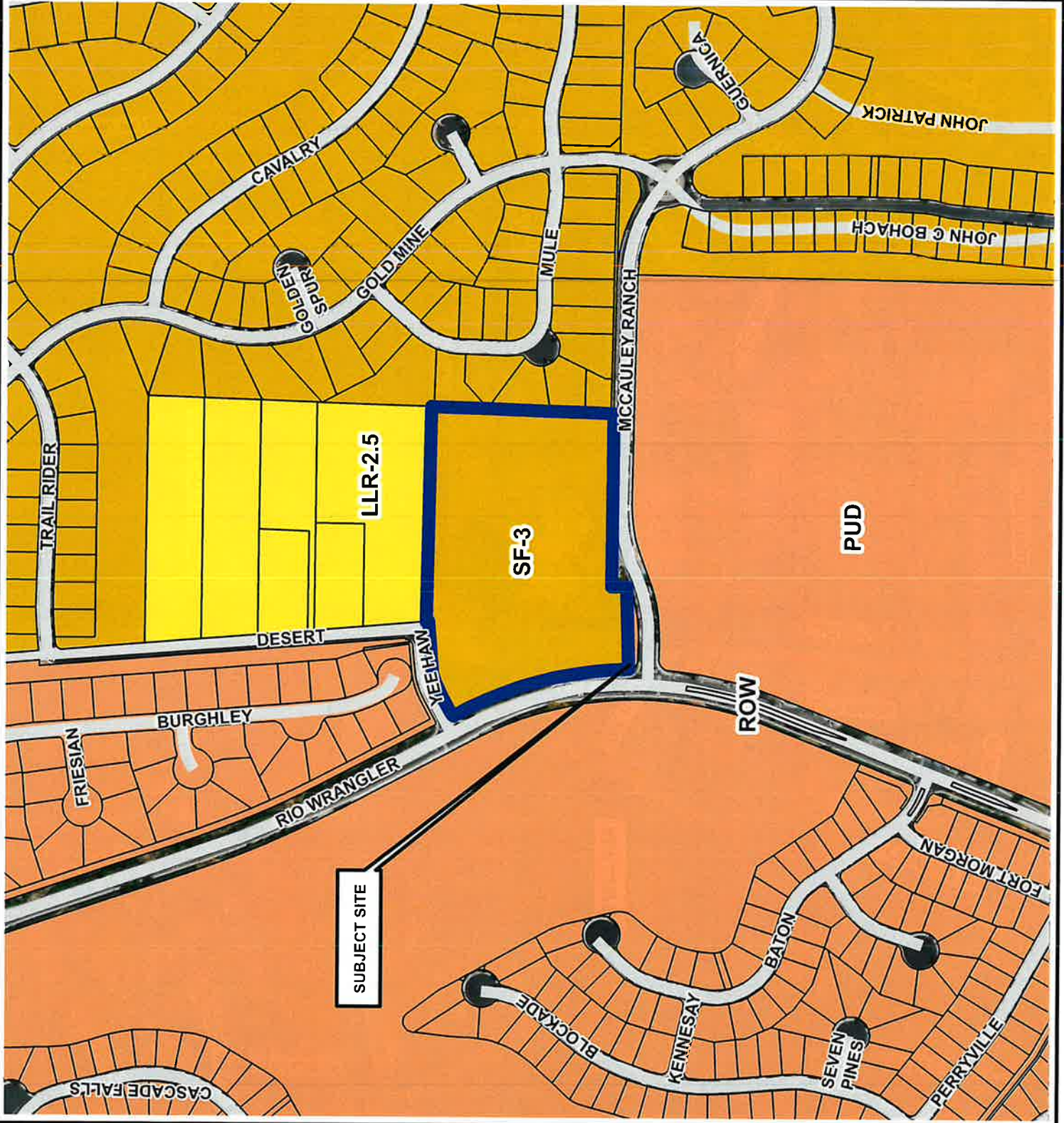


Development
Services
Department

The information herein
is approximate and
is intended for display
purposes only.




DATE: December 2023.
SCALE: 1 inch = 400 feet

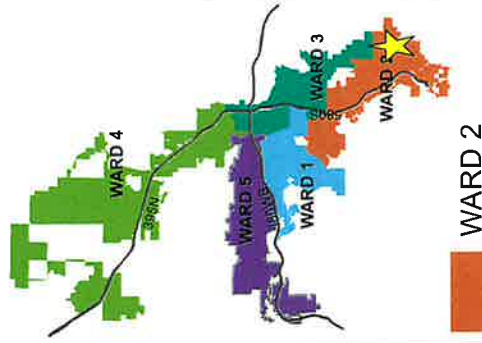


MASTER PLAN MAP

MUP24-00012

(LifeChurch
Primary School)

Subject Site ► 



WARD 2



Development
Services
Department



The information herein
is approximate and
is intended for display
purposes only.
Date: December 2023
Scale: 1 inch = 400 feet



Legend

Master Plan Land Use

- DT-MU
- I
- LL
- ME
- MF
- MX
- NOLU
- PGOS
- PQP
- RSIC
- SF
- SMU
- SPA
- UMU
- UT

EXHIBIT B. CIVIL and Landscape Plans

SITE INFORMATION:

SITE PLAN STATISTICS
PROPERTY AREA: 10.2 AC
SCHOOL PHASE PROJECT AREA: 4.0 AC
EXISTING BUILDINGS TOTAL FLOOR AREA: 33,750 SF
SCHOOL BUILDING TOTAL FLOOR AREA: 44,330 SF
SCHOOL PHASE PROJECT PARKING/PAVING AREA: 2.4 AC
SCHOOL PHASE PROJECT REQUIRED LANDSCAPE AREA: 34,848 SF (20% OF PHASE AREA)

PARKING STATISTICS

OVERALL PROPERTY:
TOTAL PARKING REQUIRED (PER CITY CODE-BELGIOUS ASSEMBLY USE): 113 STALLS
TOTAL PARKING REQUIRED (PER IIC-CHURCH USE): 318 STALLS
TOTAL PARKING PROVIDED: 415 STALLS (178 EXISTING, 234 PROPOSED)
TOTAL ACCESSIBLE PARKING REQUIRED: 12 STALLS
TOTAL ACCESSIBLE PARKING PROVIDED: 16 STALLS (6 EXISTING, 8 PROPOSED)

SCHOOL PHASE:
TOTAL PARKING REQUIRED (NEW CITY CODE-SCHOOL USE): 28 STALLS
TOTAL PARKING REQUIRED (NEW CITY-PRIVATE SCHOOL USE): 120 STALLS
TOTAL PARKING PROVIDED: 231 STALLS
TOTAL ACCESSIBLE PARKING REQUIRED: 9 STALLS
TOTAL ACCESSIBLE PARKING PROVIDED: 8 STALLS

ADDITIONAL PARKING STATISTICS

TOTAL FIRE PARKING REQUIRED: 45 STALLS

SECTION PARTIAL SOURCE
145-000-17

ENGINEERS STATEMENT:

[illegible]

STAN W. GERTON, P.C. #10000

1000

SHEET INDEX		GRAPHIC DESCRIPTION
1	T-1	TITLE SHEET
2	S-1	PRELIMINARY SITE PLAN
3	C-1	PRELIMINARY GRADING PLAN
4	U-1	PRELIMINARY UTILITY
5	CS-1	PRELIMINARY CROSS SECTIONS
6	L-1	PRELIMINARY LANDSCAPE PLAN

LIFECHURCH SCHOOL
TITLE SHEET

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
3361 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4061
Fax 775.823.4060

2866011 JANUARY 2022

SHEET T-1 OF 6



BASIS OF BEARINGS

NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994, HIGH ACCURACY REFERENCE NETWORK (NAD 83) WAS USED, AS DETERMINED USING REAL TIME KINEMATIC DATA (RTK-MODE), AS DETERMINED USING REAL TIME TRANSMISSIONS BY THE GPS OBSERVATIONS WITH CORRECTIONS FROM A NEVADA COOPERATIVE REAL TIME KINEMATIC GPS (NCRGPS) STATION OPERATED BY THE NCRGPS REFERENCE STATION (NCRGPS-REF). SATURNUS AND JUPITER REFERENCE STATION - NVARS01020 IS TAKEN AS NORTH 47°34'N, WEST 120°06'W. DISTANCES SHOWN ARE GROUND DISTANCES COMBINED GRID-TO-GROUND FACTOR = 1.000197338.

BASIS OF ELEVATION

THE BASIS OF ELEVATION IS BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AS TAKEN FROM CITY OF RENO BENCHMARK 2067, WITH A PUBLISHED ELEVATION OF 482.399 FT. BENCHMARK 2067 IS DESCRIBED AS BEING 1" DIA STEEL CAP SET IN THE TOP OF CURB AT THE NE CORNER OF RO WINGLER PARKWAY AND YEE HAN WAY, APPROXIMATELY 10' NORTHERLY OF THE ECR ALONG RIO WINGLER PARKWAY.

LIFECHURCH SCHOOL

MINOR CONDITIONAL USE PERMIT

PRELIMINARY SITE PLAN

145-020-09
DUBE, PETER R
(NOT A PART)

EX. YEE HAW WAY
(PUBLIC/LOCAL)

145-061-09
JEANNY NG & JOSHUA
CHARLEBOIS TRUST
(NOT A PART)

145-071-01
GUIDOTTI et al GINA M
(NOT A PART)

145-071-02
KOLADA FAMILY (HUSI)
(NOT A PART)

145-071-03
KELLEY JONATHAN L &
ALANA M
(NOT A PART)

145-071-04
STRATTON JEREMY D &
AMIE G
(NOT A PART)

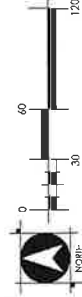
145-071-05
TRUCKEE MEADOWS
WATER AUTHORITY
(NOT A PART)

140-020-78
NEVADA TRI PARTNERS
(NOT A PART)

LEGEND:
AC PAVING
PCC CONCRETE

SITE NOTES:
SPRINKLER SYSTEM SHALL BE INSTALLED IN ALL AREAS OF THE PROPOSED BUILDING AND PLAYGROUND.

SITE KEY NOTES:
1. PCC PAVEMENT (NOT A PART)
2. PCC DRIVEWAY (NOT A PART)
3. PCC SIDEWALK (NOT A PART)
4. PCC DRIVEWAY (NOT A PART)
5. PCC DRIVEWAY (NOT A PART)
6. PCC DRIVEWAY (NOT A PART)
7. PCC DRIVEWAY (NOT A PART)
8. PCC DRIVEWAY (NOT A PART)
9. PCC DRIVEWAY (NOT A PART)
10. PCC DRIVEWAY (NOT A PART)
11. PCC DRIVEWAY (NOT A PART)
12. PCC DRIVEWAY (NOT A PART)
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14. PCC DRIVEWAY (NOT A PART)
15. PCC DRIVEWAY (NOT A PART)
16. PCC DRIVEWAY (NOT A PART)
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19. PCC DRIVEWAY (NOT A PART)
20. PCC DRIVEWAY (NOT A PART)
21. PCC DRIVEWAY (NOT A PART)
22. PCC DRIVEWAY (NOT A PART)
23. PCC DRIVEWAY (NOT A PART)
24. PCC DRIVEWAY (NOT A PART)



LIFECHURCH SCHOOL
PRELIMINARY SITE PLAN



140-020-89
WASHOE COUNTY SCHOOL
DISTRICT BOARD
(NOT A PART)

WOOD RODGERS
BUILDING RELATIONS ONE PROJECT AT A TIME
1381 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4088
Fax 775.823.4088
2866.011
JANUARY, 2024
SHEET S-1 OF 6

LIFECHURCH SCHOOL

MINOR CONDITIONAL USE PERMIT

PRELIMINARY GRADING PLAN

145-020-09
DUBE, PETER R
(NOT A PART)

EX. YEE HAW WAY
(PUBLIC/LOCAL)

145-061-09
JEANING NG & JOSHUA
CHARLEBOIS TRUST
(NOT A PART)

145-071-01
GUIDOTTI et al GINA M
(NOT A PART)

145-071-02
KOLADA FAMILY TRUST
(NOT A PART)

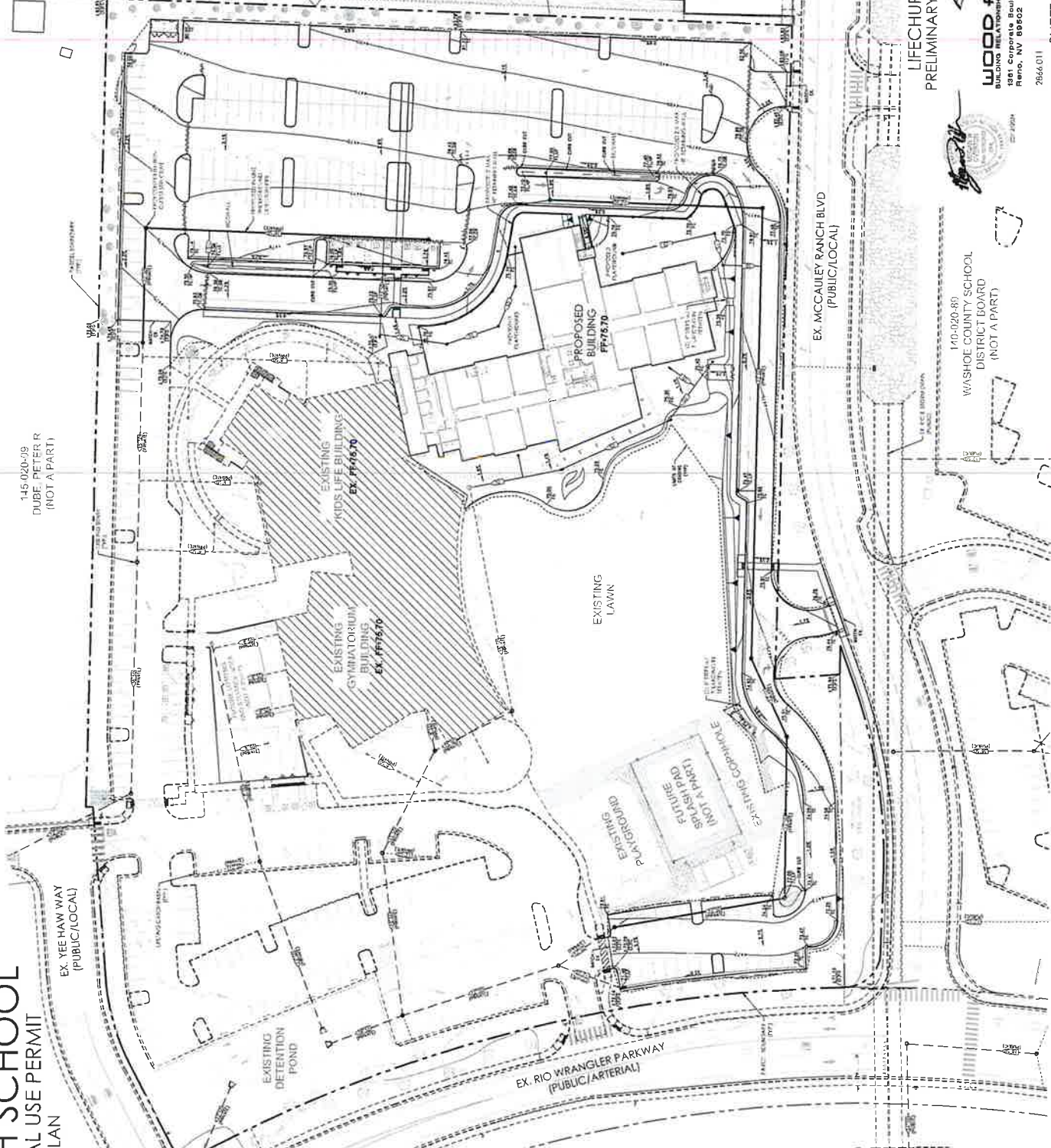
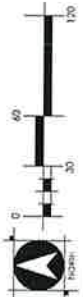
145-071-03
KELLEY, JONATHAN L &
ALAN M
(NOT A PART)

145-071-04
STRATTON, JEREMY D &
AMIE G
(NOT A PART)

145-071-05
TRUCKEE MEADOWS
WATER AUTHORITY
(NOT A PART)

145-020-78
NEVADA TRI PARTNERS
(NOT A PART)

FEMA NOTE:
FLOOD HAZARD
INFORMATION

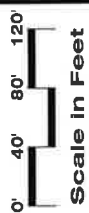


LIFECHURCH SCHOOL
PRELIMINARY GRADING PLAN



140-020-89
WASHOE COUNTY SCHOOL
DISTRICT BOARD
(NOT A PART)

WOOD RODGERS
ENGINEERS
1951 COLLETTA BLVD
RENO, NV 89502
TEL 775.823.4086
FAX 775.823.4086
JANUARY, 2024



- 1) ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.
- 2) TREES SHALL BE PLANTED WITH A MINIMUM CALIPER OF 3 INCHES.
EVERGREEN TREES SHALL HAVE A MINIMUM HEIGHT OF 7 FEET.
ADDITIONAL TREES, BEYOND THOSE REQUIRED BY CODE, MAY BE REDUCED IN SIZE AT THE DISCRETION OF THE CITY ENGINEER.
- 3) INSTALLATION METHODS SHALL BE APPROVED SPECIES LISTED ON THE URBAN FORESTER STREET TREE SELECT.
- 4) FINAL PLANT SIZE AND LAYOUT WILL BE BASED ON SOUND HORTICULTURAL PRACTICES RELATING TO MICROCLIMATE, SOIL, AND WATER REGIMES. ALL TREES WILL BE STAKED SO AS TO REMAIN UPRIGHT AND PLUMS FOLLOWING INSTALLATION. PLANTING SIZE AND QUALITY OF PLANTING WILL BE PER THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-1998).
- 5) ALL SHRUB BEDS WILL RECEIVE 4" DEPTH MULCH WITH WEED CONTROL.
- 6) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. IRRIGATION SYSTEMS AND PREVENTION WILL BE PROVIDED ON THE BASIS OF THE IRRIGATION PLAN AS REQUIRED PER CODE.
- 7) PLANTS CONCEPTUAL PLANT QUANTITIES INDICATED ARE PER CITY OF RENO CODE. PLANTING QUANTITIES SHALL BE DETERMINED DURING DEVELOPMENT OF THE FINAL CONSTRUCTION DOCUMENTS.

LIFECHURCH SCHOOL

FIRST FLOOR PLAN

FRAMEARCHITECTURE.COM

FRAME PROJECT No. 13-05

DATE: 11/11/13

PROJECT: LIFECHURCH SCHOOL

ARCHITECT: FRAMEARCHITECTURE.COM

SCALE: 1/8" = 1'-0"

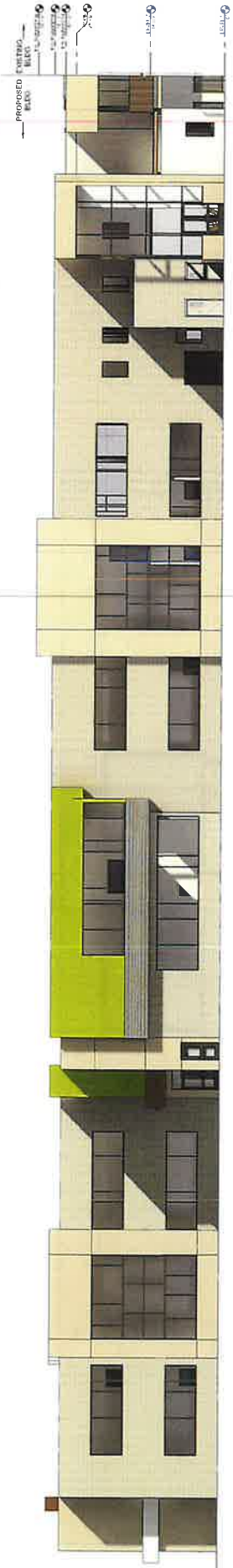
LEVEL 1

1



Frame
ARCHITECTURE INC.
FOR CONSULTANT
COORDINATION

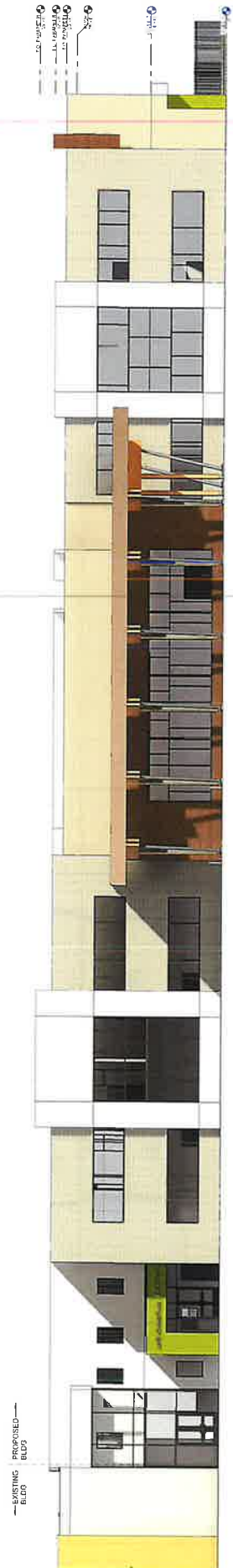
NOT FOR CONSTRUCTION



EAST ELEVATION 1



SOUTH ELEVATION 2



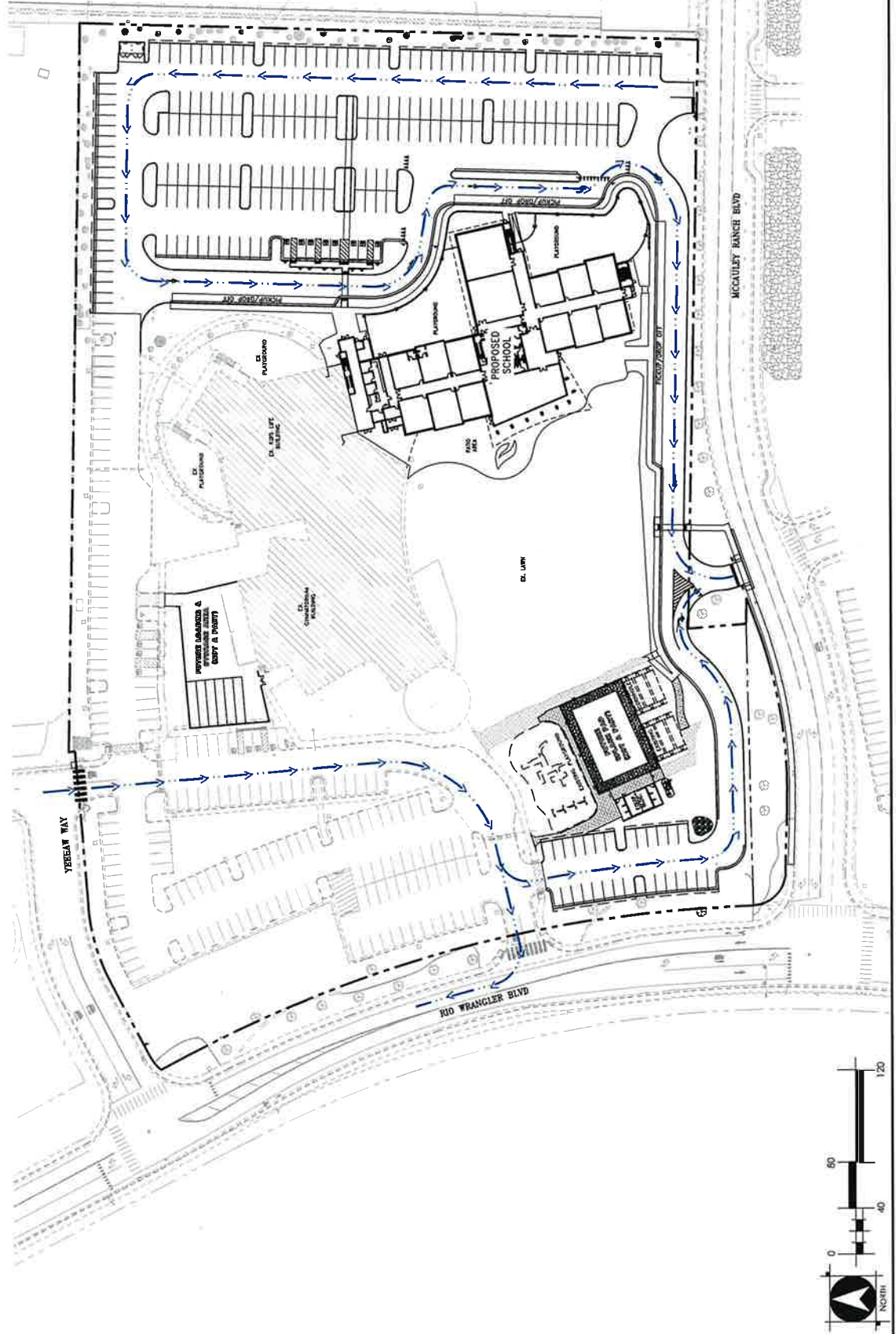
WEST ELEVATION 3

LIFE CHURCH

RENO, NEVADA
JANUARY 2024



WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
Tel 778.822.4068
Fax 778.888.4068
1361 Corporate Boulevard
Reno, NV 89502





REGIONAL TRANSPORTATION COMMISSION

Metropolitan Planning • Public Transportation & Operations • Engineering & Construction

Metropolitan Planning Organization of Washoe County, Nevada

December 14, 2023

Jeff Foster
Development Services Department
City of Reno
1 East First Street
Reno, NV 89501

RE: LifeChurch Primary School – MUP24-00012 – RTC Comment Letter

Dear Mr. Foster

RTC appreciates the opportunity to comment on the proposed LifeChurch Primary School project located at 10300 Rio Wrangler Parkway in Reno. RTC is committed to working with City staff, developers, and other stakeholders across Washoe County to create developments that improve regional transportation by reducing congestion, expanding mode share, and designing walkable neighborhoods.

The purpose of this letter is to make comments ensuring that the Project is in compliance with approved RTC plans, programs, and initiatives, and to provide recommendations based on the project's proximity to any RTC existing or upcoming roadway improvements and/or transit services.

Traffic Impact Study

RTC has reviewed the traffic impact study, and has the following comments for consideration by the City:

- RTC completed an Intersection Control Evaluation (ICE) for the Rio Wrangler Parkway / McCauley Ranch Boulevard intersection, the results of which recommended construction of a roundabout at this location. The Traffic Impact Study should include the roundabout scenario for level of service analysis.
- The recommendations of the finalized traffic impact study should acknowledge the possible aforementioned roundabout at the Rio Wrangler/McCauley Ranch intersection. Inclusion may remove the need for the recommended all-way stop control.

2050 Regional Transportation Plan (RTP)

Rio Wrangler Parkway between Spring Flower Drive and Western Skies Drive, just south of the proposed project, has been identified in the 2050 RTP for "Capacity" enhancements in the 2031-2050 timeframe. City staff along with the project sponsor should coordinate project design efforts with RTC to ensure consistency.

Active Transportation

RTC supports the goals and principles outlined in the Reno Master Plan, which emphasize mixed-use, transit-oriented development and community revitalization projects that encourage walking, bicycling, and easy access to transit. In order to enhance pedestrian and bicycle access to the proposed development, the City should consider requiring installation of wide sidewalks along McCauley Ranch Boulevard along the entire length of the parcel, as well as pedestrian lighting, ADA-compliant curb ramps, and easily accessible bike racks along the McCauley Ranch Boulevard and Rio Wrangler Parkway frontages as conditions of project approval.

Additionally, RTC encourages the incorporation of pedestrian-oriented building design strategies such as placing of building facades along the sidewalk, locating surface-level parking behind the building and away from walkways, and strategically including entrances and windows facing the street for convenient pedestrian access.

RTC looks forward to reviewing any further documents related to this project. If you have any questions regarding this response, please contact Marquis Williams by phone at 775-332-0174, by email at MWilliams@rtcwashoe.com, or by mail at the following address:

RTC Development Review
1105 Terminal Way, Suite 211
Reno, NV 89502

Sincerely,

A handwritten signature in black ink, appearing to read 'Marquis Williams', written in a cursive style.

Marquis Williams
Senior Technical Planner



Washoe County School District

425 East Ninth Street * P.O. Box 30425 * Reno, NV 89520-3425
Phone (775) 348-0200 * Fax (775) 348-0304 * www.washoeschools.net

Board of Trustees: Beth Smith, President * Diane Nicolet, Vice President * Joe Rodriguez, Clerk
Jeff Church * Adam Mayberry * Colleen Westlake* Alex Woodley * Susan Enfield, Ed.D., Superintendent

Kyle Chisholm, School Property Planning Manager
14101 Old Virginia Rd.
Reno, NV 89521-8912
(775) 789-3810

December 13, 2023

City of Reno, Development Services Dept.
Attn: Jeff Foster, Associate Planner
PO Box 1900
Reno, NV 89505

Dear Mr. Foster,

The Washoe County School District (WCSD) respectfully submits the following comments and/or concerns in regards to the application for a Minor Conditional Use Permit (Case No. MUP24-00012 "LifeChurch Primary School"):

WCSD has strong concerns over the additional traffic potentially generated by this project and the impacts it will have to the existing Damonte Ranch High School (DRHS) operations. Specifically, the traffic study provided demonstrates that the traffic levels at the Rio Wrangler/McCauley Ranch intersection are already poorly functioning and as a result of the project will reach a LOS F. The traffic study mentions an all-way-stop (AWS) will be necessary at this intersection but states that it will be "further analyzed" upon full buildout of the project. This is unsatisfactory as the phasing and timing of the project is not guaranteed and this improvement is needed now. WCSD requests that this AWS be conditioned and required to be installed prior to completion of any expansion and the first phase of the project.

Also, the DRHS's two existing driveways along McCauley ranch and the existing Rio Wrangler/Yee Haw Way will be negatively impacted with the addition of this project. The traffic study does not recommend any improvements to either of these intersections. City Engineering staff should analyze and vet the proposed function of these driveways to ensure no negative impacts to DRHS will occur.

Further, the logic stated in the traffic study regarding the 30 minute staggered bell times between the new and existing schools and associated traffic counts appears to be inaccurate. First, the recommended bell times of "8:15-9:15 AM and 3:15-4:14 PM" do not provide for said 30 minute staggering. DRHS's current bell times are 8:00 AM and 2:30 PM. Further, most of the parent traffic arrives at least 20-30 minutes before bell time for pick-up and drop-off so there is still substantial overlap between the schools. WCSD recommend the project be conditioned to require bell times of 9:00 AM & 3:30 PM to ensure adequate staggering and to allow parents exiting after bell times reduced congestions. Also, the proposed school should be required to use their primary access point at Yee Haw for pick-up and drop-off traffic so as not to conflict with DRHS's two existing driveways along McCauley Ranch.

Thank you for your time and attention to this matter. Please contact me should you have any questions or want to discuss further.

Sincerely,

Kyle Chisholm



**WASHOE COUNTY
SCHOOL DISTRICT
POLICE DEPARTMENT**
425 East Ninth Street □ P.O. Box 30425

**SAFE
ROUTES
TO SCHOOL**

MEMO

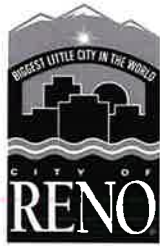
To: Kyle Chisholm, School Property Planning Manager
From: Officer Robbie Pape, Safe Routes Coordinator
Jennifer Iveson, Safe Routes Coordinator
RE: Life Church – Damonte
Date: 12/12/2023

In review of the Life Church application, Safe Routes to School anticipates a large volume of traffic using both Rio Wrangler Parkway and McCauley Ranch Blvd to include the joining intersection. To mitigate the upcoming dangers, Safe Routes recommends the following improvements and pedestrian safety measures. These measures will assist the overall safety of both motorists and pedestrians traveling to and from Damonte Ranch High School and the Life Church School. See attached diagram.

1. Crosswalks in front of proposed southeast exit/entrance on McCauley.
2. Sidewalk installation on McCauley in front of the proposed Life Church School.
3. Additional Crosswalk at McCauley and Rio Wrangler.
4. All way-controlled stop at Rio Wrangler Parkway and McCauley Ranch Blvd.
5. Use primary egress/ingress on Yee Haw way for pick-up & drop-off activities.

Respectfully,

Officer Robbie Pape
Jennifer Iveson
Program Coordinators, SRTS
rcpape@washoeschools.net
jennifer.iveson@washoeschools.net
(775) 348-0288



Environmental Control

MEMORANDUM

Date: December 11, 2023
To: Chris Pingree – Director of Development Services
Jeff Foster – Associate Planner
From: Eric Farrar, Environmental Control Officer
Subject: **December 1, 2023 Current Development Projects Review/Comments**

The Environmental Control Section (EC) under the Utility Services Department has reviewed the Development Projects memorandum dated December 1, 2023. We offer the following comments or conditions:

LifeChurch Primary School - MUP24-00012

EC has no comments regarding the request for a Minor Conditional Use Permit. The need for pretreatment devices (such as grease interceptor), Environmental Control permit or applicability of wastewater discharge requirements will be evaluated upon construction/tenant improvement or Business License application submittals. If the school includes a kitchen/food prep area, EC would require a properly-sized grease interceptor (minimum 750 gallons).

December 18, 2023

City of Reno
Planning and Development Division
PO Box 11130
Reno, NV 89520-0027

RE: LifeChurch Primary School; 145-020-17
Minor Conditional Use; MUP24-00012

Dear City of Reno Staff:

Northern Nevada Public Health (NNPH), Environmental Health Services Division (EHS) has reviewed the above referenced project.

1. EHS has reviewed the above referenced application and has no concerns for its approval of the change in land use as submitted.
2. The proposed school and subsequent parcel are served by community water and sewerage systems.
3. If the application is approved all subject civil improvement or building plans must be routed to EHS for review and approval.
4. If the project is approved it would be subject to all permitting requirements as outlined by the Washoe County District Board of Health Governing Food Establishments and must meet the standards of Nevada Administrative Code for the design and construction of the school if approved..

If you have any questions or would like clarification regarding the foregoing, please contact James English, EHS Supervisor at jenglish@nnph.org regarding all Environmental Health comments.

Sincerely,



James English, REHS, CP-FS
EHS Supervisor
Environmental Health Services
Northern Nevada Public Health

Jeff Foster

From: COOPER, CLIFFORD E <cc2132@att.com>
Sent: Monday, December 4, 2023 7:42 AM
To: Jeff Foster
Subject: RE: LifeChurch Primary School MUP24-00012

Jeff,
AT&T does not have any adverse comments regarding this project.

CLIFF COOPER
SR SPECIALIST-OSP DESIGN ENGINEER
AT&T NEVADA
1375 Capital Blvd rm 115
Reno, NV 89502
ROW Office: 775-453-7578
Email: cc2132@att.com
TEXTING and DRIVING...It Can Wait

Jeff Foster

From: Katriel Van Cleve <kvancleve@nevada.unr.edu>
Sent: Monday, December 11, 2023 12:17 PM
To: Jeff Foster
Subject: Support for Life Church's Proposed New School (Rio Wrangler and McCauley Ranch Blvd., South Reno)

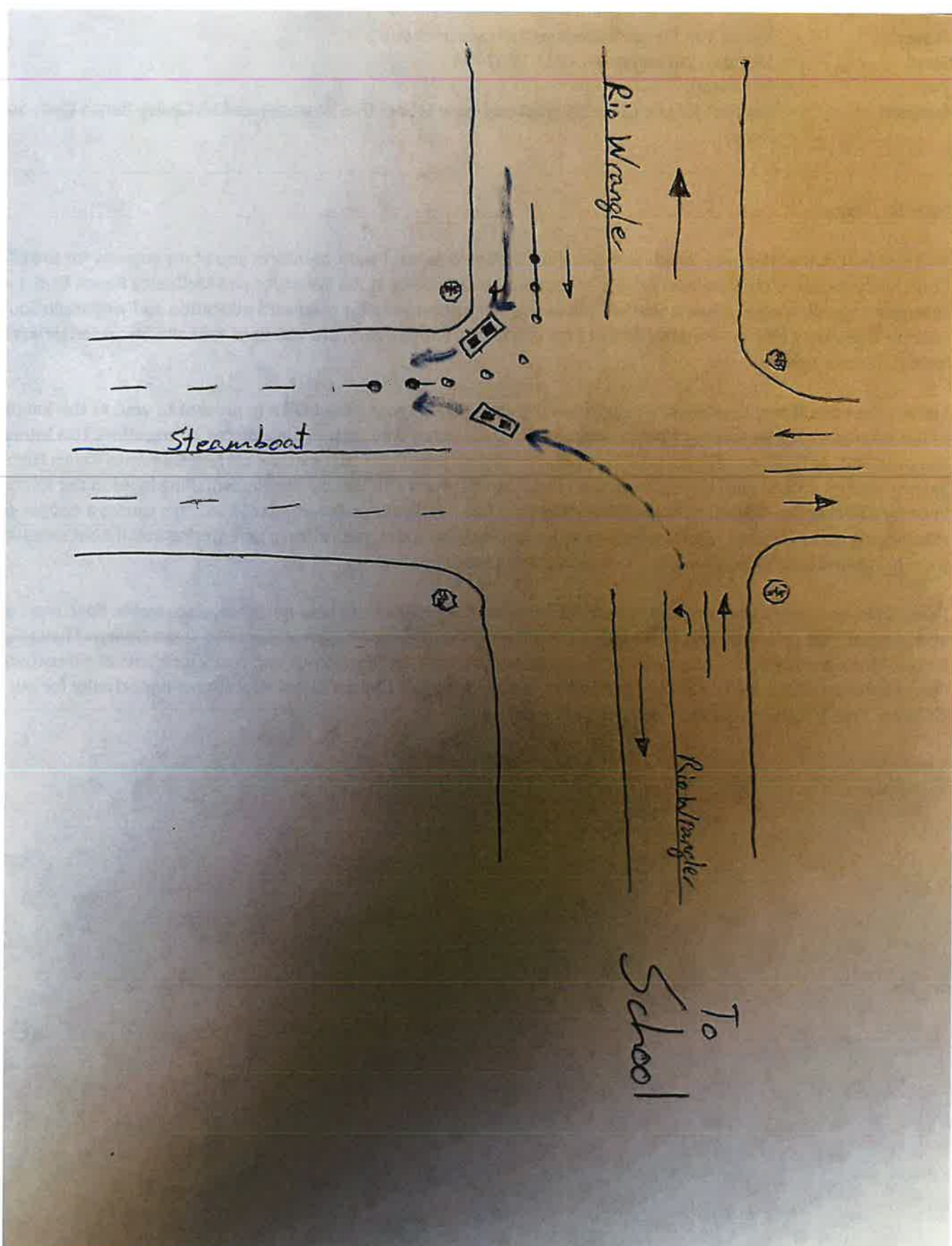
Dear Mr. Foster,

As a resident in the Damonte Ranch area living off of Rio Wrangler, I want to inform you of my support for the Life Church's proposal to create a new private school on their property at Rio Wrangler and McCauley Ranch Blvd. I urge you to support the plan amendments that will allow another opportunity for children's education and welfare in South Reno. I realize there may be increased traffic; but I for one (along with others), are willing to take the increased delays for our local children's benefit.

I have taken the liberty to prepare a suggestion for easing traffic that I would like to present to you. At the T-intersection of Rio Wrangler and Steamboat Pkwy, currently, there is a three-way stop sign-mediated intersection. This intersection has provided inefficient traffic control for a great time with many cars that exit the current Damonte Ranch High School getting backed up and with drivers from the school disobeying traffic law by illegally switching lanes in the intersection in order to enter the right-hand lane rather than their left-hand lane on Steamboat Pkwy. This causes a danger of sideswiping cars as well as more inefficiencies for drivers who could theoretically be entering Steamboat simultaneously from north and south Rio Wrangler if drivers were following the law.

I would like to suggest that stop lights be installed at that intersection to help better regulate traffic flow, and I would also suggest that pylons be installed curving from the northern end of Rio Wrangler onto Steamboat as I have illustrated below. These modifications can ease traffic congestion and prevent dangerous and costly incidents of sideswiping. Please consider these traffic controls in addition to approving Life Church's new educational opportunity for our children. Thank you for your time and consideration.

Sincerely,
Katriel Van Cleve



Jeff Foster

From: Katriel Van Cleve <kvancleve@nevada.unr.edu>
Sent: Tuesday, December 12, 2023 9:40 PM
To: Jeff Foster
Subject: Continued Support for Life Church's New School

Dear Mr. Foster,

I am aware of resistance to the establishment of a new private school run by Life Church (located at Rio Wrangler and McCauley Ranch Blvd.). I believe this school and the educational opportunities it can bring to our children are important enough in order to warrant a second letter of support for its establishment as planned in Life Church's proposal. I am certain that any traffic issues that arise can be remediated. I encourage and implore that you, and those under your direction, consider my proposed traffic solutions to the Rio Wrangler and Steamboat intersection that I sent in my prior email sent Monday. Additionally, I would like to suggest road widening measures along Rio Wrangler as well as school schedule, start-time delays as other options to aid traffic. Please support Life Church's new school. Our children's education is far more important than mild delays (especially when these delay have solutions). Thank you again for your time and consideration.

Sincerely,
Katriel Van Cleve

**Which Category
Describes You**

Citizen

Case Number

MUP24-00012

Citizen General Public Comment Form

Full Name

William McLarty

Contact Email

wmclarty@hotmail.com

Contact Phone Number

4157253349

Position

In Opposition

**Leave comments on
this case here.**

School is OKAY, but timing for traffic is a huge consideration as Damonte Ranch HS is next door. Traffic during school opening and closing is already at a standstill.

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These messages are not added in the [premium version](#).

Which Category Describes You Citizen

Case Number MUP24-00012

Do you wish to opt-in to receive Reno Connect Development Project email newsletters? Yes

Citizen General Public Comment Form

Full Name Dan Conklin

Contact Email danscvx@gmail.com

Contact Phone Number 6619933180

Position In Opposition

Leave comments on this case here.

McCauley Ranch Road is not built for extra traffic. The traffic reports don't factor in all of the new developments being approved (canyons, dpli, valley view, etc) this adds up to at least 160 cars a day, if only one person per household were to drive that will be driving on McCauley or Yeehaw daily. Either do something about widening and stop light or stop this from passing. God forbid a fire broke out and both schools were full and everyone in the canyon needed to get out and dump onto Rio Wrangler. A two lane road!

This PDF is generated with the [Google Forms Notification](#) add-on.

To generate customized PDFs from Google Forms, download [Document Studio \(video demo\)](#).

These messages are not added in the [premium version](#).

Jeff Foster

From: Michael Bordallo <bordallo34@hotmail.com>
Sent: Monday, December 11, 2023 10:41 AM
To: Mayor; Devon Reese; Jenny Brekhus; Naomi Duerr; Miguel Martinez; Meghan Ebert; Kathleen Taylor; Jeff Foster
Subject: Proposed Life Church School

Hello City Council and Manager,

I am writing to voice a safety concern on behalf of my family and neighbors living in the vicinity of a proposed life church school. This location is a terrible option for anymore vehicle traffic and school density. There is already unsafe road widths on Desert Way and Yeehaw that may injure or even kill pedestrian or vehicle occupants. We went through this with Doral Academy proposal that was cancelled due to the smart decision making of this council. With the new elementary school opened (J Wood) and the already congested traffic, opening another elementary school would create traffic hazards and fire hazards for the neighborhoods above Life Church and Damonte High School. Please do not support this unsafe congestion to an already highly trafficked area.

Thank you for your time and I highly recommend against any additional congestion or traffic to this area. The Church is trafficked with a small dare care, week night meetings and Sunday Churh, which is what it was intended for. This is unacceptable for the Church to look at profits at the expense of their neighbors.

Thank you for your time and attention.

Mike Bordallo
(775)686-9388

Jeff Foster

From: JoAnn McGoff <jamcgoff@att.net>
Sent: Monday, December 11, 2023 6:48 PM
To: Jeff Foster
Subject: Life Church Primary School expansion

Mr. foster,

I live very near Rio Wrangler and am concerned about the above building. My concern is not the building of a school, but the location. I have been told that ship has sailed, and the school will be built.

Traffic is certainly a concern with more housing planned for the area and two schools already within a mile of the planned school. Other concerns are expansion of the school...can it add another building for a middle school? Can the planned building be expanded with mobile facilities? Does it have to be two stories?

Lots of concerns which I hope will be addressed on 12/22.

Thank you.

JoAnn McGoff
2685 Hanovarian Way

Jeff Foster

From: Jon Kelley <fattire775@gmail.com>
Sent: Monday, December 11, 2023 6:00 PM
To: Jeff Foster
Subject: MUP24-00012 Life Church Primary School Permit

Hello Jeff,

We received City of Reno notification via USPS regarding project MUP24-00012 Life Church Primary School and we have a couple of questions as the information online was limited.

We live directly behind the church currently (Mule Circle) and our backyard is the church. If available, can you provide any details on the building such as location on the property and height? The church itself blocks our view west (Windy Hill) and we're concerned our views of Mt. Rose and related might be impacted. We are also curious about the traffic impacts with the completion of the Palisades subdivision, pending Canyons Edge and 40 +- acres by the water tank above the Palisades, new elementary school, and existing high school.

Thank you for your time.

Jon Kelley

Jeff Foster

From: Lynn Ault <lynn@hopereno.church>
Sent: Wednesday, December 13, 2023 8:39 AM
To: Jeff Foster
Subject: Proposed South Reno School

Hello,

My name is Lynn Ault, I own a home, with my wife, located at 10170 Cavalry Circle, Reno, NV 89521. This is just up the hill from where Life Church is located, and where the proposed school would be located. I would ask the city to reject this proposal based on the traffic concerns. Those of us who live above Life Church use two roads to get in/out of our neighborhood, and both those are already jam packed with school traffic Monday-Friday, before school and after school. On top of that, there are games and events that bring congestion to these roads as well. On Sunday mornings, there is a lot of church traffic. The church is already there, as is Damonte Ranch High School, but we do not have to add another school with all of its traffic into the mix as well. Please do not increase the amount of traffic in this already limited and congested area.

Yours Truly,

Lynn Owen Ault II

Home Owner and south Reno resident

Jeff Foster

From: Tammi Proulx <tammi.proulx@sbcglobal.net>
Sent: Sunday, December 17, 2023 9:49 PM
To: Jeff Foster
Subject: RE: MUP24-00012

Jeff Foster
City of Reno
Development Services Department
via email: fosterj@reno.gov

RE: MUP24-00012
44,351 sq. ft. LifeChurch Primary School

Dear Mr. Foster,

My name is Tammi Proulx and I live at 2725 Gold Mine Court, in the Golden Hills Subdivision and have since 2007. My family and I are extremely concerned about the proposed +44,000 sq. ft. primary school LifeChurch would like to construct at 10300 Rio Wrangler Parkway. We are already seeing increased traffic patterns due to the (much needed) new JWOOD Raw Elementary and I'm sure you are aware of the additional 150+ homes and townhomes (via another variance to original master plan of SF-3 for this area) that were approved to be built above Damonte Ranch High School. Adding traffic from the approved housing, with all cars flowing to the single lane surface road of Rio Wrangler is unsustainable - add another primary school to the mix, and it becomes dangerous. I would invite you to drive to our neighborhood at release time for the schools already in place so you can experience how heavily affected those of us who live here already are. Should there ever be an emergency evacuation, God help us.

In my opinion, there just isn't sufficient infrastructure to accommodate this project and an amendment to the conditional use permit should NOT be approved.

I appreciate your time and thank you for listening to my concerns.

Happy Holidays,

David and Tammi Proulx
tammi.proulx@sbcglobal.net

Sent from my iPhone

Jeff Foster

From: Mike Glock <mglock@dcsnv.com>
Sent: Monday, December 18, 2023 12:09 PM
To: Jeff Foster
Cc: Chuck Poe; Suzy Romero
Subject: Re: Conditional Use Permit for the Life Church

I was just emailed the permit application where they did include a traffic analysis. If you read that, it says the existing condition reaches a level of service (LOS) of F. What the hell, why would we even consider dumping more traffic on Rio Wrangler if the LOS is an "F"?

I'm sure both the City and the County have some culpability in the traffic congestion on Rio Wrangler. Neither agency has addressed the dangerous situation. But yet, you consider further growth with nothing in place to address traffic congestion.

I have to ask, if you already have a LOS of an "F", what do you think is going to happen when you dump another 700 cars on the road. And, that number is a lie as well. Since when is a school only a school. There are sporting events, club meetings, parent meetings, and on and on. Those 700 vehicles mentioned is a joke. It'll be all day long traffic. And keep in mind, those numbers quoted in the traffic study are one-way, and very conservative. If you factor in the two-way and all the other activities that a school conducts, you'll see no less than 2000 each day. And since when is a LOS a C with a 20 minute delay to make a turn.

I'm getting more frustrated as I investigate this further and type this note. We all see the issue, why don't you.

Thanks,
Mike Glock, PE
Cell: (775) 221-1545
mglock@dcsnv.com

On Dec 18, 2023, at 11:41 AM, Mike Glock <mglock@dcsnv.com> wrote:

Hi Jeff, I live in the neighborhood above the Life Church. Our neighbors complained quite vehemently about the proposed Doral Academy school that was proposed for that same corner long before the Life Church was constructed. We were then lied to by the church, saying that there would be minimal impact to us and only on Sundays. Not so. Ever since they opened, they've run a day care facility out of it contributing to a significant amount of traffic in and out of that parking lot onto YeeHaw. And on Sundays, they can't even accommodate the traffic that they generate. At least they try to keep folks from parking on Desert Way, but that doesn't always work.

Personally I understand traffic design very well and have to ask if any traffic analysis has been performed on the impact to Rio Wrangler. The traffic going to and from the high school already overloads the intersection with Steamboat Pkwy every day. As it is, we cannot get into or out of our neighborhood during those drop-off or pick-up times. The church compounds that problem and I guarantee you another school on that corner will do the same.

You probably hear it often, but the intersections on Steamboat Parkway are already overloaded. I routinely experience 5 min to 10 minute delays getting through each intersection on my way home every day. I know, this isn't about Steamboat Pkwy, but your traffic analysis would tell you where these folks are coming from and would tell you that the intersections are already beyond capacity during peak periods. And that also poses a safety concern for emergency services too that can't get through the intersections.

If your intersections are meeting signalization warrants, you should be requiring the developers to install the signals. Nothing has been done to mitigate the congestion and overloaded intersections along Steamboat or Rio Wrangler. I would ask that you try to drive from 580 to Rio Wrangler at 5pm any day and see for yourself the mess that's been created by the growth without addressing the infrastructure of the roadways.

I can talk to you more on this if you'd like, but basically, I object to another school on that lot. And if you do allow it, I would ask that you require a traffic analysis and address the delays at Steamboat and Rio Wrangler, and the ingress/egress to Yee Haw.

Thanks,
Mike Glock, PE
Cell: (775) 221-1545
mglock@dcsnv.com

Jeff Foster

From: Valerie Truce <valerietruce@mac.com>
Sent: Monday, December 18, 2023 1:57 PM
To: Jeff Foster
Subject: Life Church proposal and traffic concerns

Thanks for returning my call today. Here is the list of my concerns for the proposed elementary school relating to traffic:

1. The school zone that ends north McCauley needs to be extended to north of Yee Haw. It's very dangerous to turn south onto Rio Wrangler from Yee Haw during the drop offs and pick ups from Damonte HS, which will be heightened by adding an additional 300+ cars during commuters hours.
2. There is also grave concern for the amount of traffic on Yee Haw before and after worship services. Life Church currently blocks their congregants from entering the parking lot from Rio Wrangler, allowing them to enter only via Yee Haw. Forcing congregants to enter via Yee Haw creates traffic blocks both north and south on Rio Wrangler, but especially hinders neighbors from accessing their homes during any services at Life Church. The church's daycare/preschool are also only allowed to use Yee Haw for drop-offs and pick-ups. Has the city approved of either situation?
3. While the engineers are looking over the site and its impact on traffic, it's also important for them to take a look at Desert Way and the impact of increased traffic. Desert Way's curbs are painted red on the east of the street, but not on the west. Congregants of Life Church will often choose to park on the west side of Desert Way, very near the 90 degree turn our neighborhood uses to access homes via Yee Haw. I have seen more than one near head-on at that corner. Drivers often go too fast and take the turn too sharply, creating an unsafe situation for anyone trying to turn right at the corner of Yee Haw and Desert Way, especially if there is a car parked on the east side of Desert Way very near the turn. Also, there is no place for drivers entering Desert Way to go, without hitting a parked car or a car with passengers.

Thanks for your help. I look forward to seeing appropriate changes to traffic flow to/from Yee Haw and gaining safer access to Rio Wrangler from Yee Haw.

Sincerely,
Valerie Truce
Trail Rider Drive, Reno, Nevad

Jeff Foster

From: Mary Harger <marycjharger@gmail.com>
Sent: Tuesday, December 19, 2023 9:59 AM
To: Jeff Foster
Cc: Mandy Hodach; Erin Brown; Matt Kramer; Gayle Kern
Subject: Life Church- Primary School Opposal

Jeff,

I am writing on behalf of Damonte Ridge HOA to express our opposition to the proposed Life Church Primary School. I am also cc'ing the members of our Board, our Community Manager and General Counsel.

Our community abuts to Rio Wrangler, and all the homes whose backyards face Rio Wrangler will be affected by the additional traffic, specifically the sound.

The section in question is Rio Wrangler northbound between Yeehaw Way and Steamboat Parkway. This section already has significant traffic in the morning during rush hour, as well as during Damonte Ranch High School beginning and end of school.

The issue is the northbound cars approaching the 4-way stop at Rio Wrangler and Steamboat, where they all line up when traffic becomes heavier. These cars come to a complete stop and idle on Rio Wrangler, from the stop sign at Steamboat to more than 3/4 of the way back to Yeehaw. During this time, the noise from these cars in our Homeowners' backyards is unbearable.

If the Life Church Primary School was to be approved, this would create even more traffic stopping along Rio Wrangler, adding to the noise pollution.

Damonte Ridge HOA is adamantly opposed to this project, and asks the City to deny approval.

However, should the City choose to move forward despite the concerns, Damonte Ridge HOA demands the City require a concession from Life Church (or whoever is the developer) to pay for the installation of a soundproof wall along Yeehaw Way and the section of Rio Wrangler discussed above, to mitigate the noise pollution created with the additional traffic.

We truly appreciate your consideration, and can make ourselves available to meet to discuss matters further.

Many thanks,
Mary Harger
Damonte Ridge HOA
President
214-280-7384

Jeff Foster

From: crp161@aol.com
Sent: Tuesday, December 19, 2023 11:04 AM
To: Jeff Foster
Subject: Conditional Use Permit for Life Church Primary School

Jeff Foster

Thank you for taking the time to talk to me on the phone and for sending me the application submitted by Life Church. From talking with you and reading the application, I understand Life Church wants to build a K-8 primary school on their existing grounds located east of Rio Wrangler Parkway, north of McCauley Ranch Blvd. and south of Yee Haw Way.

As a resident in the residential tract adjacent to this parcel, I am very much opposed to this proposal. It is my opinion that until engineering changes are made on both Rio Wrangler and Yee Haw Way, this added traffic will be unacceptable for us residents trying to exit and enter our tracts. It is already a problem that needs to be addressed.

Currently, with the tremendous influx of homes and high-density units in our area, traffic has become an issue. When we add to this the traffic from Damonte Ranch High School in the morning, lunch time and afternoon it becomes nearly impossible for us to enter or exit our tract as there is no form of traffic control on Rio Wrangler at Yee Haw, our exit point. Traffic on Rio Wrangler comes to a standstill every day during these times. The very last thing us residents need until this issue is addressed is the 200-300 more cars this school will add every day to the already existing problem.

I am not a traffic engineer, but I do have some experience in this area. In my opinion there are several ways to address this issue.

- 1 - Rio Wrangler needs to be expanded from its existing 2 lanes to 4 lanes from Steamboat to south of the high school, where it already becomes 4 lanes all the way to Veterans Parkway.
- 2 - A traffic signal needs to be installed at the intersection of Rio Wrangler and Steamboat.
- 3 - The exit from the Life Church parking lot that is at Yee Haw and Desert Way needs to become an emergency exit only.
- 4 - The intersection of Yee Haw and Rio Wrangler needs some form of traffic control during the morning and afternoon school traffic.

Until this issue is addressed and corrected this application needs to be denied.

Thank you,

Charles Poe
10025 Barrel Racer Dr
Reno, NV 89521

775-721-4556
crp161@aol.com

Jeff Foster

From: Debra Y. <debyates1000@gmail.com>
Sent: Tuesday, December 19, 2023 2:09 PM
To: Jeff Foster
Subject: Re: MUP24-00012 LifeChurch Primary School

Hi Jeff,

Thank you for sending the information and traffic study related to the Proposed Private Elementary School planned on the property adjacent to my home. My reading of the reports appears that the City/staff is giving the project the Green Light. I previously expressed my opposition via phone message and our phone call. Below is my official statement of opposition.

First, the City previously denied Doral Academy to build an elementary school on this property. Citizens came out in record numbers to oppose the project. Instead, the property was purchased by Life Church who built their facilities. This seemed like a compromise. However, now LifeChurch wants to build a School. Those conditions and concerns that existed in 2017 have not lessened and only grown greater. The direct impact of traffic on Rio Wrangler road has grown dramatically since 2017. Since this time Damonte Ranch High School expanded their student capacity thus traffic impact after building a new facility on the campus. Washoe County School District has added J Wood Raw Elementary school, also dumping significant traffic onto Rio Wrangler and ancillary streets. Many Lennar Homes now appear on the eastern slope of the hill (with more to come) who also utilize the same access roads as proposed for the school. Toll Brothers Caramella Ranch subdivision is near built out adding over a thousand homes and corresponding traffic, Toll Brothers Saddle Ridge completed their build out, increasing traffic directly on Rio Wrangler. Toll Brothers Regency & Precido, HARVEST apartments, and build out of 100's of townhomes across from Harvest next to the park, while not directly on Rio Wrangler, it does clog Steamboat and impacts Rio Wrangler. It is easy to look myopically at just this one project, but in totality there has been dramatic and at most times unmanageable traffic on Rio Wrangler as a result of all the other projects approved - which in turn impact ancillary roads.

Second, stating that all will be good simply because the Church will adjust its start times is flawed. J Wood Raw School start time of 9:00 am and 3:00 dismissal already causes peak traffic times and noise to be extended, compounding the already crazy Damonte High School traffic jams, adding Life Church School to this time frame simply makes a terrible condition worse. Also, don't forget the impact of staff driving to and from work - this typically starts an hour or so before and after start times. All of the proposed NEW students will most likely be transported by single cars as opposed to Damonte High and J Wood Raw where many ride buses to school.

Third, It is frustrating that NOW the church comes back with a different proposal. I suspect that if the Community thought the Church was going to come back for another "bite at the apple" later that included a 400 student school - there would have been GREAT opposition to the original Church plans. Make them adhere to the original plan.

When I look at the various maps related to roads I also see where there may be plans to extend Rio Wrangler towards Mira Loma. What will the traffic impacts be if something like that happens? Is this being factored into the "traffic studies" or again tunnel vision on just this one more project?

I have lived in my home for almost 10 years now and when I moved out here the range horses roamed freely, much of the land was full of cattle grazing, with open space and manageable traffic. Quality of life is now dramatically eroded, as it relates to traffic, noise, crime, congestion, ACCIDENTS, pedestrian & cyclists injuries and death, and insane levels of horse deaths by car, breaks my heart. When will enough GROWTH - be enough? It sure doesn't feel like there are any BRAKES on the erosion of quality of life for the Damonte Ranch Community. Additionally, I see no noticeable increase of Police presence. People run stop signs freely, frequently do not heed flashing yellow lights, hit bicyclists, and speed

excessively. Speed limits seem only optional when there is no enforcement. Only after there is a serious accident do I see Police presence and then only for maybe an hour or so for the day! The next day all the insanity starts again! I have lost count of the number of "close calls" I have had over the past years. Scary!

I urge the Council to reject this proposal for the same reasons they did for the 2017 Doral Academy. My recollection of when Doral was proposing a school was 500 students (not the 900 I was recently told) and this proposed 400 students school and traffic impact will be no better than proposed in 2017- except much worse due to all the other developments/traffic that have been added since 2017.

Thank You for your service to the citizens of Damonte Ranch.

Sincerely,
Debra Yates
10155 Burghley Ct
Reno, NV

On Mon, Dec 11, 2023 at 11:26 AM Jeff Foster <FosterJ@reno.gov> wrote:

Deb,

Following up on our conversation, please find attached the application submitted by LifeChurch for a proposed K-8 school on the existing 10-acre site. In order to shrink the file size to one that the email system would allow to be emailed, I removed the drainage study and sanitary sewer reports, figuring those would likely not be important like the traffic study is. The full file is almost 56 MB (too big to email) and this reduced file without those two studies is 29 MB. If you would like those studies separately, just let me know.

Jeffrey A. Foster



Associate Planner

Development Services Department

775.393.4165 (o) or 775.399.5153 (c)

fosterj@reno.gov

1 E. First St., Reno, NV 89505

Reno.Gov

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

Jeff Foster

From: Suzy Romero <suzy@romeroinc.com>
Sent: Tuesday, December 19, 2023 4:03 PM
To: Jeff Foster; Naomi Duerr
Subject: OPPOSE LIFE CHURCH SCHOOL

Hi Jeff, Naomi, and those who are considering the Life Church School expansion,

We strongly oppose the construction of the school at Life Church because of the substantial safety hazards that the increased traffic would create.

We have lived above Damonte Ranch High School the past 6.5 years and in that time, Rio Wrangler Parkway has become increasingly inundated with school traffic. Whether you are exiting the high school or coming off Yee Haw Way, there are too many cars on Rio Wrangler, especially with only one lane each direction. As it is, we wait at least 5-8 minutes in a calm fashion to get from Yee Haw to Steamboat on Rio Wrangler in the morning and afternoons.

Quite frankly though, the congestion during drop-off and pick up times is my least concern. Considering that the jam-packed roads can barely accommodate the current traffic conditions, what would happen in a true emergency such as a school shooter, fire, earthquake, etc.? I could not imagine the frenzy of having the panicked parents of both Life Church's and Damonte Ranch High School's students trying to get in and out of the area. Emergency services would not be able to get through and residents in the area would not be able to evacuate safely. It would be absolute chaos.

This entire area needs to be revisited with an updated, independent traffic analysis.

The permit application that was drawn, with the original traffic analysis, says the existing condition reaches a level of service of an "F." Why would another school permit even be considered or allowed? Since then, there has been another school built and many high-density developments in the area, which cannot handle this dangerous situation. I could not imagine another 500-700 vehicles on Rio Wrangler at any given time, especially during an emergency. I know they say they will modify the pickup and drop off times, but that is not the largest concern. Safety for everyone in the community is the number one concern and adding another school in this location is not acceptable.

Warmest Regards,

Suzy Romero

Gary Romero, Inc.
Romero Door & Hardware
(775) 824-0687

Our office will be closed on Monday 12/25 for Christmas and Monday 1/1 for New Years. Happy Holidays!

Jeff Foster

From: Philip Klink <pkklink@gmail.com>
Sent: Thursday, December 21, 2023 8:37 AM
To: Jeff Foster
Subject: MUP24-00012 LifeChurch School application

Hello Jeff,

I am writing to express my deep concern and disapproval regarding the application and approval for construction of a 44,000 sq. ft. school on Yee Haw and Desert Way. A former application for a school at this location was denied. There were good reasons for that denial. Traffic and safety issues have only increased since that denial for the Doral Academy. I have been a resident of 10130 Burghley Ct for 17 years and purchased this home in the knowledge that no development other than residential would be permitted behind me.

The school and traffic it would generate are totally incompatible and unwelcome in this neighborhood. Please do not approve the zoning change or the permit to build a school or any other major traffic driven project in this neighborhood. Please consider the negative effect this project would have on the safety and livability of existing residents.

Thank you in advance for taking into consideration the effect this project would have not only on the existing residence but also the children who would be exposed to greater jeopardy should this project go forward.

Respectfully submitted,

Philip Klink & Kathy Wilson
10130 Burghley Ct

Jeff Foster

From: dburns@rocketwireless.com <dburns@rocketwireless.com>
Sent: Thursday, December 21, 2023 11:06 AM
To: Jeff Foster
Cc: naomi@votenaomi.com
Subject: FW: MUP24-00012 LifeChurch Primary School

Jeff – my name is David Burns and I live in Damonte Ridge. I want to add my outrage to the facts delineated by Deb Yates below. It is outrageous and incredulous that the city would consider approving this school. As Debra said, the development all around us over the past 8 years THAT I have lived here has degraded substantially our quality of life. The traffic, the noise the impeding of views, and in particular, the increasing death of horses recently is HORRENDOUS! It may be easy for you because you do not live here but if you did, you would NEVER approve such a project. The out-of control development in this area is unconscionable and we demand that this project be stopped. It was rejected some 8 years ago BEFORE all of the recent development. So now it is that much more important to stop it again for the residents of the area. I do not think you want to be part of a legacy that is ruining what once was such a beautiful and open area. STOP THIS PROJECT!

From: FriendsOfDamonteRidge <friendsofdamonteridge@gmail.com>
Sent: Wednesday, December 20, 2023 10:31 PM
Subject: Fwd: MUP24-00012 LifeChurch Primary School

Friends of Damonte Ridge,

Debra Yates sent me information about a proposal to build a new school for 400 students at the Life Church just south of our development. This development will increase traffic on Dessert Way, Yee Haw way and Rio Wrangler and Steamboat.

Feel free to review the information below.

You can contact Debra Yates if you would like more information. debyates1000@gmail.com

Tom Fitzgerald

 **LifeChurch Application- School 2023.pdf**

Here is the Application submitted to the City, staff comments and traffic study.

On Tue, Dec 19, 2023 at 2:26 PM Debra Y. <debyates1000@gmail.com> wrote:

Hi FriendsOfDamonteRidge, Some may or may not know that the Life Church facility is proposing an almost 400 student school on the Church campus at the end of our subdivision. Here is a copy of the letter I recently wrote to the City in opposition to the project. If you feel appropriate to share with other Damonte Ranch Homeowners - that would be great. My understanding is the City Council will be voting on this just after Christmas. The 27th or 29th??? Important that homeowners in opposition get comments into the City soon. Thank You!

----- Forwarded message -----

From: **Debra Y.** <debyates1000@gmail.com>
Date: Tue, Dec 19, 2023 at 2:08 PM

Jeff Foster

From: Kate&Bill Tolles <tolles2018@gmail.com>
Sent: Thursday, December 21, 2023 10:31 PM
To: Mayor; Devon Reese; Jenny Brekhus; Naomi Duerr; Miguel Martinez; Meghan Ebert; Kathleen Taylor; Jeff Foster
Subject: Case #MUP24-00012 LifeChurch Primary School

Reno City Council/ City Planner,

I would like to register my concerns with the proposed building/expansion of the LifeChurch Primary School. Based on the published information, this will be a private school for 350+ students K-8. This means that parents will be dropping off/picking up their students throughout the entire school year. The proposed entrance and exit are off of McCauley Ranch Road, just east of the intersection with Rio Wrangler Rd and immediately across from Damante Ranch HS.

My primary concern here is traffic. LifeChurch is surrounded by three roads, McCauley Ranch Road, Yee Haw Way, and Rio Wrangler Rd. All of these are one-lane roads. Rio Wrangler and McCauley Ranch currently get backed up with traffic significantly during the workweek due just to the High School. Adding another school will significantly exacerbate the situation. Rio Wrangler from Western Skies north to Steamboat were just not designed for this level of traffic

Yee Haw and McCauley Ranch are the only entrances to the Damonte Foothills housing development. Compound this with the pending additional development of housing behind (east) of Damonte Foothills, again with only YeeHaw and McCauley as the primary access and these streets will become impossible to navigate during the work week. Bring in pedestrians and school children and the regular appearance of wild horses and we have all the elements for frequent major traffic incidents and fatalities.

Consequently, the traffic issue should be enough to put a halt to the building of a primary school on the LifeChurch property. It should also be noted that a major portion of the proposed site is currently single-family residential, not a school zone.

My apologies for the last minute submission of my concerns. But it is due to the short turn around of when this proposal was publicly posted at the entrance to the development and the City Council meeting. Barely 30 days during the busy holiday season. I would also add that for every person registering a concern with the City, I am confident that there are many, many more who have the same or similar concerns but have not had the time to submit to you. Or, frankly, they may feel it would fall on deaf ears. Please prove them wrong.

Thank you for your time and consideration of my concerns.

Respectfully,
Catherine Tolles
Damonte Ranch resident

Jeff Foster

From: em <kuemily@yahoo.com>
Sent: Friday, December 22, 2023 11:45 AM
To: Jeff Foster
Subject: Recent Planning for a new school by Life Church

Good Morning Jeff,

I live in the neighborhood above the Life church. Recently I heard our city is planning for another school near by us, Doral Academy?

You might have heard lots of complains regarding our bad traffics especially in the morning and when they are out. Although only certain time periods of the day affect our traffic load but if there is any emergency it could be a disaster, especially Rlo Wrangler Is a near our area is not a wide street and we have only one exit there for our community.

Please reconsider not to have another school for the safety of our neighborhood as well the children and their parents when travel to this area for schooling.

Sincerely,
P. Emily Ku
530-563-6267

Jeff Foster

From: Scot Sherman <scotsherman@hotmail.com>
Sent: Friday, December 22, 2023 1:34 PM
To: Jeff Foster
Cc: marne sherman
Subject: RE: Re: LifeChurch Primary School

Hi Jeff,

My wife made a very good point regarding the impact the school will have on Desert Way. With 365 students at this new school parents will be using Desert Way as a parking lot to pick up their children and Desert Way simply is not wide enough to handle cars parked along it. The Church already puts out 'Do not park' signs on Sunday to stop church goers from parking on that street. With cars parked on that street it will make that blind corner a danger to everyone driving that street along with a high likely of a head on collision or a child getting hit. The City will need to paint those curbs red and make it illegal to park on that street.

Best Regards,
Scot

From: Scot Sherman
Sent: Friday, December 22, 2023 12:33 PM
To: fosterj@reno.gov
Cc: marne sherman <gingerblossoms1@yahoo.com>
Subject: Re: LifeChurch Primary School

Good afternoon Jeff,

Thank you for taking the time out of your busy schedule to talk with me regarding the proposed LifeChurch Primary School project.

As discussed over the phone my biggest concern is with traffic in the area. With the proposed new LifeChurch school that will make 3 major schools in the area (JWood Raw Elementary School, Damante Ranch High School, & The LifChurch Primary School) while the City of Reno has done nothing to improve the infrastructure in the area. The LifeChurch will prolong the time of traffic on Rio Wrangler Parkway even longer both in the morning hours and afternoon. I understand that the City plans on putting in a round about at the intersection of Rio Wrangler Parkway and McCauley Ranch Blvd., but that will not address the congestion on Rio Wrangler itself or the major issues that already exist at the intersection of Rio Wrangler Parkway and Yee Haw Way. Even though Yee Haw Way would not be the primary exit for the LifeChurch school parents are sure to use that exit to bypass the traffic at McCauley Ranch Blvd. As it is everyone who leaves during these peak times take their lives in their hands trying to get out of Yee Haw Way, including my son. I would consider this intersection to be a major concern and add yet adding another school to the area will not improve the situation.

My stance on the LifeChurch project is that if the city is not planning on improving the intersection of Rio Wrangler Parkway and Yee Haw Way in addition to addressing the traffic jam on Rio Wrangler Parkway then I am 100% against the new school. However, if the City plans on improving the intersection of Rio Wrangler Parkway and Yee Haw Way and somehow addressing the traffic jam on Rio Wrangler by either widening it or improving the intersection at Steam Boat and Rio Wrangle Parkway then I am ok with the new school project. The City must realize that if they approve projects such as these without taking into consideration things such as traffic then they take on the responsibility / liability if something does occur. i.e.: A major accident or an emergency where residents and students alike can't leave the area in a timely manner. Almost every day I see potential accidents at this intersection as drivers on Rio Wrangler don't stop to

let you in. (Every once in awhile you get a nice citizen that will let you in). You just need to go for it and hope beyond all hope they will stop.

Best Regards,
Scot Sherman
775-846-2178

Jeff Foster

From: City of Reno <reno@enotify.visioninternet.com>
Sent: Sunday, December 10, 2023 10:31 AM
To: Jeff Foster
Subject: justmandym@gmail.com

Message submitted from the <City of Reno> website.

Site Visitor Name: Mandy Hodach
Site Visitor Email: justmandym@gmail.com

Hello Jeff,

I am writing in regard to the potential rezoning of the area for Life Church to build a school. As an educator I understand the need for additional private faith based schools in the Reno area. Unfortunately, I am voicing my non-support of building a school in that particular location. I live in the Damonte Ridge neighborhood, and my home backs up to Rio Wrangler. The amount of noise and traffic and speeding cars that go by on a two lane road behind my home every single day is just already too much. To add a school to an already congested and loud area where homes are is just not fair to those of us who live here.

Thank you for your time,
Mandy Hodach
2650 Friesian Court

Jeff Foster

From: thecoverts@charter.net
Sent: Monday, December 11, 2023 3:33 PM
To: Jeff Foster
Subject: Life Church School

Hello Jeff

I would like to know why this will not go to the Planning Commission or Council unless appealed? In the original approval in 2015 there was never a mention of a school. Since Life Church is now adding that, why would that not be something that should be reviewed because of the traffic impact to the community?

The traffic study says that Rio Wrangler and McCauley would be classified E or F without a 3 way stop sign. Would not the City and RTC be involved in deciding if that road can have a stop sign at that location. The traffic is horrendous now and this is just going to add to the mess. And the city has approved more houses above the newly completed Lennar project above the high school. That is the main concern. With the new elementary school just opened it is even more of a mess.

What would be the timing and process to appeal so that Council and Planning at least know what is going on in our area?

Best,

Judy Covert
10105 Gold Mine Drive
775-772-0749

Jeff Foster

From: thecoverts@charter.net
Sent: Tuesday, December 19, 2023 9:45 AM
To: Jeff Foster
Cc: Naomi Duerr; Jenny Brekhus; Hillary Schieve
Subject: MUP24-00012 LifeChurch Primary School (Opposed)

Dear Jeff,

My husband and I have lived in Golden Hills for over 11 years and we know and experience every day what has happened to traffic here. It is not only during the week days but there are many other activities during the evening and weekends at the two existing schools. We oppose Life Church school proposal because of the increased traffic issues we currently have with the new J Wood Raw school on Rio Wrangler, as well as the increased traffic generated by Damonte Ranch High School, plus all the new homes in the entire Damonte area.

The traffic study done by LifeChurch is outdated and still says E or F LOS rating at McCauley Ranch and Rio Wrangler. It suggested the only way to alleviate that intersection rating is a 3 way stop. I cannot imagine how bad that will be for existing traffic if RTC would approve such a suggestion. We tried to get the school yellow blinking light zone extended so we could get out on Rio Wrangler with all the traffic, and they wouldn't even do that.

This decision needs to be based on current home levels not from 2015 when the Church received the SUP. I would like to know how many houses and condo approvals have been approved and not been built yet, plus all the homes built in this entire area since the SUP which does not include any wording of a school building.

I drove down McCauley Ranch Blvd this weekend. Strangely enough that road from the roundabout to Rio Wrangler has recently been re-paved with two right turn lanes turning north onto Rio Wrangler? Even if there is a 3 way stop there how are two cars going to be able to turn onto a one lane road at the same time? And did the city suddenly decide to pave that street? There are many other streets in Damonte Ranch that are in dire need of repaving. McCauley had nothing wrong with it.

Please flag my email address so we know when the decision is made.

Thank you for your time and consideration.

Sincerely,

Judy and Jim Covert
10105 Gold Mine Drive
Reno, NV 89521

From: thecoverts@charter.net
To: [Jeff Foster](#)
Cc: [Naomi Duerr](#)
Subject: Comments for Life Church Primary School MUP24100012
Date: Monday, March 4, 2024 1:53:29 PM

Date: March 4, 2024
To: Jeff Foster, Associate Planner, City of Reno
From: Judy Covert

Re: Comments to MUP24-00012 Life Church Primary School

Jeff, thank you for all your assistance with my previous questions.

In the November 21, 2023 Project Description prepared by Wood Rodgers, the exact parcel the school building will be built on is zoned residential SF3. According to their Project Request page 2 of 11 ' "School, Primary" is permitted in the SF-3 zoning district with approval of a Minor Conditional Use Permit.' I believe this is a dangerous precedent for any future city developments that want to easily change zoning. Why isn't this required to go through a normal rezoning request not a MUP?

Below are my comments regarding Wood Rodgers response to Staff Comments dated February 19, 2024.

Planning Comments:

- #2. What is the total number of students including Kidslife, Phase 1A, Phase 1B. The 240 total number of students does not appear to include the Kidslife of 120 mentioned on page 1 of 11 under Project Background but the Traffic Study Table 4 says 360 students on page 6 of 15. The Kidslife max student population on that table says 20. These numbers need to be verified.
- #6. A photometric plan needs to be done before any city decision. The school will back up to residential homes.
- #13. Additional note from Wood Rogers: "Due to rising construction costs and the church's reliance on fundraising, they MAY utilize portable units in lieu of the building, either temporarily **or permanently**. Please verify the original SUP was for a school building with no mention of portable buildings on a SF3 parcel.

Engineering/Public Works Comments:

- #2. A completely new Traffic Study needs to be done by RTC to be sure the information provided by Headway Transportation is accurate for current information and will be approved by RTC.

When was the referenced November 21, 2023 study actually completed? It references 8 Tables and 8 Figures. There are no Figures included in the 15 page document provided with the MUP request. Does the Traffic Study include The Canyons, Canyons Edge? If so are they a part of the six 40-acre parcels above Claim Jumper and to the south. One (145-010-06) has been approved for 75% SF3 and 25% PGOS so that's another 90 homes. DPII for 80 condos. The others are HDR and UT 40 and at some point, will most likely be asking for zoning changes to residential. All land that will be developed in the future should be included as the only way for those properties to eventually exit to Rio Wrangler is i.e. via Trail Rider to YeeHaw, McCauley Ranch Blvd, and Stanley to Western Skies. (The referenced project names and parcels have had name and housing numbers have changed and been revised over the last few years so it is very confusing). Is the new JWood Raw Elementary school, opened last August south of the Damonte High School, traffic included in this Traffic Study?

In addition, Sunny Hills Ranchos now owns the remaining Bella Vista parcels, and a request has been made to the City of Reno for an amendment to the Bella Vista Ranch Phase II Planned Unit Development (PUD) handbook to:..... a) increase the maximum dwelling units from ±575 units to ±609 units. This will increase the number of homes plus they will be completing Rio Wrangler from South Meadows to Steamboat Parkway. If I remember, RTC proposed a roundabout at Steamboat and Rio Wrangler when Rio Wrangler was completed to South Meadows. This, and the proposed roundabout at McCauley and Rio Wrangler, should be verified by RTC.

7. The east side of the entire curb on Desert Way needs to be painted red because there should be no parking. The church currently puts out no parking signs along the first parcel north of church on Sundays, but people still park farther up, and cars proceed in both directions when a car is parked along the east curb.

There is also a problem with Kidslife parents rushing in and out of the church entrance on YeeHaw. They often do not stop at the church stop sign exiting from the church and turning in front of cars on Yee Haw that turn left onto Desert Way.

Judy and Jim Covert
10105 Gold Mine Drive
Reno, NV 89521

Jeff Foster

From: Colt Stewart <coltstewart46@gmail.com>
Sent: Monday, December 18, 2023 4:08 PM
To: Jeff Foster
Cc: Naomi Duerr; Jenny Brekhus; Hillary Schieve
Subject: MUP24-00012 LifeChurch Primary School (Opposed)

Dear Jeff,

Thank you for the application and reports referenced in this proceeding.

My wife And I have reviewed the material and wish to state, for the record, our opposition.

First of all there has been no effort by the Church to inform or involve the community. The fact that the Church filed on November 22 for an expedited 30 day review right during the most sacred Christian and Jewish holidays of the year is proof positive that the Church wants to put one over on you and the Golden Hills community. This is disgraceful.

Secondly, the Traffic Volumes analysis does NOT factor in the brand new Nix Toulyakidas Elementary School daily traffic at exactly the times we are concerned with.

Thirdly, the Crash History studied NDOT data which ended on December 31st 2020. That data is now four years out of date. Shame on those who failed to get the updated RPD data for all Veterans, Rio Wrangler, Damonte Ranch and Steamboat Parkways Incidents and accidents.

The population of the Golden Hills/Palisades and Caramella Ranch Developments has increased significantly since the end of 2020. How many horses have been killed this year alone as speed limits are ignored?

To say that such oversights by your professionals is merely incomplete is an understatement. It is downright prejudicial and incompetent.

Emergencies.

Elizabeth and I are 7 and a half year residents of this area. We know how difficult it is to get out of Hee Haw left or right onto Rio Wrangler. During the am, noon and afternoon school rush hours. We can avoid those times except during any emergency. Any emergency such as a medical emergency, fire, earthquake, school shooter, power failure, water main break, storm damage, etc would turn the already clogged streets into a disaster area.

Please deny this MUP.

Regards,

Coulter H & Elizabeth J Stewart
10045 Barrel Racer Drive

Sent from my iPad

Friday, March 1, 2024

Subject: MUP24-00012 Life Church Primary School

To: Jeff Foster, Reno City Planning

The following comments are a collection from several families in the existing Golden Hills Community which will have to live with and bear the brunt of the safety, security and hazardous conditions resulting from this ill advised project.

First: Seven years ago this exact same type of project was proposed, examined, evaluated and rejected by the community and the City of Reno when the Golden Hills community was one half the size it is now. That project, The Doral School, is now located on the Mt. Rose Highway, a much smarter location with four lane access.

Second: Limited Notification, to wit:

1. The applicant made NO effort to notify or involve the 500 households in the Golden Hills area, or any of the immediate communities adjacent to the proposed site prior to submittal and at no time since.
2. During the Christmas-Thanksgiving Holidays City Planning Staff posted 3 yellow signs at locations with no or severely limited safe parking so we could stop, get out and review the details of this proposal, easily.
3. The original decision on this application was slated for December 22, when many of us are away or otherwise involved in either Christmas or Chanukah activities.

Third: Public Safety & Traffic:

1. Rio Wrangler Parkway is a one lane road from Western Skies Drive, at the South end of the Damonte Ranch high School Sports fields, all the way north, through the proposed new school project area, to its present terminus at the intersection with Mira Loma Road. Two existing four lane Parkways, Steamboat and Rio Wrangler, south of Western Skies feed into this constriction. An additional 6 one lane roads also feed into this

- constricted section of Rio Wrangler, carrying commuters, students, parents, from several local neighborhoods and semis filled with rock, dirt and gravel from the, nearby, open pit Rhyolite Mine throughout the day.
2. For the reasons described above the Level of Service (LOS) here is already rated and “F” at several times of the morning and afternoon all week long.
 3. The RTC safety study data is out of date and does not include up to date crash data from the Reno Police Department for the surrounding relevant high school, and other public elementary and intermediate school commuting traffic area.
 4. It is clear, from the Staff and Rodgers and Wood responses to community concerns, that this project is not considered a neighborhood school. They state openly that the students and vehicle trips will be coming from elsewhere. They grossly misstate the number of vehicular trips their project will generate daily. They claim 700 trips daily. We know that any school generates at least triple this number with extracurricular activities throughout the week. Thus the actual number will be in the range of 2,000 daily trips .
 5. Four Lanes Required. To accommodate this level of added activity as well as for the as yet un-acknowledged hundreds of additional homes already permitted for the Dolan properties and Cyan 2 and Buena Vista 2, east and north of the Golden Hills Community, Rio Wrangler needs to be expanded to four lanes NOW, rather at some undetermined point in the future. This needs to include proper traffic control signals and signage at Steamboat Parkway and from Western Skies to Steamboat Parkway. Sooner rather than later, the Bridge from Mira Loma to South Meadows Parkway will need to be completed.
 6. Until the 4 lane segment of Rio Wrangler from Western Skies to Steamboat Parkway is completed there will be severely restricted emergency vehicle access to the Golden Hills Community throughout the week.

In Summary: This proposed school is a dangerous idea for this location without expensive and lengthy infrastructure development along Rio Wrangler Parkway. The flimsy mitigation measures proposed by Staff and Rodgers & Woods are simply inadequate to even accommodate the needs of the existing communities and traffic let alone future development.

Please decline to allow this project.

Regards,

Coulter and Elizabeth Stewart

Barrel Racer Dr. Reno, NV

Jeff Foster

From: City of Reno <reno@enotify.visioninternet.com>
Sent: Thursday, December 21, 2023 2:03 PM
To: Jeff Foster
Subject: LifeChurch change in zoning for proposed primary school

Message submitted from the <City of Reno> website.

Site Visitor Name: Peggy Spence
Site Visitor Email: survivingreno@gmail.com

These are my concerns:

- Damonte Ranch HS was here prior to the housing development. It was a known factor when purchasing property here.
- High school services all 9th through 12th graders in the greater neighborhood.
- The property on the corner of McCauley Ranch and Rio Wrangler Parkway was originally zoned as residential. Never intended for business use with the expectation of traffic flow with this narrow corridor.
- The church was built after the housing development.
- The church traffic impacts the neighborhood on the weekends and with occasional special events.
- The addition of the daycare is a business. The traffic to the daycare impacts the commute traffic from the neighborhood during the weekday mornings.
- The proposed primary school is also a business.
- The students at the proposed private school will have to arrive by private vehicle. This will have a significant impact to traffic at similar hours to the high school and commute traffic from the neighborhood.
- The proposed school will inevitably host after hours events for their school community, which would add additional impact to the neighbor.
- The main street servicing the existing church property, Rio Wrangler Parkway, is only one lane each way.
- The street to the north of the church property, Yee Haw Way, is a very narrow street with lots of traffic in the morning.
- The street to the south of the church, McCauley Ranch Road, already has a high volume of traffic from the high school and commuters exiting the existing neighborhood.
- The need to access the proposed school property will require left hand turns that will further negatively impact the existing traffic in the area.
- We have a convalescent care facility on the corner of Trail Rider Drive and Gold Mine Drive. Emergency care vehicles would be severely challenged to reach the person in need.
- These same issues that prohibited the zoning of Doral Academy on Desert Way.

December 21, 2023

Dear Jeff Foster,

I am writing in regard to the proposed addition of a primary school at the LifeChurch property on Rio Wrangler Parkway. First of all, one public notice sign was posted on McCauley Ranch Road the beginning of December. The second public notice sign on Rio Wrangler Parkway was only posted the week of December 18th. Many of the neighbors in the were unaware of the proposed project. Between the lack of notice posted and the impending holidays, you may not receive feedback from the people of the neighborhood who will be impacted by this proposed change.

These are my concerns:

- Damonte Ranch HS was here prior to the housing development. It was a known factor when purchasing property here.
- High school services all 9th through 12th graders in the greater neighborhood.
- The property on the corner of McCauley Ranch and Rio Wrangler Parkway was originally zoned as residential. Never intended for business use with the expectation of traffic flow with this narrow corridor.
- This property was donated to the church by the original owner.
- The church was built after the housing development. The homeowners were not aware there would be a change in zoning that would permit this.
- The church traffic impacts the neighborhood on the weekends and with occasional special events.
- The addition of the daycare is a business. The traffic to the daycare impacts the commute traffic from the neighborhood during the weekday mornings.
- The proposed primary school is also a business. They will service students who have the ability to pay tuition and pass their registration requirements. It is not a neighborhood learning facility.
- The students at the proposed private school will have to arrive by private vehicle. There will be no bus service for private school students. This will have a significant impact to traffic at similar hours to the high school and commute traffic from the neighborhood.
- The proposed school will inevitably host after hours events for their school community, which would add additional impact to the neighbor.
- We are already impacted by the traffic from the existing evening events at the high school.
- The main street servicing the existing church property, Rio Wrangler Parkway, is only one lane each way.
- The street to the north of the church property, Yee Haw Way, is a very narrow street with lots of traffic in the morning.
- The street to the south of the church, McCauley Ranch Road, already has a high volume of traffic from the high school and commuters exiting the existing neighborhood.
- The need to access the proposed school property will require left hand turns that will further negatively impact the existing traffic in the area.

- We also have a convalescent care facility on the corner of Trail Rider Drive and Gold Mine Drive. Emergency care vehicles would be severely challenged to reach the person in need with the additional traffic created by the proposed school.
- The same issues that prohibited the zoning of the proposed Doral Academy on Desert Way are the same issues that this proposed primary school would create.

I did see that there was a tripod set up this Wednesday (12/20) on Rio Wrangler Parkway with a device to record the traffic patterns on Rio Wrangler Parkway. However, this is finals week at the high school and the traffic to school is dramatically reduced during the finals. This would not provide you with an actual vision of the traffic in this area during the regular school session.

I hope the City of Reno will be more reflective of the negative impact this proposed change in zoning will have on the neighbors in the Damonte Ranch Highlands development.

Sincerely,



Peggy Spence

10104 Gold Mine Dr
Reno, NV. 89521
775-851-7563
survivingreno@gmail.com

Jeff Foster

From: Jeff Foster
Sent: Monday, December 11, 2023 1:49 PM
To: Todd Landry; David Hutchinson
Subject: FW: MUP24-00012 (Life Church Primary School)

Follow Up Flag: Follow up
Flag Status: Flagged

More traffic/parking-specific concerns.



Jeffrey A. Foster

Associate Planner
Development Services Department
775.393.4165 (o) or 775.399.5153 (c)
fosterj@reno.gov
1 E. First St., Reno, NV 89505

Reno.Gov

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

From: Peter Dube <pete@thedubegroup.com>
Sent: Monday, December 11, 2023 1:28 PM
To: Jeff Foster <FosterJ@reno.gov>
Subject: RE: MUP24-00012 (Life Church Primary School)

Thanks for your comments and explanation. I shared this information on NextDoor as this proposed expansion has triggered over 100 comments last time I checked, mostly related to anger at the explosive growth and increased traffic related to apartment complexes.

For me personally, I have communicated my concerns to the City for years over increased traffic loads on Desert Way. Two tight turns (Yee Haw and Trail Rider) – it is only time before an emergency traps people. I complained when the entirety of Desert Way wasn't painted red (no parking) but when I called Planning, I was told the width of the street allowed parking on one side. Thankfully, the Church has recognized the danger and actually erects pylons along my frontage, which does make a difference. The City needs to ban street parking along the entirety of Desert Way (and Yee Haw) as part of the approval process.

Anyway, thanks again.

Dubé Group Architecture

PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001

*****Please note new mailing address*****

From: Jeff Foster [<mailto:FosterJ@reno.gov>]
Sent: Monday, December 11, 2023 8:44 AM
To: Peter Dube <pete@thedubegroup.com>
Subject: RE: MUP24-00012 (Life Church Primary School)

Peter,

Thank you for your emails. Correct, the school was not part of the 2015 approval. The Title 18 zoning code allowable process for this proposed use is a Minor Conditional Use Permit (MUP). According to Table 18.03.206, "School, Primary" is permitted in the SF-3 zoning district with approval of a MUP. In addition, the project triggers a Site Plan Review for development of a primary school adjacent to residentially zoned property (RMC 18.08.602(b)(2)(d)). Both applications can be combined in a MUP, so that is the current application. The previous SUP approval will be amended to reflect the change in direction such that one or both previously approved but unbuilt components may be removed from the approval.

Please let me know if you have any further questions.

I will flag your communication to send a copy of the decision letter.



Jeffrey A. Foster

Associate Planner
Development Services Department
775.393.4165 (o) or 775.399.5153 (c)
fosterj@reno.gov
1 E. First St., Reno, NV 89505

Reno.Gov

Please be advised that my working hours are as follows:
Mon-Fri - 8:00 am to 4:30 pm

From: Peter Dube <pete@thedubegroup.com>
Sent: Sunday, December 10, 2023 7:43 AM
To: Jeff Foster <FosterJ@reno.gov>
Subject: RE: MUP24-00012 (Life Church Primary School)

Hi Jeff, I found the application online so understand the scope. My concern is how they get to vary from the SUP which doesn't mentions schools...

Dubé Group Architecture

PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001

c | 775.315.9014

*****Please note new mailing address*****

From: Peter Dube
Sent: Sunday, December 10, 2023 7:27 AM
To: 'fosterj@reno.gov' <fosterj@reno.gov>
Subject: MUP24-00012 (Life Church Primary School)

Good morning. I own the two parcels totaling +/- 5 acres immediately to the north of Life Church. I reviewed the approved special use permit from 2015 and a primary school (44,351) was not approved in the SUP – why are they allowed to construct such a large structure without going through SUP process again? Could you provide a site plan so we can more fully understand its impact on surrounding residential uses?

I would also like to receive a copy of the decision letter.

Thanks!

Dubé Group Architecture

PO Box 18724 | Reno, NV 89511

e | pete@thedubegroup.com
o | 775.323.1001
c | 775.315.9014

*****Please note new mailing address*****

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PAYMENT DATE

03/25/2024

COLLECTION STATION

7933 - Front Desk 2

RECEIVED FROMAPPEAL FEE -WASHOE
COUNTY SCHOOL DISTRICT**DESCRIPTION**

MUP24-00012

City of Reno
1 East First Street
Reno, NV 89501**BATCH NO.**

2024-00003737

RECEIPT NO.

2024-00200714

CASHIER

Roman, Lorena

PAID
MAR 25 2024
CITY OF RENO

PAYMENT CODE	RECEIPT DESCRIPTION	TRANSACTION AMOUNT																
6901	Copies/Miscellaneous 00100-0000-5780-1099 Other income \$100.00	\$100.00																
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Page 1 of 1

03/25/2024 12:03:52 AM

