STAFF REPORT

Report To: Board of Supervisors **Meeting Date:** July 6, 2017

Staff Contact: Susan Pansky, Special Projects Planner

Agenda Title: For Possible Action: To approve a Tentative Subdivision Map request from G&E Investments, LLC (property owners: Gordon Street, LLC and G&E Investments, LLC) for 16 single family attached residential units in a Common Open Space Development on property zoned Multi-Family Apartment (MFA) within the Brown Street Specific Plan Area (BS-SPA), located at 1709, 1725, 1759 and 1809 N. Edmonds Drive, APNs 008-306-09, -11, -15, and -16. (TSM-17-052) (Susan Pansky, spansky@carson.org)

Staff Summary: The applicant proposes to create 16 single-family attached residential units on approximately 1.37 acres between Edmonds Drive and Fairview Drive within the Brown Street Specific Plan Area (BS-SPA). This subdivision is proposed as a Common Open Space Development in compliance with Carson City Municipal Code, Section 17.10 with a minimum lot size of 2,877 square feet and an average lot size of 3,706 square feet. Each parcel will be served by private shared driveways with access from Edmonds Drive and will contain private open space proposed to be owned and maintained by each individual homeowner.

Agenda Action: Formal Action/Motion **Time Requested:** 30 minutes

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Proposed Motion

I move to approve TSM-17-052, a Tentative Subdivision Map request from G&E Investments, LLC (property owners: Gordon Street, LLC and G&E Investments, LLC) for 16 single family attached residential units in a Common Open Space Development on property zoned Multi-Family Apartment within the Brown Street Specific Plan Area, located at 1709, 1725, 1759 and 1809 N. Edmonds Drive, APNs 008-306-09, -11, -15, and -16 based on the findings and subject to the conditions of approval in the staff report.

Board's Strategic Goal

Economic Development

Previous Action

The Planning Commission recommended approval of the proposed Tentative Subdivision Map at their meeting on May 31, 2017 by a vote of 5 ayes and 0 nays with 1 absent.

Background/Issues & Analysis

The Planning Commission found that the proposed Tentative Subdivision Map meets the required findings pursuant to the Carson City Municipal Code. Please see the attached staff report to the Planning Commission for further explanation.

Attachments:

1) Planning Commission Staff Report
2) Tentative Map Application (TSM-17-052)

Applicable Statute, Code, Policy, Rule or Regulation

CCMC 17.05 (Tentative Maps), CCMC 17.07 (Findings) and CCMC 17.10 (Common Open Space Development)

Financial Information

Is there a fiscal impact? ☐ Yes ☒ No

If yes, account name/number:

Is it currently budgeted? ☐ Yes ☐ No

Explanation of Fiscal Impact:

Alternatives

1) Modify the recommended conditions of approval for the request.
2) Deny the application.
3) Refer the application back to the Planning Commission for further consideration.

Board Action Taken:

Motion: _____ 1) _____ Aye/Nay

2) _____ _____

_____

_____

_____

_____

_____

(Vote Recorded By)

STAFF REPORT FOR THE PLANNING COMMISSION MEETING OF MAY 31, 2017

FILE NO: TSM-17-052 **AGENDA ITEM: H-1**

STAFF AUTHOR: Susan Pansky, AICP
Special Projects Planner

REQUEST: To make a recommendation to the Board of Supervisors regarding a Tentative Subdivision Map request from G&E Investments LLC (property owners: Gordon Street LLC & G&E Investments LLC) to approve a Tentative Subdivision Map for 16 single family attached residential units in a Common Open Space Development, on property zoned Multi-Family Apartment (MFA) within the Brown Street Specific Plan Area (BS-SPA), located at 1709, 1725, 1759 & 1809 N. Edmonds Drive, APNs 008-306-09, -11, -15, & -16.

APPLICANT: G&E Investments LLC

OWNER: Gordon Street LLC & G&E Investments LLC

LOCATION: 1709, 1725, 1759 & 1809 N. Edmonds Drive

APN(s): 008-306-09, -11, -15, & -16

RECOMMENDED MOTION: "I move to recommend approval of TSM-17-052, a Tentative Subdivision Map consisting of 16 single family attached residential units in a Common Open Space Development, on property zoned Multi-Family Apartment within the Brown Street Specific Plan Area, located at 1709, 1725, 1759 & 1809 North Edmonds Drive, APNs 008-306-09, -11, -15, & -16, based on the findings and subject to the recommended conditions of approval in the staff report."

RECOMMENDED CONDITIONS OF APPROVAL:

1. The applicant shall sign and return the Notice of Decision including conditions of approval within 10 days of receipt of notification. If the Notice of Decision is not signed and returned within 10 days, the item may be rescheduled for the next Planning Commission meeting for further consideration.

2. The approval of this Tentative Map without a variance to relieve the applicant of the common open space requirement in the Carson City Development Standards, Division 1.17 shall not be valid until the Zoning Code Amendment (ZCA-17-024) has been approved by the Board of Supervisors providing an exemption for single family uses in the Multi-Family Apartment (MFA) zoning district.

3. All lot areas and lot widths shall meet the zoning requirements approved as part of this Tentative Map with the submittal of any parcel map or final map.

4. Buildings shall be painted earth-tone or subtle colors, with the exception of trim. The applicant shall provide color samples to the Planning Division for review and approval.

5. Different materials shall be provided on the front façades of the buildings that face North Edmonds Drive and Fairview Drive. The applicant shall provide material samples to the Planning Division for review and approval.

6. Additional architectural detail, such as shutters, stone accents or similar, shall be provided on the North Edmonds Drive and Fairview Drive elevations to enhance these “front” façades to the satisfaction of Planning Division staff.

7. Landscaping plans in compliance with Carson City Development Standards, Division 3 are required. These plans shall incorporate appropriate trees spaced along the street frontages at a minimum of 40-foot intervals.

8. A private maintenance agreement for all shared aspects of the project including, but not limited to, access driveways and underground utilities, shall be provided for review and approval by the Planning and Engineering Divisions. This maintenance agreement shall be recorded prior to or in conjunction with the final map.

9. The development will be subject to the collection of Residential Construction Tax compliant with CCMC 15.60.

10. It will be the applicant’s responsibility to maintain all landscaping and irrigation systems within the public road right-of-ways/corridors, including the development’s common landscape, open space, natural and turf areas associated with the proposed development.

11. The applicant will be required to incorporate “best management practices” into their construction documents and specifications to reduce the spread of noxious weeds. The Parks Department is willing to assist the applicant with this aspect of their project.

12. The Unified Pathways Master Plan identifies Fairview Drive as a “shared street” bike facility.

13. Hours of construction will be limited to 7:00 a.m. to 7:00 p.m., Monday through Friday, and 7:00 a.m. to 5:00 p.m. on Saturday and Sunday. If the hours of construction are not adhered to, the Carson City Building Division will issue a warning for the first violation, and upon a second violation, will have the ability to cause work at the site to cease immediately.

14. Lots not planned for immediate development shall be left undisturbed and mass grading and clearing of natural vegetation shall not be allowed. Any and all grading shall comply with City standards. A grading permit from the Nevada Division of Environmental Protection shall be obtained prior to any grading. Noncompliance with this provision shall cause a cease and desist order to halt all grading work.

15. All construction and improvements must meet the requirements of Carson City Standard Details.

16. The applicant shall provide construction plans to the Engineering Division for approval of all required on-site and off-site improvements, prior to any submittals for approval of a final map.

17. Standards five foot sidewalks must be installed along the Fairview Drive frontage, per CCDS 11.12.081, and pedestrian access must be provided through the development to this sidewalk.

18. The site design must incorporate storm water detention, so that post development runoff will not exceed pre-development runoff leaving the site, per CCDS 14.4.1. Onsite drainage facilities must be labeled as private on the improvement plans, must be accessible for maintenance and must be privately maintained.

19. A final version of the geotechnical report must be provided with the application for site improvements, and the design requirements and recommendations of that report must be met.

20. Shared onsite sewer and/or water must be privately owned and maintained.

21. Access easements must be provided for shared driveways, and utility easements must be provided for shared private water and sewer lines.

22. All water meters must be located as close to the North Edmonds Drive right-of-way as possible.

23. The map needs to clearly allow utilities in the common area.

24. The project must comply with the 2012 IFC and northern Nevada fire code amendments.

25. The project will need to meet all applicable codes found in Title 12.06 and Appendix 18, Division 5 of the Carson City Municipal Code (CCMC) and all applicable codes found in the 2012 Uniform Plumbing Code (UPC).

26. The applicant shall obtain a dust control and stormwater pollution prevention permit from the Nevada Division of Environmental Protection (NDEP). The site grading must incorporate proper dust control and erosion control measures.

27. A "will serve" letter from the water and wastewater utilities shall be provided to the appropriate Nevada state agencies (Water Resources, NDEP) prior to approval of a final map.

28. A Final Map, prepared in substantial conformance with the Tentative Map, must be approved and recorded within four years after the approval of a Tentative Map unless a longer time is provided for in an approved development agreement with the City.

29. The following notes shall be added to the Final Map:

    A. These parcels are subject to Carson City's Growth Management Ordinance and all property owners shall comply with provisions of said ordinance.

    B. All development shall be in accordance with the North Edmonds Common Open Space Development Tentative Map (TSM-17-052).

    C. The parcels created with this Final Map are subject to the Residential Construction Tax payable at the issuance of Building Permits for residential units.

    D. Shared maintenance areas including, but not limited to, access driveways and underground utilities, are subject to a private maintenance agreement between the property owners recorded as Document No. _____.

30. A copy of the signed Notice of Decision shall be provided with the submission of any Final Map.

31. The applicant shall provide evidence to the Planning Division indicating the all agencies' concerns or requirements have been satisfied and that all conditions of approval have been met.

32. Prior to the recordation of the Final Map for any phase of the project, the improvements associated with said phase must either be constructed and approved by the City, or the specific performance of said work secured by providing the City with a proper surety in the amount of 150% of the engineer's estimate. In either case, upon acceptance of the improvements by the City, the developer shall provide the City with a proper surety in the amount of 10% of the engineer's estimate to secure the Developer's obligation to repair defects in workmanship and materials which may appear in the work within one year of acceptance by the City.

LEGAL REQUIREMENTS: NRS Chapter 278 (Planning and Zoning), CCMC Chapter 17.07 (Findings), CCMC Chapter 17.10 (Common Open Space Development), CCMC Section 18.04.105 (Multi-Family Apartment)

MASTER PLAN DESIGNATION: Mixed-Use Residential (MUR)

ZONING DISTRICT: Multi-Family Apartment within the Brown Street Specific Plan Area (MFA-SPA)

KEY ISSUES: Is the Tentative Map consistent with the Specific Plan? Does the proposal meet the Tentative Map requirements and other applicable requirements?

SURROUNDING ZONING AND LAND USE INFORMATION:

NORTH: General Commercial (GC)/Casino Use
SOUTH: Multi-Family Apartment in Brown Street Specific Plan Area (MFA-SPA)/Single Family Detached Residences
WEST: Multi-Family Apartment in Brown Street Specific Plan Area (MFA-SPA)/Apartments and Manufactured Homes
EAST: General Commercial – Planned Unit Development (GC-P) and Single Family 21,000 – Planned Unit Development (SF21-P)/Single Family Detached Residences

ENVIRONMENTAL INFORMATION:

FLOOD ZONE: Zone X (areas of minimal flooding)
SLOPE/DRAINAGE: The site is previously developed and relatively flat
SEISMIC ZONE: Zone II (Moderate) – Earthquake fault on site

SITE DEVELOPMENT INFORMATION:

SUBJECT SITE AREA:	1.37 acres
EXISTING LAND USE:	Single Family Detached Residential
TOTAL RESIDENTIAL LOTS:	16 Single Family Attached Residential Lots proposed
PROPOSED LOT SIZES:	2,877 to 4,637 square feet (average 3,706 square feet)
REQUIRED SETBACKS:	Front – 10 feet
	Side – 10 feet
	Street Side – 10 feet
	Rear – 20 feet
PARKING REQUIRED:	Two spaces per dwelling unit

SITE HISTORY:

- CSM-16-108 – Conceptual Subdivision Map review for 16 single family attached residential units

DISCUSSION:

On October 18, 2016, the applicant participated with City staff in a Conceptual Subdivision Map review (CPUD-16-108) for the proposed development per the subdivision process requirements of the Carson City Municipal Code (CCMC). The purpose of the Conceptual Subdivision review is for City staff to provide comments to the applicant regarding City requirements for the proposed subdivision.

The North Edmonds Conceptual Map proposal consists of four parcels with existing single family residences on 1.37 acres within the Brown Street Specific Plan Area, which the applicant proposes to demolish and then subdivide into 16 single family attached residential units with private open space only. The development is proposed as a Common Open Space Development under CCMC Chapter 17.10, which allows for variations in lot size from those typically required in the underlying zoning district. The lots range in size from 2,877 square feet to 4,637 square feet, with an average lot size of 3,706 square feet. The applicant proposes to construct two-story attached homes consisting of three bedrooms with home sizes between 1,516 and 1,633 square feet. Although the homes will be attached, each individual unit will have private front, rear and side (where applicable) yards. The lots are proposed to extend into shared driveway areas that will be maintained through a maintenance agreement among the future property owners.

The purpose of a Common Open Space Development as stated in CCMC Chapter 17.10 is to set forth regulations to permit variance of lot size, including density transfer (cluster) subdivisions, in order to preserve or provide open space, protect natural, cultural and scenic resources, achieve a more efficient use of land, minimize road building and encourage stable, cohesive neighborhoods offering a mix of housing types.

The minimum lot size in the Multi-Family Apartment (MFA) zoning district is 6,000 square feet but is generally intended for multi-family projects that consist of more than two units on a single lot. High density residential development is encouraged in the MFA district and is appropriate whether it is considered single family or multi-family. In the case of the proposed project, using the Common Open Space Development provisions allows for high density single family attached residential uses without being required to meet the minimum lot size of 6,000 square feet. Development within the MFA zoning district with a Common Open Space Development does not have a minimum lot area.

Common Open Space Developments require a minimum of 250 square feet of open space per unit, which can be considered public or private. With the North Edmonds project, an average of 1,225 square feet per unit may be counted as private open space per the requirements in CCMC Section 17.10.046(1) which allows private yards with no dimension less than 15 feet.

This project is located in the Brown Street Specific Plan Area and in the Multi-Family Apartment zoning district, under which additional standards and regulations apply as outlined below.

Brown Street Specific Plan Area

The Brown Street Specific Plan Area was created as a part of the Carson City Master Plan to encourage targeted infill and redevelopment within the Specific Plan Area that will promote stabilization, transition, compatibility and enhancement of the area. Development is encouraged to occur in a unified manner, where possible, and is required to meet certain standards. The standards that specifically apply to the North Edmonds project are listed below with responses to each.

BS-SPA 1.2—Development Context Diagram
Any infill or redevelopment proposed within the BS-SPA (whether on a single existing parcel or a larger parcel comprised of multiple lots) shall provide a Development Context Diagram to illustrate how the proposed development relates to adjacent uses in terms of its housing types, orientation, organization of uses (including parking), and how it relates in compatibility and transition to adjacent neighborhoods.

A Development Context Diagram was provided by the applicant as a part of the Tentative Map handbook included in the application (Page 13). This diagram demonstrates the compatibility of higher density attached housing with the surrounding commercial and multi-family uses, as well as an adequate transition from the more intense uses in the Brown Street area to the less intense existing single family detached uses.

BS-SPA 1.3—Variety of Housing Types
The incorporation of a broader variety of housing types is encouraged within the BS-SPA.

The addition of single family attached housing to the existing mix of multi-family and single family uses meets the goal to incorporate a broader variety of housing types.

BS-SPA 2.2—Pedestrian and Bicycle Connections
A system of pedestrian and bicycle connections shall be provided to establish visual and physical connections to and between the following:
any sidewalks, trails, or walkways on adjacent properties that extend to the boundaries shared within the development;
adjacent neighborhoods; and
existing bike path along Highway 50.

Sidewalks are proposed within the project area on both the North Edmonds Drive side and on the Fairview Drive side to improve pedestrian connectivity.

BS-SPA-2.3—Urban Roadway Standards
Existing streets shall be upgraded to meet Carson City standards for width and construction for an urban roadway section with on-street parking.

North Edmonds Drive will be upgraded to urban street standards, including sidewalks, on street parking and half street pavement improvements.

BS-SPA 3.1—Building Orientation
The primary entrance of all residential uses shall be oriented towards Edmonds or Brown Streets to maintain a pedestrian-oriented street frontage and to maintain the privacy and quality of life of existing residents within the BS-SPA.

The primary entrances of the end units have been oriented toward North Edmonds and Fairview Drives to meet this requirement. The primary entrances of the internal units and all of the garages are oriented toward the internal driveways, which also meets the requirement to maintain the privacy and quality of life for existing residents within the area.

BS-SPA 3.2—Relationship to Surrounding Development
To encourage a cohesive pattern of development and to enhance the compatibility of future infill and redevelopment with existing, adjacent residences, the following design standards shall apply:

- *Infill and redevelopment that is of a greater intensity and height shall provide a visual transition and compatibility by "stepping down" its height to meet the height of the existing use; and*
- *Proposed land uses shall be organized in a manner that is compatible with existing uses and should use less intense uses (in terms of height and mass) to provide a transition between "pods" of existing homes within the BS-SPA and future uses that may be of a higher intensity.*

The existing casino and apartment uses to the north and west are both three stories high. The buildings within the North Edmonds project are two stories, which provides an adequate transition to the existing single story homes to the south.

BS-SPA 3.3—Parking Location and Design
To minimize the visual presence of off-street parking within the BS-SPA, the following design standards shall apply:

- *To the extent feasible, surface parking required to serve higher-intensity residential uses should be located behind the primary structure, away from the street frontage;*
- *Larger lots shall be broken into a series of smaller blocks of parking areas not to exceed 20 spaces each;*

- *If site constraints or other factors warrant the location of parking along the street frontage, a landscape buffer and/or decorative wall shall be provided to screen parked cars from the sidewalk and street.*

The North Edmonds project has been designed to provide all parking facing internal access driveways to meet this requirement.

BS-SPA 3.4—Garage Placement and Design
The use of a variety of garage configurations (i.e., front-loaded (street-oriented) garages, side-loaded garages, or alley-loaded garages) shall be required to promote more pedestrian-friendly residential streetscapes. In addition, the following standards shall apply:

- *Front-loading garage doors shall be limited to 20 feet (2 bays) or 35% of the front façade of the dwelling structure, which ever is less.*
- *Front-loading garages shall be recessed a minimum of four feet behind the front façade of the dwelling portion of the structure, or a front porch that is a minimum of five feet deep by eight feet long, or recessed a minimum of two feet beneath the second floor bay.*

All garages for the project have been designed to face the internal access driveways, rather than the street frontages of either North Edmonds Drive or Fairview Drive. Each proposed garage is a two-bay garage.

BS-SPA 3.5—Varied Streetscapes
To promote more interesting streetscapes and offer consumers a wider choice of housing styles, a variety of home models shall be provided. For the purposes of satisfying the above standard, each home or building elevation shall distinctly differ from other home model elevations in a minimum of four of the following areas:

- *The placement of all windows and doors on the front façade elevation.*
- *The use of different materials on the front façade elevation.*
- *Substantial variation in the location and/or proportion of garages and garage doors.*
- *The width of the front façade elevation must differ more than two feet.*
- *Variation in the location and proportion of front porches.*
- *Substantial variations in roof-lines and/or in the angle of roof runs.*
- *Use of roof dormers.*
- *A variation of building types, i.e., ranch, two-story, and split level.*
- *Window shapes that are substantially different.*
- *Other distinct design variations approved by the City.*

A varied streetscape is provided through pedestrian orientation, placement of windows and doors on the front façade elevation, the use of different materials on the front façade elevation, variation in the location and proportion of front porches, substantial variation in roof lines, and the use of roof dormers.

BS-SPA-3.7—Street Trees
Street trees shall be provided along all public rights of way, spaced at 40' intervals. Provisions shall be made as part of any development for the private maintenance of any street frontage landscaping, right-of-way landscaping and common landscape areas.

Street trees have been proposed with the conceptual landscape plan and a condition is recommended to ensure that the placement of these trees meets this minimum spacing requirement.

Multi-Family Apartment Zoning District

All residential development within any Multi-Family Apartment zoning district is subject to the following standards regardless of whether the development is proposed for single family or multi-family residential uses.

The following standards are intended to establish minimum standards for residential development within the Multi-Family Apartment (MFA) zoning district.

i. Maximum permitted density:

a. For one-bedroom or studio units, one unit per 1,200 square feet of area.

b. For two or more bedroom units, one unit per 1,500 square feet of area.

Each unit in the North Edmonds project is three bedrooms and the density is one unit per 3,730 square feet of area.

ii. Maximum building height: 45 feet.

The proposed building height for the structures is approximately 30 feet.

iii. Setbacks:

a. Front yard: 10 feet, plus an additional 10 feet for each story above two stories; minimum driveway approach from property line to garage doors is 20 feet.

b. Side yard: 10 feet for external project boundaries, minimum 10 feet between residential structures for internal setbacks. Where a side yard is adjacent to a single-family zoning district, an additional 10 feet is required for each story above one story.

c. Street side yard: 10 feet, plus an additional 5 feet for each story above two stories; minimum driveway approach from property line to garage doors is 20 feet.

d. Rear yard: 20 feet. Where a rear yard is adjacent to a single-family zoning district, an additional 10 feet is required for each story above one story.

The proposed setbacks are in compliance with the setback requirements of this section. In the case of the side yards on attached structures, a setback of zero may be used provided that they are attached by a parapet firewall.

iv. Required parking: Two spaces per dwelling unit; and in compliance with the Development Standards Division 2, Parking and Loading.

Each unit has two parking spaces in compliance with the Development Standards.

v. Open Space:

a. A minimum of 150 square feet per dwelling unit of common open space must be provided. For projects of 10 or more units, areas of common open space may only include contiguous landscaped areas with no dimensions less than 15 feet, and a minimum of 100 square feet per unit of common open space area must be designed for recreation, which may include but not be limited to picnic areas, sports courts, a

softscape surface covered with turf, sand or similar materials acceptable for use by young children, including play equipment and trees, with no dimension less than 25 feet.

At the time of the Conceptual Subdivision Map review, staff informed the applicant that a variance would be necessary because of the requirement for common open space. After further review of this section, staff determined that common open space requirements should not be applicable when single family residential uses are proposed in the Multi-Family Apartment zoning district. As a result, a Zoning Code Amendment (ZCA-17-024) is currently being processed by staff to provide an exemption for single family residential uses. This amendment is expected to be approved by the Board of Supervisors in June or July 2017. In the meantime, staff has recommended a condition that the approval of the North Edmonds project will not be valid until the Zoning Code Amendment is approved.

b. *A minimum of 100 square feet of additional open space must be provided for each unit either as private open space or common open space.*

An average of 1,225 square feet of allowable private open space is included in the proposed development.

c. *Front and street side yard setback areas may not be included toward meeting the open space requirements.*

The project's private open space exceeds the minimum requirement without including the front and street side yard setback areas.

vi. *Landscaping. Landscaping shall comply with the Development Standards Division 3, Landscaping.*

The applicant has provided a conceptual landscape plan and will be required to develop landscaping in compliance with the Division 3 Development Standards.

FINDINGS:

Per CCMC Section 17.07.005 (Findings), approval or denial of a Tentative Subdivision Map shall be based on the specific findings outlined below.

1. *Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.*

Development proposed with this Tentative Map will be required to obtain a dust control and stormwater pollution prevention permit from the Nevada Division of Environmental Protection (NDEP), and the site grading must incorporate proper dust control and erosion control measures. The new lots will also be required to connect to the City water and sewer system.

2. *The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.*

The project will connect to the City water system, which has sufficient quantity for the foreseeable needs of the additional lots. Sufficient water resources are addressed

through the Growth Management building permit allocation system and other ongoing water management efforts.

3. *The availability and accessibility of utilities.*

   The new lots are within a previously developed area with all public utilities available for connection.

4. *The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.*

   The new lots are within a previously developed area with existing service from schools, police, transportation, recreation and parks.

5. *Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.*

   The project is not adjacent to public lands.

6. *Conformity with the zoning ordinance and land use element of the City's Master Plan.*

   The proposed development is consistent with the zoning ordinance and the land use element of the City's Master Plan.

7. *General conformity with the City's Master plan for streets and highways.*

   The proposed development meets the City's Master plan for streets and highways.

8. *The effect of the proposed subdivision on existing public streets and the need for new streets or highways to serve the subdivision.*

   As a requirement from the Brown Street Specific Plan Area, the project will upgrade the existing street frontage at North Edmonds Drive to serve the subdivision.

9. *The physical characteristics of the land such as flood plains, earthquake faults, slope and soil.*

   The project is located within close proximity of an earthquake fault. Conditions of approval have been recommended, where applicable, to address potential concerns related to this issue.

10. *The recommendations and comments of those entities reviewing the subdivision request pursuant to NRS 278.330 thru 278.348, inclusive.*

    The recommendations of reviewing departments and other entities have been incorporated into the conditions of approval for the proposed subdivision, as applicable.

11. *The availability and accessibility of fire protection including, but not limited to, the availability and accessibility of water and services for the prevention and containment of fires including fires in wild lands.*

    Fire protection for the proposed lots is available and accessible.

12. Recreation and trail easements.

The proposed project is in a small infill area surrounded by existing development. Recreation and trail easements are not proposed or required.

With the recommended conditions of approval, the findings to grant approval have been met by the applicant. Therefore, it is recommended that the Planning Commission approve application TSM-17-052 based on the required findings as noted above.

PUBLIC COMMENTS: Public notices were mailed on May 12, 2017 to 134 adjacent property owners within 600 feet of the subject site pursuant to the provisions of NRS and CCMC. As of the completion of this staff report, no comments have been received regarding the proposed project. Any written comments that are received after this report is completed will be submitted prior to or at the Planning Commission meeting on May 31, 2017 depending on their submittal date to the Planning Division.

OTHER CITY DEPARTMENT OR OUTSIDE AGENCY COMMENTS: Comments were received from various city departments and are outlined below. Recommendations have been incorporated into the recommended conditions of approval, where applicable.

Engineering Division:

1. All construction and improvements must meet the requirements of Carson City Standard Details.

2. Standard 5 foot sidewalk must be installed along the Fairview Drive frontage, per CCDS 11.12.081, and pedestrian access must be provided through the development to this sidewalk.

3. The N Edmonds Drive street section along the frontage must be upgraded to the standard roadway section for urban streets with on street parking and 5 foot sidewalks (CCPW Standard Detail #C-5.1.9), per the Specific Plan Area requirements. This requirement includes repaving half of the street along the property frontage.

4. The site design must incorporate storm water detention, so that post development runoff will not exceed pre-development runoff leaving the site, per CCDS 14.4.1. Onsite drainage facilities must be labeled as private on the improvement plans, must be accessible for maintenance, and must be privately maintained.

5. A final version of the geotechnical report must be provided with the application for site improvements, and the design requirements and recommendations of that report must be met.

6. Shared onsite sewer and/or water must be privately owned and maintained.

7. Access easements must be provided for shared driveways, and utility easements must be provided for shared private water and sewer lines.

8. All water meters must be located as close to the N Edmonds right-of-way as possible.

Building Division:

1. The map needs to clearly allow utilities in the common area.

Fire Department:

1. The project must comply with the 2012 IFC and northern Nevada fire code amendments.

Parks, Recreation and Open Space:

1. The development will be subject to the collection of Residential Construction Tax compliant with CCMC 15.60.

2. It will be the applicant's responsibility to maintain all landscaping and irrigation systems within the public road right-of-ways/corridors, including the development's common landscape, open space, natural, and turf areas associated with the proposed development.

3. The applicant will be required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. Our department is willing to assist the applicant with this aspect of their project.

4. The Unified Pathways Master Plan identifies Fairview Drive as a "shared street" bike facility.

School District:

No comments.

Environmental Control Division:

1. The project will need to meet all applicable codes found in Title 12.06 and Appendix 18 Division 15.5 of the Carson City Municipal Code (CCMC) and all applicable codes found in the 2012 Uniform Plumbing Code (UPC).

Health and Human Services:

No comments received.

Attachments

Aerial Photo
City Comments
Application (TSM-17-052)

North Edmonds Common Open Space Development — Subject Parcels

Engineering Division
Planning Commission Report
File Number TPUD-17-052

TO: Hope Sullivan - Planning Department

FROM Stephen Pottéy – Development Engineering Department

DATE: May 16, 2017 **MEETING DATE:** May 31, 2017

SUBJECT TITLE:

Action to consider an application for Tentative Subdivision Map for 16 Siungle Family Attached residential units in a Common Open Space Development, apn's 008-306-09, -11, -15 and -16.

RECOMMENDATION:

The Engineering Division has no preference or objection to the special use request.

CONDITIONS OF APPROVAL:

The Engineering Division has reviewed the application within our areas of purview relative to adopted standards and practices and to the provisions of CCMC 17.07.005. The Engineering Division offers the following condition of approval:

- All construction and improvements must meet the requirements of Carson City Standard Details.
- Standard 5 foot sidewalk must be installed along the Fairview Drive frontage, per CCDS 11.12.081, and pedestrian access must be provided through the development to this sidewalk.
- The N Edmonds Drive street section along the frontage must be upgraded to the standard roadway section for urban streets with on street parking and 5 foot sidewalks (CCPW Standard Detail #C-5.1.9), per the Specific Plan Area requirements. This requirement includes repaving half of the street along the property frontage.
- The site design must incorporate storm water detention, so that post development runoff will not exceed pre-development runoff leaving the site, per CCDS 14.4.1. Onsite drainage facilities must be labeled as private on the improvement plans, must be accessible for maintenance, and must be privately maintained.
- A final version of the geotechnical report must be provided with the application for site improvements, and the design requirements and recommendations of that report must be met.
- Shared onsite sewer and/or water must be privately owned and maintained.
- Access easements must be provided for shared driveways, and utility easements must be provided for shared private water and sewer lines.
- All water meters must be located as close to the N Edmonds right-of-way as possible.

TSM-17-052 Eng

FINDINGS:

The following Tentative Map Findings by the Engineering Division are based on approval of the above conditions of approval:

1. *Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.*
   The existing infrastructure has been found sufficient to supply the water and sanitary sewer needs of the subdivision, and the City has the capacity to meet the water and sewer demand.

2. *The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.*
   The City has sufficient capacity to meet the water demand of the subdivision.

3. *The availability and accessibility of utilities.*
   Water and sanitary sewer utilities are available and accessible.

4. *The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.*
   The road network necessary for the subdivision is available and accessible.

5. *Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.*
   Development engineering has no comment on this finding.

6. *Conformity with the zoning ordinance and land use element of the city's master plan.*
   Development engineering has no comment on this finding.

7. *General conformity with the city's master plan for streets and highways.*
   The development is in conformance with the city’s master plan for streets and highways.

8. *The effect of the proposed subdivision on existing public streets and the need for new streets or highways to serve the subdivision*.
   The existing infrastructure is sufficient to meet the additional demand imposed by the subdivision.

9. *The physical characteristics of the land such as flood plains, earthquake faults, slope and soil.*
   The site is near an active earthquake fault; recommendations of a final geotechnical report must be met.

10. *The recommendations and comments of those entities reviewing the subdivision request pursuant to NRS 278.330 thru 278.348, inclusive.*
    Development engineering has no comment on this finding.

11. *The availability and accessibility of fire protection including, but not limited to, the availability and accessibility of water and services for the prevention and containment of fires including fires in wild lands.*
    The subdivision has sufficient secondary access, and sufficient fire water flows.

12. *Recreation and trail easements*.
    Development engineering has no comment on this finding.

These comments are based on the tentative map plans and reports submitted. All applicable code requirements will apply whether mentioned in this letter or not.

Susan Dorr Pansky

From: Charlene Gaworski
Sent: Friday, May 19, 2017 10:29 AM
To: Susan Dorr Pansky
Subject: RE: TSM-17-052 - North Edmonds

Susan,

If these are detached structures I have no comment, if attached the map needs to clearly allow the utilities in the common area.

Thanks
Charlene

From: Susan Dorr Pansky
Sent: Thursday, May 18, 2017 3:14 PM
To: Charlene Gaworski; Dave Ruben; Mark Irwin; Dustin Boothe
Subject: TSM-17-052 - North Edmonds

If you plan to provide comments for TSM-17-052, the North Edmonds Common Open Space Tentative Map, please send them to me no later than tomorrow by the end of the day. Thank you!

Susan Pansky, AICP
Special Projects Planner
Carson City Community Development, Planning Division
108 E. Proctor Street
Carson City, NV 89701
Phone: 775.283.7076
Fax: 775.887.2278
spansky@carson.org
www.carson.org/planning

Susan Dorr Pansky

From: Dave Ruben
Sent: Friday, May 19, 2017 9:51 AM
To: Susan Dorr Pansky
Cc: Hope Sullivan
Subject: RE: TSM-17-052 - North Edmonds

Comments for TSM 17-052:

1. Project must comply with the 2012 IFC and northern Nevada fire code amendments as adopted by Carson City.

From: Susan Dorr Pansky
Sent: Thursday, May 18, 2017 3:14 PM
To: Charlene Gaworski; Dave Ruben; Mark Irwin; Dustin Boothe
Subject: TSM-17-052 - North Edmonds

If you plan to provide comments for TSM-17-052, the North Edmonds Common Open Space Tentative Map, please send them to me no later than tomorrow by the end of the day. Thank you!

Susan Pansky, AICP
Special Projects Planner
Carson City Community Development, Planning Division
108 E. Proctor Street
Carson City, NV 89701
Phone: 775.283.7076
Fax: 775.887.2278
spansky@carson.org
www.carson.org/planning

May 10, 2017

TSM-17-052

Parks

1) The development will be subject to the collection of Residential Construction Tax compliant with CCMC 15.60.
2) It will be the applicant's responsibility to maintain all landscaping and irrigation systems within the public road right-of-ways/corridors, including the development's common landscape, open space, natural, and turf areas associated with the proposed development.
3) The applicant will be required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. Our department is willing to assist the applicant with this aspect of their project.
4) The Unified Pathways Master Plan identifies Fairview Drive as a "shared street" bike facility.

Thank you,

Vern & Patti

Patti Liebespeck
Office Specialist
Carson City Parks, Recreation & Open Space
3303 Butti Way, Bldg 9
Carson City, NV 89701
Phn: (775) 887-2262 x 7342

Fax: (775) 887-2145

pliebespeck@carson.org

www.carson.org

May 19, 2017

Major Project Review Committee

Re: # TSM 17-052

Greetings,

After initial plan review the Carson City Environmental Control Authority (ECA), a Division of Carson City Public Works Department (CCPW), has the following requirements per the Carson City Municipal Code (CCMC) and the Uniform Plumbing Code (UPC) for the TSM 17-052 project:

1. Project will need to meet all applicable codes found in Title 12.06 and Appendix 18 Division 15.5 of the Carson City Municipal Code (CCMC) and all applicable codes found in the 2012 Uniform Plumbing Code (UPC).

Please notify Mark Irwin if you have any questions regarding these comments, I can be reached at 775-283-7380.

Sincerely;

Mark Irwin
Senior Environmental Control Officer

c: Kelly Hale, Environmental Control Foreman

NORTH EDMONDS

Tentative Subdivision Map

April 2017

Prepared For:

G&E Investments

PO Box 2826 Minden, NV 89410

Prepared By:

Manhard CONSULTING

3476 Executive Pointe Way, Suite 12
Carson City NV 89706

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LIST OF FIGURES

APPENDICES

PROJECT LOCATION

The project site (APNs 008-306-09, -11, -15, -16) is 1.37 acres and is located between North Edmonds Drive and Fairview Drive, just south of Gordon Street. The site is surrounded on the west and south by multi-family residential, single family residential, and General Commercial (Silver Dollar Casino). There are single family residences to the east. The four parcels are bound to the north by business development, to the south by and existing residence, to the east by Fairview Drive, and to the west by North Edmonds Drive. It is approximately .17 miles south of US Highway 50.

Figure 1: Project Location

EXISTING SITE CONDITIONS

The four existing parcels are each developed with one single family housing unit. The northernmost parcel is occupied by a small daycare center and the three southern parcels are occupied by single family residences. Each residential parcel is fully fenced. Vegetation consists of sparse landscape trees, weeds, and grass. Site topography is gently sloping to the northeast over the majority of the parcels. The site is currently drained via sheet flow which directs some of the flows to existing onsite swales. Gas, water, and sewer utilities run parallel to the east side of North Fairview Drive. A shallow swale runs parallel to North Edmonds Drive.

EXISTING MASTER PLAN AND ZONING DESIGNATIONS

All four parcels have a Master Plan designation of Mixed-Use Residential and a zoning designation of Multi-Family Apartments (MFA)/BS-SPA and are located within the Brown Street Specific Plan Area.

Figure 2: Existing Master Plan Designation

Figure 3: Existing Zoning Designation

SURROUNDING PROPERTIES

The surrounding property designations are as follows:

Figure 4: Surrounding Property Designations

Direction	Current Zoning	Master Plan Zoning	Current Land Use
North	General Commercial	Mixed-Use Commercial	General Commercial
South	MFA/BS-SPA	Mixed-Use Residential	Single Family Residential
East	SF21-P	Low Density Residential	Single Family Residential
West	MFA/BS-SPA	Mixed-Use Residential	Multi-family Residential

APPLICATION REQUEST

The enclosed application is a request for:

1. **A Tentative Subdivision Map to create a single family subdivision consisting of 16 single family attached residential units. The TSM is presented as a Common Open Space Development and meets the established requirement of Chapter 17.10 Common Open Space Development.**

PROJECT DESCRIPTION

North Edmonds is proposed to be a single family attached subdivision comprised of 16 residential units, each on a separate parcel. The project is presented as a Common Open Space Development, pursuant to Chapter 17.10 Common Open Space Development in the Carson City Municipal Code. The parcels will be accessed from North Edmonds Drive onto shared driveways. Each building will contain four units, with each unit being separated by a fire wall. The units each have three bedrooms, two-and-a-half baths, a two-car garage, a deck; they range from 1524 to 1630 square feet and have an average of 1579 square feet of private open space.

The primary entrances of the buildings are oriented towards North Edmonds Drive to maintain a pedestrian-oriented street frontage and to maintain the privacy and quality of life of existing residents. The North Edmonds Drive street section along the frontage will be upgraded to the standard roadway section for urban streets with on-street parking and five-foot wide sidewalks. A five-foot sidewalk will be installed along the Fairview Drive frontage. A standard six-foot dog-ear fence will be installed along the Fairview Drive frontage.

Landscape and Open Space

A conceptual level Landscape Plan is provided as part of the Tentative Map. A reduced copy (11”x17”) is included in Appendix D. Division 3, Landscaping, includes landscape standards for multi-family residential with 3 or more units. A Landscape Plan is not required for a single family subdivision, however, a conceptual Landscape Plan is provided as part of this Tentative Map application. It has been designed to improve the aesthetic appearance of the development and will enhance the appearance of the street, complement the buildings, and aid in the enhancement of property values. The Landscape Plan complies with applicable Carson City Landscaping standards. The homes will be developed with front yard and rear yard landscaping, including the frontage along North Edmonds Drive. The existing trees on site will be removed to accommodate the proposed development.

Figure 5: Preliminary Landscape Plan (Typical Building Unit) (11" x 17" copy in Appendix D)

Pursuant to CCMC Section 17.10.046, a minimum of 250 square feet of open space per dwelling unit is required to be provided as open space (includes private open space). The average open space provided is 1,579 square feet per lot. The shared driveway area is also private open space (see Preliminary Site Plan) but is not included in the open space calculations. A total of 25,266 square feet of private open space is included in the Site Plan; 42% of the project site.

Figure 6: Preliminary Site Plan

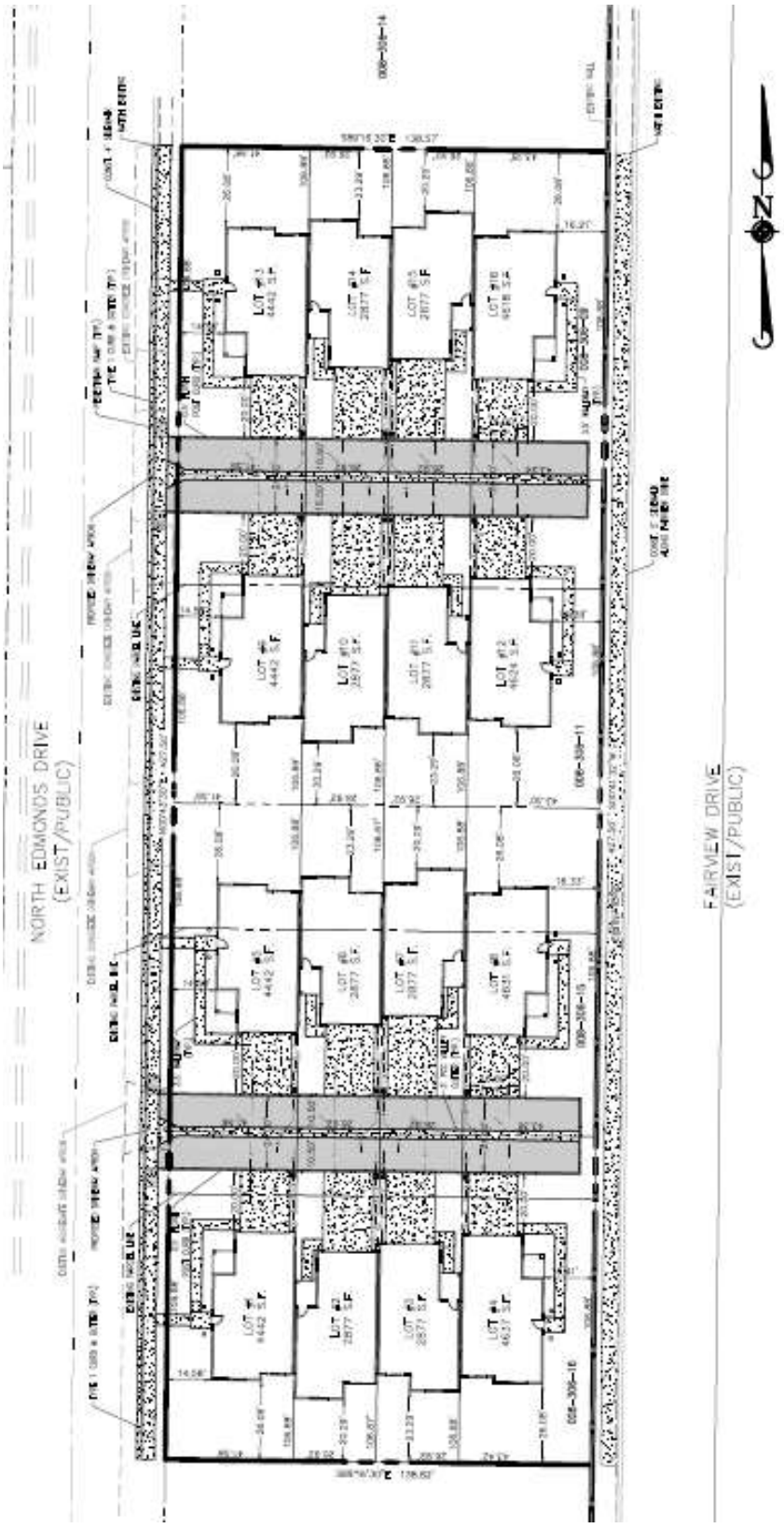


Figure 7: Preliminary Floor Plans

Building Elevations

The building façade will be a mix of vertical and horizontal siding and wood shake, painted in a complementary color scheme. The garage doors will be carriage-style aluminum. Brick veneer will be installed around the columns to provide architectural detail. The roof will be asphalt shingle. There will be a metal railing around the balconies. The building height is 30 feet, 2 inches.

Figure 8: Preliminary Elevations


Manhard
CONSULTING LTD
A5


Manhard
CONSULTING LTD
A4

Shared Elements

As shown on the Site Plan, there are several elements that are shared among the property owners, including the shared driveway, exterior of the building, fencing, and drainage. These shared elements will require a Maintenance Agreement to be executed among the property owners, which will provide details for maintenance and repair of these elements.

Water

Carson City currently provides water service to the property. It maintains the Quill Water Treatment Plan and wells to ensure efficient operations and an adequate supply of water throughout the City. Carson City Public Works staff monitors, regulates flows, samples, and maintains the surface water flows and groundwater wells to maximize the conjunctive use of the City's variety of sources. The proposed 16 units will connect to the existing Carson City 8" water main that is currently available at two locations in North Edmonds Drive. Details are included in the Utility Plan.

Solid Waste

Waste Management currently provides solid waste service and curbside recycling to the site. Carson City provides landfill, recycling, and hazardous waste services

Sewage

Carson City operates and maintains the City's sewer collection system and provides service to the site. This includes preventive and emergency maintenance, line replacement, line extensions and connection, development permitting and inspections. The proposed 16 new units would connect to the City sewer system that is currently available on North Edmonds Drive. Details are included in the Utility Plan.

BROWN STREET SPECIFIC PLAN REVIEW

As required by the Brown Street Specific Plan, the Development Context Diagram (Figure 9) illustrates how the project relates to adjacent uses in terms of housing types, orientation, organization of uses (including parking) and how it relates in compatibility and transition to adjacent neighborhoods.

Development Context Diagram

The Diagram shows how the proposed single family attached homes will provide an efficient use of land area and an appropriate housing density for the site. The project area provides for a range in housing density in the Brown Street Specific Plan area. The project provides a transition in density between the multi-family units to the west and the single-family neighborhoods to the east and south. In addition to the transition in density, the proposed higher density single family residential use is more compatible with the commercial use to the north and will be buffered by landscaped yards and the existing parking lot in the commercial area. The shared driveways provide for four parking spaces per unit (2 garage spaces and 2 driveway spaces) which will provide ample off-street parking.

Figure 9: Development Context Diagram

SITE ANALYSIS TO DETERMINE COMMON OPEN SPACE AND LOT SIZE VARIATION

The Carson City Municipal Code, Section 17.10.036, requires a site analysis to include information and maps, describing all significant physical and contextual features or factors which may affect the development of the property. The text below coupled with the Tentative Map is intended to meet the requirements of CCMC Section 17.10.036. The elements of the site analysis are reviewed below:

Figure 10: Site Analysis Location Map

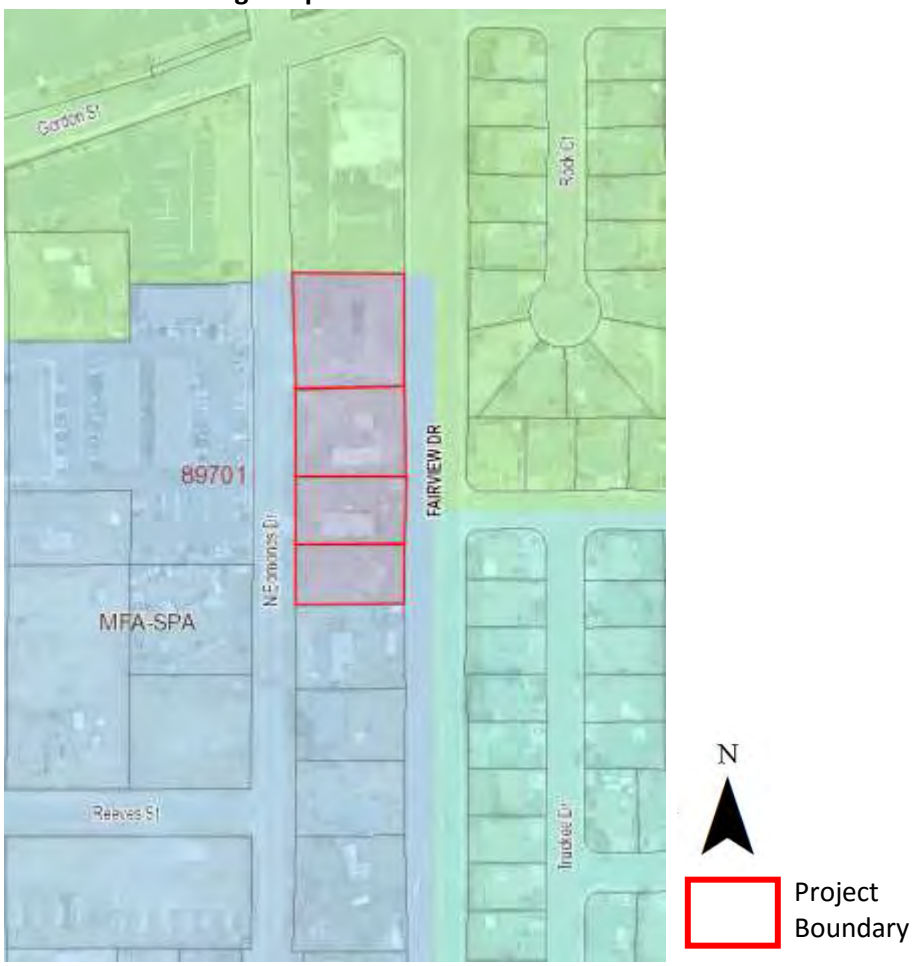
Land Use and Zoning

The figure below depicts current and planned land use and adopted zoning on the site and adjacent adopted zoning and current, planned and approved, but unbuilt land uses.

Figure 11: Site Analysis Land Use and Zoning- Table

Location	Current Land Use	Planned Use	Adopted Zoning
Project Site	Single Family Residential (3 parcels), General Commercial (Day Care, 1 parcel)	Single Family Attached housing	MFA/BS-SPA
North	General Commercial (Casino)	N/A	General Commercial
South	Single Family Residential	N/A	MFA/BS-SPA
East	Single Family Residential	N/A	SF21-P
West	Multi-Family Residential	N/A	MFA/BS-SPA

Figure 12: Site Analysis Land Use and Zoning- Map



Existing Structures

There are four existing residential structures on the four parcels that make up the project site; one of the structures is used as a day care and three are single family homes. All four structures will be removed to accommodate the proposed development.

Figure 13: Existing Structures

Existing Vegetation

The existing vegetation consists of sparse landscape trees, weeds, and grass.

Topography

The site topography is gently sloping (less than 5%) to the northwest over a majority of the parcel. Topography is shown on the Grading Plan.

Soil

A "Preliminary Geotechnical Investigation" has been completed for this project and is attached. The NRCS Web Soil Survey maps the site as predominately Dalzell fine sandy loam.

Natural Drainageways

There are no natural drainageways on the site. A drainage swale that passes underneath the existing driveways for each property is currently in place and drains north toward Gordon Street. As proposed, all drainage for the site will be contained in swales and the roadway and will travel to North Edmonds Drive.

Wetlands and Water Bodies

There are no wetlands or water bodies on the site.

Flood Hazards

The site is in FEMA Flood Zone X, Area of Minimal Flood Hazard.

Seismic Hazards

Based on a review of the New Empire Geologic Map (Binger, 1977), the project site lies within the limits of the New Empire Fault zone. The nearest fault trace is mapped adjacent to or crossing the west project boundary. The age of the latest rupture along the fault trace, as currently mapped, ranges from mid to late Pleistocene. Due to the close proximity of the mapped fault trace, a preliminary fault investigation was completed. Based on the findings of the preliminary fault investigation, there is no visible surficial evidence indicating the existing of a Holocene-active fault trace at or near the project site.

Easements

Easements are identified on the Tentative Map.

Utilities

Utilities are addressed on the Tentative Map. Existing gas, water, and sewer utilities run parallel to the east side of North Edmonds Drive.

Appropriate access points

The project site will be accessed through shared driveways from the east side of North Edmonds Drive. Structural section improvements will be required on the east side of North Edmonds Drive to meet Carson City standards for width and construction for an urban roadway section with on-street parking. A 5’ sidewalk along the west side of Fairview Drive will be constructed in accordance with Carson City specifications.

MASTER PLAN POLICY CHECKLIST

The purpose of the Master Plan Policy Checklist is to provide a list of answers that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to this TPUD application. This project complies with the Master Plan and the Brown Street Specific Plan, and accomplishes the following objectives:

Chapter 3: A Balanced Land Use Pattern

1. It is consistent with the Master Plan Land Use Map in location and density. (1.1a)
2. It promotes growth within areas already served by community water and wastewater facilities as it is already served by existing infrastructure. (1.1b)
3. It meets the provisions of the Growth Management Ordinance. (1.1d, Municipal Code 18.12)
4. It is located to be adequately served by city services including fire and sheriff services, and coordinated with the School District to ensure adequate provision of schools. (1.5d)
5. As an infill development in the Brown Street Specific Plan Area, it provides for transition of residential uses from single family residential to multi-family residential. (1.2a) provides an opportunity for a range of uses at a variety of scales and intensities in the Brown Street Specific Plan Area. (2.1a)
6. The Brown Street Specific Plan Area is used as a tool to allow urban intensity development with unique characteristics. (2.1c)
7. Friction Zones are not created. (2.1d)
8. It provides a variety of housing models and densities within the urbanized area appropriate to the development size, location, and surrounding neighborhood context. (2.2a, 9.1a)
9. It protects environmentally sensitive areas through proper setbacks, dedication, or other mechanisms in accordance with Carson City Municipal Code standards. (3.1b)
10. It is sited outside the primary floodplain and away from geologic hazards area. (3.3d,e)
11. It provides for levels of services consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions).
12. Does not create land use conflicts; as provided in the Brown Street Specific Plan, it provides for transition between the adjacent single family residential and multi-family residential neighborhoods. There is buffer between the project site and the General Commercial uses.
13. The project meet the requirements of the Brown Street Specific Plan.

Chapter 4: Equitable Distribution of Recreational Opportunities

1. The new development does not create enough demand to provide new park facilities. Private open space is provided in accordance with CCMC Section 17.10.046. (4.1b)

Chapter 5: Economic Vitality

1. The project provides a housing mix consistent with the labor force and non-labor force populations of the City. (BS-SPA 5.1j)
2. The Brown Street Specific Plan Area will be revitalized (5.9b)

Chapter 6: Livable Neighborhoods and Activity Centers

1. Durable materials will be used in construction. (6.1a)
2. The project will promote variety and visual interest through the incorporation of building styles and colors, garage orientation, and other features in accordance with the Carson City Municipal Code (6.1b).
3. The project will provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards. (6.1c)
4. It provides appropriate height, density, and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill project in accordance with the Carson City Municipal Code. (6.2a, 9.3b, 9.4a)
5. The proposed project is compatible with the surrounding development of residential homes. (9.1a)
6. The proposed project is not spot zoned. It is higher density residential development among other areas of residential and commercial development and is compatible with existing development.

Chapter 7 A Connected City

1. The goals and policies contained in the city's Transportation, Transit, and Unified Pathway Master Plans are incorporated in this project as appropriate. (11.1a)
2. Sidewalks will be improved or constructed along North Edmonds Drive and Fairview Drive. (12.1a, 12.1c)

Chapter 8 Specific Plan Areas

1. The project is designated Mixed-Use Residential. (BS-SPA 1.1)
2. A Development Context Diagram is provided in this application that illustrates how the proposed development relates to adjacent uses. (BS-SPA 1.2)
3. The higher density single family residential development proposed will incorporate a broader variety of housing types as encouraged within the BS-SPA. (BS-SPA 1.3)
4. Sidewalks are extended and improved in the project area. (BS-SPA 2.2)
5. Existing streets will be upgraded to meet Carson City standards (BS-SPA 2.3)
6. The primary entrances are oriented towards North Edmonds Drive to maintain a pedestrian-oriented street frontage and maintain the privacy and quality of life of existing residents within the BS-SPA. (BS-SPA 3.1)
7. The project encourages a cohesive pattern of development. Proposed land uses are organized in a manner that is compatible with existing uses and provide a transition between pods of existing homes within the BS-SPA. (BS-SPA 3.2)
8. Off-street parking is provided away from the street frontage. (BS-SPA 3.3)
9. Garages are located off shared driveways to promote a more pedestrian-friendly residential streetscape. (BS-SPA 3.4)
10. A varied streetscape is provided through pedestrian-orientation, placement of windows and doors on the front façade elevation, the use of different materials on the front façade elevation, variation in the location and proportion of front porches, substantial variations in roof lines, and the use of roof dormers. (BS-SPA 3.5)

TENTATIVE SUBDIVISION MAP FINDINGS

In accordance with Carson City Municipal Code Section 17.07.005, this project has been designed to consider the following:

1. **Environmental and health laws and regulations concerning water and air pollution, the disposal of solid waste, facilities to supply water, community or public sewage disposal and, where applicable, individual systems for sewage disposal.**

   All environmental health laws and regulations regarding water, air pollution, and waste disposal will be incorporated into the proposed project.

2. **The availability of water which meets applicable health standards and is sufficient in quantity for the reasonably foreseeable needs of the subdivision.**

   Water is available to the site. It will be provided by Carson City and conform to the applicable health standards and fulfill quantity requirements for residences.

3. **The availability and accessibility of utilities.**

   Public utilities are currently available to serve the proposed project.

4. **The availability and accessibility of public services such as schools, police protection, transportation, recreation and parks.**

   Educational requirements will be met by Carson City School District. Police services will be provided by the Carson City Sheriff's Department. The Regional Transportation Commission is responsible for transportation in and around the project area. Carson City Parks Department will provide recreational and parks services.

5. **Access to public lands. Any proposed subdivision that is adjacent to public lands shall incorporate public access to those lands or provide an acceptable alternative.**

   The project site is not adjacent to public lands.

6. **Conformity with the zoning ordinance and land use element of the city's master plan.**

   The proposed project is in conformance with the Master Plan designation of Mixed Use Residential and the current zoning designation of Multi-Family Apartments/Brown Street Specific Plan.

7. **General conformity with the city's master plan for streets and highways.**

   The proposed project is in conformance with the Carson City streets and highways master plan. In additional the project is providing off-site improvements to North Edmonds Drive and along Fairview Drive in accordance with the Brown Street Specific Plan.

8. The effect of the proposed subdivision on existing public streets and the need for new streets or highways to serve the subdivision.

The project is served by a shared driveway; no new streets are required to serve the subdivision. The project is providing off-site improvements to North Edmonds Drive and along Fairview Drive in accordance with the Brown Street Specific Plan. This project does not meet the requirements for a traffic study.

9. The physical characteristics of the land such as flood plains, earthquake faults, slope and soil.

Site topography is gently sloping to the northeast over the majority of project. The parcel is designated by FEMA as Zone X, Area of Minimal Flood Hazard. Hydrologic analyses were performed to determine the conceptual peak discharge for the 5-year and 100-year peak flow events. The site will be designed to accommodate peak flow events. A complete geotechnical investigation is also included as part of this request.

10. The recommendations and comments of those entities reviewing the subdivision request pursuant to NRS 278.330 thru 278.348, inclusive.

All recommendations and comments provided during the review of this project will be incorporated where applicable.

11. The availability and accessibility of fire protection including, but not limited to, the availability and accessibility of water and services for the prevention and containment of fires including fires in wild lands.

The availability and accessibility of fire protection to the proposed residential units will be in compliance with Carson City Fire Department recommendations.

12. Recreation and trail easements.

Recreation and trail easements are not applicable to this subdivision.

Carson City Planning Division
108 E. Proctor Street· Carson City NV 89701
Phone: (775) 887-2180 • E-mail: planning@carson.org

FILE # TSM - 17 -

APPLICANT **PHONE #**
G&E Investments 775-782-7327

MAILING ADDRESS, CITY, STATE, ZIP
PO Box 2826, Minden, NV 89410

EMAIL
cbonafede@honecompany.com

PROPERTY OWNER **PHONE #**
G&E Investments/Gordon Street LLC 775-782-7327

MAILING ADDRESS, CITY, STATE, ZIP
PO Box 2826, Minden, NV 89410

EMAIL
cbonafede@honecompany.com

APPLICANT AGENT/REPRESENTATIVE **PHONE #**
Manhard Consulting/Chris Baker 775-882-5630

MAILING ADDRESS, CITY, STATE, ZIP
3476 Executive Pointe Way, Carson City, NV 89706

EMAIL
cbaker@manhard.com

Project's Assessor Parcel Number(s)
008-306-09, -11, -15, -16

Project's Street Address
1709, 1725, 1759, 1809 N. Edmonds Drive

Nearest Major Cross Street(s)
N. Edmonds Dr. / Gordon St. / Fairview Dr.

Project's Master Plan Designation
Mixed Use Residential

Project's Current Zoning
MFA/BS-SPA

FOR OFFICE USE ONLY:

CCMC 17.06 and 17.07

TENTATIVE SUBDIVISION MAP

FEE*: $3,500.00 + noticing fee
*Due after application is deemed complete by staff

☐ **SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:**
- ☐ Application Form including Applicant's Acknowledgment
- ☐ Property Owner Affidavit
- ☐ Copy of Conceptual Subdivision Map Letter
- ☐ Detailed Written Project Description
- ☐ Master Plan Policy Checklist
- ☐ Wet Stamped Tentetive Map (24" x 36")
- ☐ Reduced Tentative Map (11" x 17")
- ☐ Conceptual Drainage Study
- ☐ Geotechnical Report
- ☐ Traffic Study (if applicable)
- ☐ Documentation of Taxes Paid to Date

☐ **CD or USB DRIVE with complete application in PDF**

STATE AGENCY SUBMITTAL including:
- ☐ 2 Wet-stamped copies of Tentative Map (24" x 36")
- ☐ Check made out to NDEP for $400.00 + $3/lot
- ☐ Check made out to Division of Water Resources for $180.00 + $1/lot

Application Reviewed and Received By:

Submittal Deadline: See attached Planning Commission application submittal schedule.

Note: Submittals must be of sufficient clarity and detail for all departments to adequately review the request. Additional information may be required.

Project Name
North Edmonds

Total Project Area	Number of Lots	Smallest Parcel Size
1.37 acres	16	

Please provide a brief description of your proposed project below. Provide additional pages to describe your request in more detail.

See attached

NOTE: If your project is located within the Historic District or airport area, it may need to be scheduled before the Historic Resources Commission or the Airport Authority in addition to being scheduled for review by the Planning Commission. Planning staff can help you make this determination.

ACKNOWLEDGMENT OF APPLICANT: (a) I certify that the foregoing statements are true and correct to the best of my knowledge and belief; (b) I agree to fulfill all conditions established by the Board of Supervisors.

Christopher Bonafede, MANAGER
Applicant's Signature

4/11/17
Date

PROPERTY OWNER'S AFFIDAVIT

I, Christopher Bonafede, Manager (Print Name), being duly deposed, do hereby affirm that I am the record owner of the subject property located at 1709/1725/1759/1809 N. Edmonds Drive, CC, NV 89701 (Property Address and APN), and that I have knowledge of, and I agree to, the filing of this Tentative Subdivision Map application.

Signature	Address	Date
	G&E Investments LLC, PO Box 2826, Minden,NV 89423	4/11/2017

Use additional page(s) if necessary for other names.

STATE OF NEVADA)
COUNTY)

On April 11, 2017, personally appeared before me, a notary public, Christopher Bonafede, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that he/she executed the foregoing document.

Notary Public

AUDREY L. SLOBE
Notary Public, State of Nevada
Appointment No. 05-94090-5
My Appt. Expires Jan 2, 2021

Master Plan Policy Checklist

Conceptual & Tentative Subdivisions, PUD's & Parcel Maps

PURPOSE

The purpose of a development checklist is to provide a list of questions that address whether a development proposal is in conformance with the goals and objectives of the 2006 Carson City Master Plan that are related to subdivisions of property. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: North Edmonds Tentative Subdivision Map

Reviewed By: _____

Date of Review: _____

DEVELOPMENT CHECKLIST

The following five themes are those themes that appear in the Carson City Master Plan and which reflect the community's vision at a broad policy level. Each theme looks at how a proposed development can help achieve the goals of the Carson City Master Plan. A check mark indicates that the proposed development meets the applicable Master Plan policy. The Policy Number is indicated at the end of each policy statement summary. Refer to the Comprehensive Master Plan for complete policy language.

CHAPTER 3: A BALANCED LAND USE PATTERN

The Carson City Master Plan seeks to establish a balance of land uses within the community by providing employment opportunities, a diverse choice of housing, recreational opportunities, and retail services.

Is or does the proposed development:

- ☑ Consistent with the Master Plan Land Use Map in location and density?
- ☑ Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- ☑ Encourage the use of sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- ☑ Located in a priority infill development area (1.2a)?
- ☑ Provide pathway connections and easements consistent with the adopted Unified Pathways Master Plan and maintain access to adjacent public lands (1.4a)?
- ☑ Encourage cluster development techniques, particularly at the urban interface with surrounding public lands, as appropriate, and protect distinctive site features (1.4b, c, 3.2a)?

- ☐ At adjacent county boundaries, coordinated with adjacent existing or planned development with regards to compatibility, access and amenities (1.5a)?
- ☑ Located to be adequately served by city services including fire and sheriff services, and coordinated with the School District to ensure the adequate provision of schools (1.5d)?
- ☐ In identified Mixed-Use areas, promote mixed-use development patterns as appropriate for the surrounding context consistent with the land use descriptions of the applicable Mixed-Use designation, and meet the intent of the Mixed-Use Evaluation Criteria (2.1b, 2.2b, 2.3b, Land Use Districts, Appendix C)?
- ☑ Provide a variety of housing models and densities within the urbanized area appropriate to the development size, location and surrounding neighborhood context (2.2a, 9.1a)?
- ☑ Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- ☐ If at the urban interface, provide multiple access points, maintain defensible space (for fires) and are constructed of fire resistant materials (3.3b)?
- ☑ Sited outside the primary floodplain and away from geologic hazard areas or follow the required setbacks or other mitigation measures (3.3d, e)?
- ☑ Provide for levels of services (i.e. water, sewer, road improvements, sidewalks, etc.) consistent with the Land Use designation and adequate for the proposed development (Land Use table descriptions)?
- ☑ If located within an identified Specific Plan Area (SPA), meet the applicable policies of that SPA (Land Use Map, Chapter 8)?

CHAPTER 4: EQUITABLE DISTRIBUTION OF RECREATIONAL OPPORTUNITIES

The Carson City Master Plan seeks to continue providing a diverse range of park and recreational opportunities to include facilities and programming for all ages and varying interests to serve both existing and future neighborhoods.

Is or does the proposed development:

- ☑ Provide park facilities commensurate with the demand created and consistent with the City's adopted standards (4.1b, c)?
- ☐ Consistent with the Open Space Master Plan and Carson River Master Plan (4.3a)?

CHAPTER 5: ECONOMIC VITALITY

The Carson City Master Plan seeks to maintain its strong diversified economic base by promoting principles which focus on retaining and enhancing the strong employment base, include a broader range of retail services in targeted areas, and include the roles of technology, tourism, recreational amenities, and other economic strengths vital to a successful community.

Is or does the proposed development:

- ☑ Incorporating public facilities and amenities that will improve residents' quality of life (5.5e)?

- ☐ Promote revitalization of the Downtown core (5.6a)?
- ☐ Incorporate additional housing in and around Downtown, including lofts, condominiums, duplexes, live-work units (5.6c)?

CHAPTER 6: LIVABLE NEIGHBORHOODS AND ACTIVITY CENTERS

The Carson City Master Plan seeks to promote safe, attractive and diverse neighborhoods, compact mixed-use activity centers, and a vibrant, pedestrian-friendly Downtown.

Is or does the proposed development:

- ☑ Promote variety and visual interest through the incorporation of varied lot sizes, building styles and colors, garage orientation and other features (6.1b)?
- ☑ Provide variety and visual interest through the incorporation of well-articulated building facades, clearly identified entrances and pedestrian connections, landscaping and other features consistent with the Development Standards (6.1c)?
- ☑ Provide appropriate height, density and setback transitions and connectivity to surrounding development to ensure compatibility with surrounding development for infill projects or adjacent to existing rural neighborhoods (6.2a, 9.3b 9.4a)?
- ☐ If located in an identified Mixed-Use Activity Center area, contain the appropriate mix, size and density of land uses consistent with the Mixed-Use district policies (7.1a, b)?
- ☐ If located Downtown:
  - ☐ Integrate an appropriate mix and density of uses (8.1a, e)?
  - ☐ Include buildings at the appropriate scale for the applicable Downtown Character Area (8.1b)?
  - ☐ Incorporate appropriate public spaces, plazas and other amenities (8.1d)?

CHAPTER 7: A CONNECTED CITY

The Carson City Master Plan seeks promote a sense of community by linking its many neighborhoods, employment areas, activity centers, parks, recreational amenities and schools with an extensive system of interconnected roadways, multi-use pathways, bicycle facilities, and sidewalks.

Is or does the proposed development:

- ☐ Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- ☐ Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- ☑ Provide appropriate pathways through the development and to surrounding lands, including parks and public lands, consistent with the Unified Pathways Master Plan (12.1a, c)?

CARSON CITY
Capital of Nevada

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Secured Tax Inquiry Detail for Parcel # 008-306-09

Property Location: 1809 N EDMONDS DR
Billed to: GORDON STREET LLC
% G & E INVESTMENTS LLC
P O BOX 2826
MINDEN, NV 89423-0000

Tax Year: 2016-17
Roll #: 006656
District: 2.4
Tax Service:
Land Use Code: 400

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due

No Taxes Owing

Current Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
08/15/16	315.01		315.01	315.01	.00
10/03/16	314.00		314.00	314.00	.00
01/02/17	314.00		314.00	314.00	.00
03/06/17	314.00		314.00	314.00	.00
Totals:	**1,257.01**	**.00**	**1,257.01**	**1,257.01**	

Payment Cart | History

Additional Information

	2016-17	2015-16	2014-15	2013-14	2012-13
Tax Rate	3.5200	3.5200	3.5400	3.5600	3.5600
Tax Cap Percent	.2	3.2	3.0	4.2	6.4
Abatement Amount	279.90				

CARSON CITY
Capital of Nevada

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Secured Tax Inquiry Detail for Parcel # 008-306-11

Property Location: 1759 N EDMONDS DR
Billed to: G & E INVESTMENTS LLC
P O BOX 2826
MINDEN, NV 89423-0000

Tax Year: 2016-17
Roll #: 005111
District: 2.4
Tax Service:
Land Use Code: 230

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due

Current Year	(Unsecured Taxes exist)				No Taxes Owing
08/15/16	118.45		118.45	118.45	.00
10/03/16	118.00		118.00	118.00	.00
01/02/17	118.00		118.00	118.00	.00
03/06/17	118.00		118.00	118.00	.00
Totals:	**472.45**	**.00**	**472.45**	**472.45**	

Payment Cart | History

Additional Information

	2016-17	2015-16	2014-15	2013-14	2012-13
Tax Rate	3.5200	3.5200	3.5400	3.5600	3.5600
Tax Cap Percent	.2	3.2	3.0	3.0	3.0
Abatement Amount	84.21	18.35		106.82	203.93

CARSON CITY
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Secured Tax Inquiry Detail for Parcel # 008-306-15

Property Location: 1725 N EDMONDS DR
Billed to: G & E INVESTMENTS LLC
% KATHLEEN L HONE
P O BOX 2826
MINDEN, NV 89423-0000

Tax Year: 2016-17
Roll #: 006112
District: 2.4
Tax Service:
Land Use Code: 230

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due

Current Year	(Unsecured Taxes exist)				No Taxes Owing
08/15/16	100.50		100.50	100.50	.00
10/03/16	97.00		97.00	97.00	.00
01/02/17	97.00		97.00	97.00	.00
03/06/17	97.00		97.00	97.00	.00
Totals:	**391.50**	**.00**	**391.50**	**391.50**	

Payment Cart | History

Additional Information

	2016-17	2015-16	2014-15	2013-14	2012-13
Tax Rate	3.5200	3.5200	3.5400	3.5600	3.5600
Tax Cap Percent	2	3.0	3.0	3.0	3.0
Abatement Amount	36.43	24.74		85.58	178.99

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Secured Tax Inquiry Detail for Parcel # 008-306-16

Property Location: 1709 N EDMONDS DR
Billed to: G & E INVESTMENTS LLC
P O BOX 2826
MINDEN, NV 89410-0000

Tax Year: 2016-17
Roll #: 006113
District: 2.4
Tax Service:
Land Use Code: 200

Code Table

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
Current Year					**No Taxes Owing**
08/15/16	139.01		139.01	139.01	.00
10/03/16	136.00		136.00	136.00	.00
01/02/17	136.00		136.00	136.00	.00
03/06/17	136.00		136.00	136.00	.00
Totals:	**547.01**	**.00**	**547.01**	**547.01**	

Payment Cart | History

Additional Information

	2016-17	2015-16	2014-15	2013-14	2012-13
Tax Rate	3.5200	3.5200	3.5400	3.5600	3.5600
Tax Cap Percent	.2	3.0	3.0	3.0	6.4
Abatement Amount	47.17	32.85		11.73	107.14

Carson City Planning Division

108 E. Proctor Street
Carson City, Nevada 89701
(775) 887-2180
www.carson.org
www.carson.org/planning

November 1, 2016

Mr. Chris Baker
Manhard Consulting, Ltd.
9850 Double R Blvd., Suite 101
Reno, NV 89521

via email: cbaker@manhard.com

SUBJECT: CSM-16-108 – Conceptual Subdivision Map Review
North Edmonds Townhomes
16 Single-family attached residential lots

REVIEW DATE: October 18, 2016

SITE INFORMATION:

APNs:	008-306-09, -11, -15 and -16
Project Size:	1.37 acres
Master Plan Designation:	Mixed-Use Residential (MUR) with Brown Street Specific Plan Area Overlay
Zoning:	Multi-Family Apartments (MFA)

The following is a summary of the comments provided from City staff at the Conceptual Review meeting held on October 18, 2016, regarding the proposed North Edmonds Townhomes Subdivision.

PLANNING DIVISION – Contact Susan Pansky, Special Projects Planner

1. An application for a Tentative Subdivision Map must be submitted in accordance with the Carson City Municipal Code (CCMC), Section 17.05, Tentative Maps, in order to subdivide the property as proposed on the Conceptual Map. As presented, the project will require a Variance from the Multi-Family Apartment Development Standards which require a minimum of 150 square feet of common open space as outlined below.

2. The Tentative Subdivision Map application must include or address the following items:

   a. This project is located within the Brown Street Specific Plan Area outlined in the Carson City Master Plan. All requirements of the Brown Street Specific Plan are required to be adhered to with this project. Based on the current design, the following items will need to be specifically addressed as a part of the proposed project:

      i. A Development Context Diagram is required to illustrate how development relates to adjacent uses in terms of housing types, orientation, organization of uses (including

Bill Conceptual Map

parking), and how it relates in compatibility and transition to adjacent neighborhoods. (BS-SPA 1.2)

ii. Existing streets shall be upgraded to meet Carson City standards for width and construction for an urban roadway section with on-street parking. (BS-SPA 2.3)

iii. The primary entrance of all residential uses shall be oriented towards Edmonds or Brown Streets to maintain a pedestrian-oriented street frontage and to maintain the privacy and quality of life of existing residents within the SPA. (BS-SPA 3.1)

b. Although single family attached residential units are proposed, because the project is located in the Multi-Family Apartment zoning district, it is required that the application demonstrate how the proposed project meets Carson City Development Standards, Division 1.17 – Multi-Family Apartment Development Standards as follows:

The following standards are intended to establish minimum standards for residential development within the Multi-Family Apartment (MFA) zoning district.

i. Maximum permitted density:

a. For one-bedroom or studio units, one unit per 1,200 square feet of area.

b. For two or more bedroom units, one unit per 1,500 square feet of area.

ii. Maximum building height: 45 feet.

iii. Setbacks:

a. Front yard: 10 feet, plus an additional 10 feet for each story above two stories; minimum driveway approach from property line to garage doors is 20 feet.

b. Side yard: 10 feet for external project boundaries, minimum 10 feet between residential structures for internal setbacks. Where a side yard is adjacent to a single-family zoning district, an additional 10 feet is required for each story above one story.

c. Street side yard: 10 feet, plus an additional 5 feet for each story above two stories; minimum driveway approach from property line to garage doors is 20 feet.

d. Rear yard: 20 feet. Where a rear yard is adjacent to a single-family zoning district, an additional 10 feet is required for each story above one story.

iv. Required parking: Two spaces per dwelling unit; and in compliance with the Development Standards Division 2, Parking and Loading.

v. Open Space:

a. A minimum of 150 square feet per dwelling unit of common open space must be provided. For projects of 10 or more units, areas of common open space may only include contiguous landscaped areas with no dimensions less than 15 feet, and a minimum of 100 square feet per unit of common open space area must be designed for recreation, which may include but not

be limited to picnic areas, sports courts, a softscape surface covered with turf, sand or similar materials acceptable for use by young children, including play equipment and trees, with no dimension less than 25 feet.

b. A minimum of 100 square feet of additional open space must be provided for each unit either as private open space or common open space.

c. Front and street side yard setback areas may not be included toward meeting the open space requirements.

vi. Landscaping. Landscaping shall comply with the Development Standards Division 3, Landscaping.

c. As designed, a Common Open Space Development is proposed. As a part of the standard Tentative Subdivision Map application, please indicate on the map that the project is a Common Open Space Development. The following additional information is required as a part of the submittal (CCMC Section 17.10.035):

i. Site Analysis to Determine Common Open Space and Lot Size Variation. A site analysis showing development opportunities and constraints shall be prepared as a key consideration, along with the project design objectives, to determine the total area covered by lots and roads, lot areas and the total area to be designated as common open space. The site analysis shall include information and maps, including a site opportunities and constraints map, describing all significant physical and contextual features or factors which may affect the development of the property. The elements of the site analysis shall include, as a minimum, the following information:

a. Location Map. A general location map providing the context of location and vicinity of the site.

b. Land Use and Zoning. Current and planned land use and adopted zoning on the site and adjacent adopted zoning and current, planned and approved, but un-built land uses.

c. Existing Structures. A description of the location, physical characteristics, condition and proposed use of any existing structures.

d. Existing Vegetation. A description of existing vegetation, including limits of coverage, and major tree sizes and types. In the instance of heavily wooded sites, typical tree sizes, types and limits of tree coverage may be substituted.

e. Topography. An analysis of slopes on the site, and adjacent to the site, using a contour interval of five feet, or at a contour interval appropriate for the site and agreed to by the Director, identifying areas with 15 percent or greater slope, areas with 33 percent or greater slope end areas identified as "Skyline" on the adopted Carson City Skyline Map.

f. Soil. An analysis of the soil characteristics of the site using Soil Conservation Service (SCS) information.

g. Natural Drainageways. Identification of natural drainageways on and adjacent to the site.

h. Wetlands and Water Bodies. Identification of existing or potential wetlands and

water bodies on the site.

i. Floor Hazards. Identification of existing and potential flood hazards using Federal Emergency Management Agency (FEMA) information.

j. Seismic Hazards. Identification of seismic hazards on and/or near the site, including location of any Holocene faults.

k. Easements. A description of the type and location of any easements, public and/or private, on the site.

l. Utilities. A description of existing or available utilities, and an analysis of appropriate locations for water, power, sanitary sewer and storm water sewer facilities.

m. Appropriate Access Points. An analysis of appropriate access points based upon existing and proposed streets and highways and site opportunities and constraints.

4. Please provide the proposed building elevation drawings including proposed heights of buildings.

8. Please provide details of any perimeter fencing.

9. Please provide a conceptual level landscaping plan as a part of the Tentative Subdivision Map application.

10. Please provide written justification for the proposed removal of the existing trees on site.

ENGINEERING DIVISION – Contact Stephen Pottéy, Project Manager

11. Standard five-foot sidewalk must be installed along the Fairview Drive frontage.

12. The N. Edmonds Drive street section along the frontage must be upgraded to the standard roadway section for urban streets with on street parking and five-foot sidewalks (CCPW Standard Detail #C-5.1.9), per the Specific Plan Area requirements. This requirement includes repaving half of the street along the property frontage.

13. A traffic impact study will be required with the Tentative Map to analyze the impact to the Gordon St./Fairview Dr. and N. Edmonds Dr./Fairview Dr. intersections.

14. Access to new drainage facilities must be provided for maintenance. All onsite drainage facilities must be labeled as private in the improvement plans and must be privately maintained.

15. Any engineering work done on this project must be wet stamped and signed by an engineer licensed in Nevada. This will include site, grading, utility and erosion control plans as well as standard details.

16. All construction work must be to Carson City Development Standards (CCDS) and meet the requirements of the Carson City Standard Details.

17. Fresh water must be used for dust control. Contact our Public Works Department at 887-2355.

18. New electrical service must be underground.

19. This project will need a Construction Storm Water General Permit from Nevada Division of Environmental Protection.

20. A sealed Geotechnical Report for the whole site should be submitted with the Tentative Map.

21. Street lighting requirements must be met. Please see Section 12 of CCDS.

22. A wet stamped main analysis must be submitted with the tentative map to show that adequate pressure will be delivered to the meter and fire flows meet the minimum requirements of the Carson City Fire Department. See CCDS 15.3.1(a). Please contact Tom Grundy, PE at (775) 283-7081 for fire flow test data.

23. A wet stamped sewer analysis must be submitted that includes addressing the effect of flows on the existing City system. See Section 15.3.2 of CCDS.

24. It is likely that a separate fire line will be necessary. If a commercial fire line is required, the system must be designed by an engineer. The backflow preventer assembly must be above ground in a hot box, and located as close to the property line (on the private side) as possible. Please see Chapter 445A of Nevada Administrative Code.

25. A private testing agreement will be necessary for the compaction and material testing in the street right of way. The form can be obtained through Carson City Permit Engineering.

26. The domestic water service line must meet state backflow requirements. See Chapter 445A of the Nevada Administrative Code.

27. The irrigation system will need a reduced pressure backflow preventer if a vacuum breaker system cannot be designed to operate properly.

28. An erosion control plan meeting Section 13 of CCDS will be required in the improvement plan set.

29. Any existing water and sewer services not being used must be abandoned at the main.

30. If an existing water service is to be re-used, it must be checked for condition. It may need to be replaced.

31. Please show gas and electric connections for this project on the site improvement plans.

32. Any work performed in the street right of way will require a traffic control plan and a time line type schedule to be submitted before the work can begin. A minimum of one week notice must be given before any work can begin in the street right of way.

33. Please show all easements on the tentative map.

34. A Technical Drainage Study meeting the requirements of Section 14 of the Carson City Development Standards must be submitted with the tentative map.

35. Driveways should line up with driveways on the other side of N. Edmonds whenever possible.

36. A sewer and water connection fee form must be included in the first improvement plan submittal.

These comments are based on a very general site plan and do not indicate a complete review. All pertinent requirements of Nevada State Law, Carson City Code, and Carson City Development Standards will still apply whether mentioned in this letter or not.

BUILDING DIVISION – Contact Shawn Keating, Chief Building Official

No comments.

FIRE DEPARTMENT – Contact Dave Ruben, Fire Marshal

37. The project must comply with 2012 IFC and adopted Northern Nevada fire code amendments.

38. Depending on the construction used, fire sprinklers may be required.

PARKS AND RECREATION DEPARTMENT – Contact Vern Krahn, Park Planner

39. This project will be subject to the collection of Residential Construction Tax payable at the issuance of a building permit for each residential unit.

40. All common landscape areas and associated open space will not be the responsibility of the Parks and Recreation Department to maintain.

HEALTH DEPARTMENT – Contact Dustin Boothe, Division Manager

No comments received.

ENVIRONMENTAL CONTROL – Contact Mark Irwin, Environmental Control Officer

No comments.

Thank you for your Conceptual Map submittal. If you have further questions, please contact the Planning Division at (775) 887-2180, or contact the applicable department staff member as listed below.

Planning Division –
Susan Pansky, Special Projects Planner
(775) 283-7076
Email: spansky@carson.org

Engineering Division –
Stephen Pottéy, Project Manager
(775) 887-2300
Email: spottey@carson.org

Building Division –
Shawn Keating, Chief Building Official
(775) 887-2310
Email: skeating@carson.org

Fire Prevention –
Dave Ruben, Fire Marshal
(775) 283-7153
Email: druben@carson.org

Health Department –
Dustin Boothe, Division Manager
(775) 283-7220
Email: dboothe@carson.org

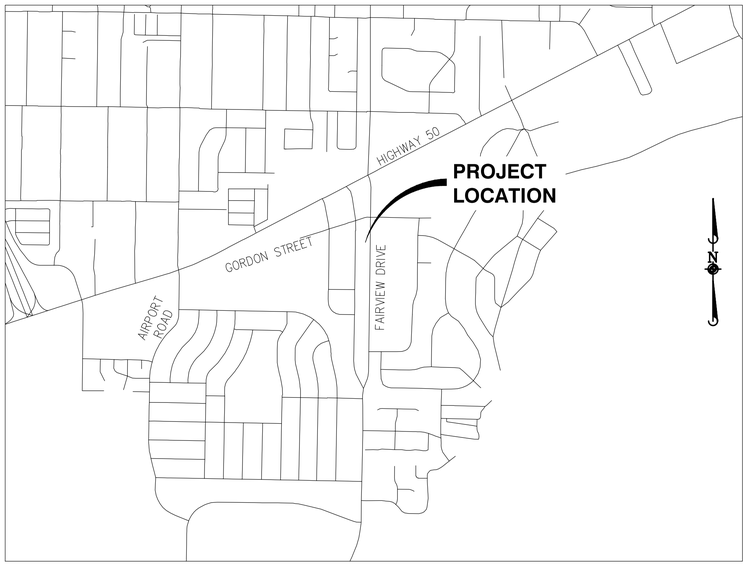
Environmental Control Division –
Mark Irwin, Environmental Control Officer
(775) 283-7380
Email: mirwin@carson.org

Sincerely,
Community Development Department, Planning Division

Susan Pansky, AICP
Special Projects Planner

cc: File CSM-16-108

Tentative Map
for
NORTH EDMONDS
COMMON OPEN SPACE DEVELOPMENT
Carson City, Nevada



VICINITY MAP

1"=1000'

STANDARD SYMBOLS

10-01-15

EXISTING		PROPOSED
	STORM SEWER	
	SANITARY SEWER	
	FORCE MAIN	
W	WATER MAIN	W
G	GAS	
E	ELECTRIC	
T	TELEPHONE	
	SANITARY MANHOLE	
	SANITARY CLEANOUT	
	STORM MANHOLE	
	CATCH BASIN	
	HAY BALES	
	RIP RAP	
	FLARED END SECTION	
	HEADWALL	
	STREET LIGHT	
795.2 / 790.25	RIM/ INVERT BUBBLE	795.2 / 790.25 RIM INV.
	RIM/ INVERT BUBBLE	795.2 / 790.25 / 790.25 RIM INV. IN INV. OUT
	HEADWALL INVERT BUBBLE	790.25 INV.
	DITCH OR SWALE	
	DIRECTION OF FLOW	
	OVERFLOW RELIEF SWALE	
764	1 FOOT CONTOURS	689
	ROADWAY GRADE BREAK	
	CURB AND GUTTER	
	SIDEWALK	
	ACCESSIBLE CURB RAMP	
	PROPERTY LINE	
	SIGN	
	POWER POLE	
	GUY WIRE	
	GAS VALVE	
	HANDHOLE	
	ELECTRICAL BOX	
	TELEPHONE PEDISTAL	
	CHAIN-LINK FENCE	
62.80 TC(e)	TOP OF CURB ELEVATION	62.80 TC
62.80 EP(e)	EDGE OF PAVEMENT ELEVATION	62.80 EP
62.80 TW(e)	TOP OF WALL ELEVATION	62.80 TW
62.80 FG(e)	FINISH GRADE ELEVATION	62.80 FG
	GRADE BREAK ELEVATION	62.80 GB
	FLOWLINE ELEVATION	62.80 FL
	ROCKERY WALL	
	RETAINING WALL	
	LANDSCAPE WALL	
	CLASS "A" MONUMENT	

ABBREVIATIONS

AGG.	AGGREGATE GRAVEL	FES	FLARED END SECTION	PVC	POLYVINYL CHLORIDE PIPE
B.A.M.A.	BIT. AGG. MIXTURE	F-F	FACE TO FACE	PVC	POINT OF VERTICAL CURVE
B-B	BACK TO BACK	FF	FINISHED FLOOR	PVI	POINT OF VERTICAL INTERSECTION
BC	BEGINNING OF CURVE	FL	FLOW LINE	PVT	POINT OF VERTICAL TANGENCY
BFC	BACK FACE OF CURB	FM	FORCE MAIN	R	RADIUS
BIT.	BITUMINOUS CONCRETE	FG	FINISH GRADE	RCP	REINFORCED CONCRETE PIPE
BM	BENCHMARK	GAS	GAS	ROW	RIGHT-OF-WAY
B.O.	BY OTHERS	GW	GUY WIRE	RR	RAILROAD
B/P	BOTTOM OF PIPE	HDWL	HEADWALL	SD	STORM DRAIN
BVC	BEGINNING OF VERTICAL CURVE	HH	HANDHOLE	SDMH	STORM DRAIN MANHOLE
BW	BOTTOM OF WALL	HP	HIGH POINT	SF	SQUARE FOOT
CB	CATCH BASIN	HWL	HIGH WATER LEVEL	SHLD.	SHOULDER
CL	CENTERLINE	HYD.	HYDRANT	SL	STREET LIGHT
CMP	CORRUGATED METAL PIPE	I.E.	INVERT ELEVATION	SS	SANITARY SEWER
CNTRL	CONTROL	INL	INLET	SSMH	SANITARY SEWER MANHOLE
CONC.	CONCRETE	INV.	INVERT	STA.	STATION
CY	CUBIC YARD	IP	IRON PIPE	SY	SQUARE YARDS
D	DITCH	LP	LOW POINT	T	TELEPHONE
DIA.	DIAMETER	MAX.	MAXIMUM	TBR	TO BE REMOVED
DIP	DUCTILE IRON PIPE	MB	MAILBOX	TC	TOP OF CURB
DI	DUCTILE IRON	MIN.	MINIMUM	T/P	TOP OF PIPE
DT	DRAIN TILE	NWL	NORMAL WATER LEVEL	TRANS	TRANSFORMER
E	ELECTRIC	P	PAVEMENT	TW	TOP OF WALL
EC	END OF CURVE	PC	POINT OF CURVE	VB	VALVE BOX
E-E	EDGE TO EDGE	PCC	POINT OF COMPOUND CURVE	VV	VALVE VAULT
ELEV.	ELEVATION	PI	POINT OF INTERSECTION	WL	WATER LEVEL
EP	EDGE OF PAVEMENT	PL	PROPERTY LINE	WM	WATER MAIN
EVC	END OF VERTICAL CURVE	PP	POWER POLE		
EX.	EXISTING	PROP.	PROPOSED		
		PT	POINT OF TANGENCY		

Avoid cutting underground utility lines. It's costly.
before Call you Dig
1-800-227-2600
UNDERGROUND SERVICE (USA)

Sheet List Table

SHEET NUMBER	SHEET TITLE
1	TITLE SHEET
2	SITE PLAN
3	UTILITY PLAN
4	GRADING PLAN
5	CROSS SECTIONS
6	DETAIL SHEET

BASIS OF BEARINGS

MODIFIED NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994 (NAD 83/94) DETERMINED USING REAL TIME KINEMATIC GPS (RTK GPS) OBSERVATIONS OF CARSON CITY CONTROL MONUMENTS CC011 AND CC012 AS SHOWN ON RECORD OF SURVEY MAP NO. 2749 RECORDED AUGUST 11, 2010 IN THE OFFICIAL RECORDS OF CARSON CITY NEVADA, AS FILE NO. 403425. COMBINED GRID TO GROUND FACTOR = 1.0002. ALL DISTANCES SHOWN HEREIN ARE GROUND VALUES.

BASIS OF ELEVATION

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AS TAKEN FROM CARSON CITY CONTROL MONUMENT CC011, HAVING A PUBLISHED ELEVATION OF 4635.46 FEET. CC011 IS DESCRIBED AS BEING A 2" DIAMETER BRASS DISK STAMPED "CC011 2010" LOCATED IN THE TOP OF CURB ON THE EAST SIDE OF BROWN STREET, APPROXIMATELY 185 FEET NORTH OF THE INTERSECTION OF BROWN STREET AND GORDON STREET.

UTILITIES

CABLE	–	CHARTER COMMUNICATIONS
PHONE	–	AT&T
ELECTRICAL	–	NV ENERGY
GAS	–	SOUTHWEST GAS
SEWER	–	CARSON CITY
SOLID WASTE	–	WASTE MANAGEMENT
WATER	–	CARSON CITY

PROJECT DATA

ASSESSOR PARCEL NUMBERS	–	008-306-09, 008-306-11, 008-306-15, 008-306-16
TOTAL SITE AREA	–	1.37 ACRES
TOTAL LOT AREA	–	1.37 ACRES
TOTAL COMMON AREA	–	0 ACRES
TOTAL AREA OF RIGHT OF WAY	–	0 ACRES
TOTAL UNITS	–	16 (11.68 UNITS/ACRE)
AVERAGE LOT SIZE	–	3,706 SF
CURRENT ZONING	–	MFA
PROPOSED ZONING	–	MFA

ENGINEER'S STATEMENT

I, DAVID M. KITCHEN, DO HEREBY CERTIFY THAT THIS MAP HAS BEEN PREPARED BY ME, OR UNDER MY SUPERVISION AND WAS COMPLETED ON THIS 14th DAY OF APRIL, 2017.

PROFESSIONAL ENGINEER - STATE OF NEVADA
DAVID M. KITCHEN
Exp 06-30-17
CIVIL
No. 14487
04-28-17

DAVID M. KITCHEN P.E.#14487

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OWNER

G&E INVESTMENTS
PO BOX 2826
MINDEN, NV 89410

ARCHITECT

MANHARD CONSULTING, LTD
9850 DOUBLE R BLVD, SUITE 101
RENO, NEVADA 89521
(775) 746-3500

PLANNER

MANHARD CONSULTING, LTD
9850 DOUBLE R BLVD, SUITE 101
RENO, NEVADA 89521
(775) 746-3500

GEOTECHNICAL ENGINEER

CONSTRUCTION MATERIALS ENGINEERS, INC.
6980 SIERRA CENTER PARKWAY, SUITE 90
RENO, NEVADA 89511
(775) 851-8205
ATTN: STELLA MONTALVO

LANDSCAPE ARCHITECT

MANHARD CONSULTING, LTD
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RENO, NEVADA 89521
(775) 746-3500

DATE | REVISIONS | DRAWN BY | CHECKED BY

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NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT
CARSON CITY, NEVADA
TITLE SHEET

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	

SHEET 1 OF 6

GEICCNV01

PENDING AGENCY APPROVAL

Apr 27, 2017 – 15:08 Dwg Name: P:\Geiccnv01\Work\Eliza\Tenp Drawings\Plan Set\Tentative_Map\01_Title_Sheet.dwg Updated By: SJVolden

SITE DATA

ZONING:	MULTI-FAMILY/APARTMENTS
TOTAL SITE AREA (ACRES):	±1.37
DRIVEWAYS (ACRES):	±0.29
LANDSCAPED AREAS AND PATHWAYS (ACRES):	±0.66
PRIVATE OPEN SPACE (PER CCMC17.10.046(1))(ACRES):	±0.45 (33.04%)
NUMBER OF UNITS:	16
GARAGE PARKING:	32
DRIVEWAY PARKING (NOT USED IN CALCS):	32
TOTAL PARKING REQUIRED:	32 RATIO 2:1
MINIMUM SETBACK:	
FRONT:	20 FEET
REAR:	20 FEET
SIDE:	0 FEET
STREET SIDE:	10 FEET

LEGEND

CONCRETE

AC PAVEMENT

PROPERTY LINE

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N

008-307-06

008-307-17

008-307-16

NORTH EDMONDS DRIVE
(EXIST/PUBLIC)

EXISTING AGGREGATE DRIVEWAY APRON

EXISTING CONCRETE DRIVEWAY APRON

TYPE 1 CURB & GUTTER (TYP.)

PROPOSED DRIVEWAY APRON

EXISTING PARCEL LINE

PEDESTRIAN RAMP (TYP.)

CONST. 4' SIDEWALK

MATCH EXISTING

N00°43'30"E 427.50'

0.5' FLUSH POST CURB (TYP.)

3.5' WALKWAY (TYP.)

LOT #1 4442 S.F.

LOT #2 2877 S.F.

LOT #3 2877 S.F.

LOT #4 4637 S.F.

LOT #5 4442 S.F.

LOT #6 2877 S.F.

LOT #7 2877 S.F.

LOT #8 4631 S.F.

LOT #9 4442 S.F.

LOT #10 2877 S.F.

LOT #11 2877 S.F.

LOT #12 4624 S.F.

LOT #13 4442 S.F.

LOT #14 2877 S.F.

LOT #15 2877 S.F.

LOT #16 4618 S.F.

008-306-07

008-306-16

008-306-15

008-306-11

008-306-09

008-306-14

138.82' S89°16'30"E

138.57' S89°16'30"E

3' PCC VALLEY GUTTER (TYP.)

EXISTING FENCE

EXISTING WALL

427.50' S00°41'32"W

CONST. 5' SIDEWALK ALONG FAIRVIEW DRIVE

MATCH EXISTING

FAIRVIEW DRIVE
(EXIST/PUBLIC)

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DRAWN BY | CHECK BY | REVISION | DATE

NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT

CARSON CITY, NEVADA

SITE PLAN

PROFESSIONAL ENGINEER - STATE OF NEVADA
DAVID M. KITCHEN
Exp: 06-30-17
CIVIL
No. 14487
04-28-17

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	1"=20'

SHEET 2 OF 6

GEICCNV01

PENDING AGENCY APPROVAL

April 27, 2017 - 16:03 Data Name: P:\Geiconv01\Data\Eng\Final Drawings\Plan Set\Tentative Map\02 Site Plan.dwg Updated By: SJorden

LEGEND

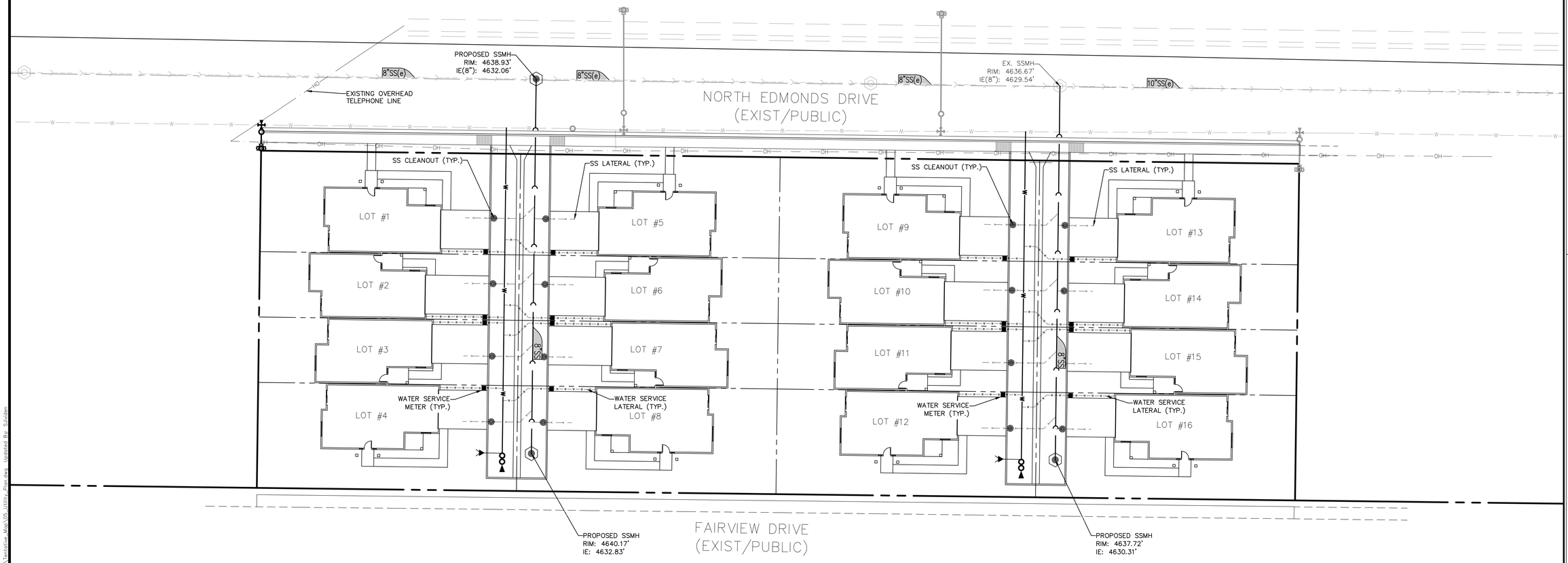
- 8"SS — SANITARY SEWER & DIRECTION INDICATOR (DASHED AND GRAY IF EXIST)
- 18"SD — STORM DRAIN & DIRECTION INDICATOR (DASHED AND GRAY IF EXIST)
- W — 8" WATER MAIN (DASHED AND GRAY IF EXISTING)
- STORM DRAIN MANHOLE (HOLLOW AND GRAY IF EXISTING)
- SANITARY SEWER MANHOLE (HOLLOW AND GRAY IF EXISTING)
- GATE VALVE (GRAY IF EXISTING)
- FIRE HYDRANT (GRAY IF EXISTING)
- LOT #16 — LOT NUMBER
- FLUSH VALVE AND AIR RELEASE VALVE ASSEMBLY

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

N



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NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT

CARSON CITY, NEVADA

UTILITY PLAN

PROFESSIONAL ENGINEER - STATE OF NEVADA
DAVID M. KITCHEN
Exp: 06-30-17
CIVIL
No. 14487
04-28-17

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	1"=20'

SHEET 3 OF 6

GEICCNV01

PENDING AGENCY APPROVAL

April 27, 2017 - 15:49 Data Name: P:\Geiccnv01\Data\Eng\Final Drawings\Plan Set\Tentative Map\05_Utility Plan.dwg Updated By: SJolden

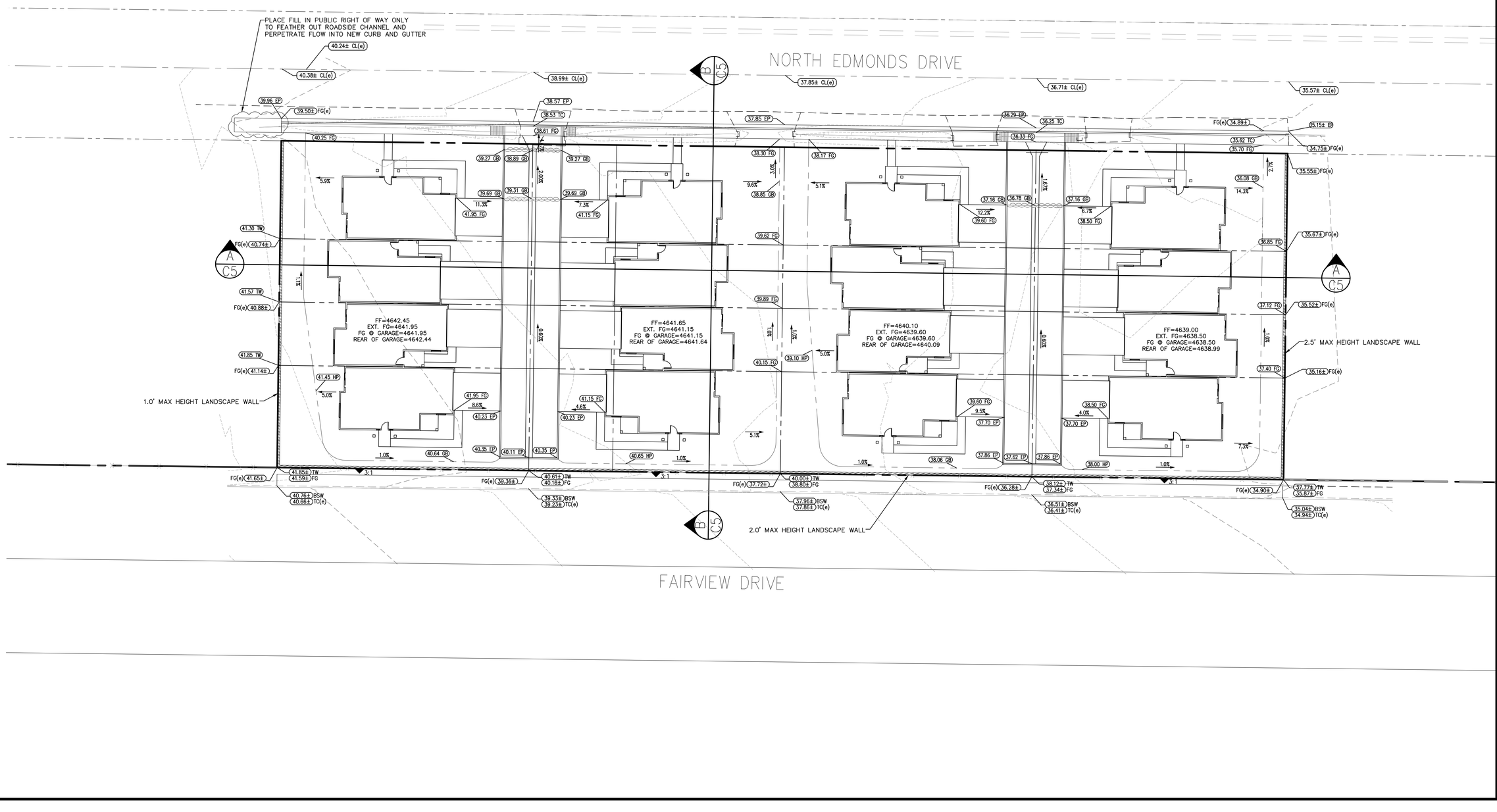
GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

GRADING NOTES

1. SEE CROSS SECTIONS SHEET FOR CROSS-SECTION INFORMATION
2. SOME LOTS MAY REQUIRE EXTRA DEPTH FOOTINGS. EACH LOT SHALL BE EXAMINED FURTHER AT FINAL PLOT PLAN APPROVAL
3. POST CURB IS TO BE DEPRESSED AT EACH DRIVEWAY
4. ALL TOPOGRAPHIC INFORMATION PROVIDED BY MANHARD CONSULTING.
5. SITE FEMA INFO: THE PROJECT SITE IS LOCATED WITHIN A NON-SHADED ZONE X PER FLOOD INSURANCE RATE MAP NUMBER 3200010111C, EFFECTIVE DATE: DECEMBER 22, 2016. AREAS OF 100-YEAR FLOOD WITH AVERAGE DEPTHS LESS THAN 1 FOOT
6. ADD 4600 TO ALL SPOT ELEVATIONS



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NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT

CARSON CITY, NEVADA

GRADING PLAN

PENDING AGENCY APPROVAL

DAVID M. KITCHEN
Exp: 06-30-17
CIVIL
No. 14487
PROFESSIONAL ENGINEER - STATE OF NEVADA
04-28-17

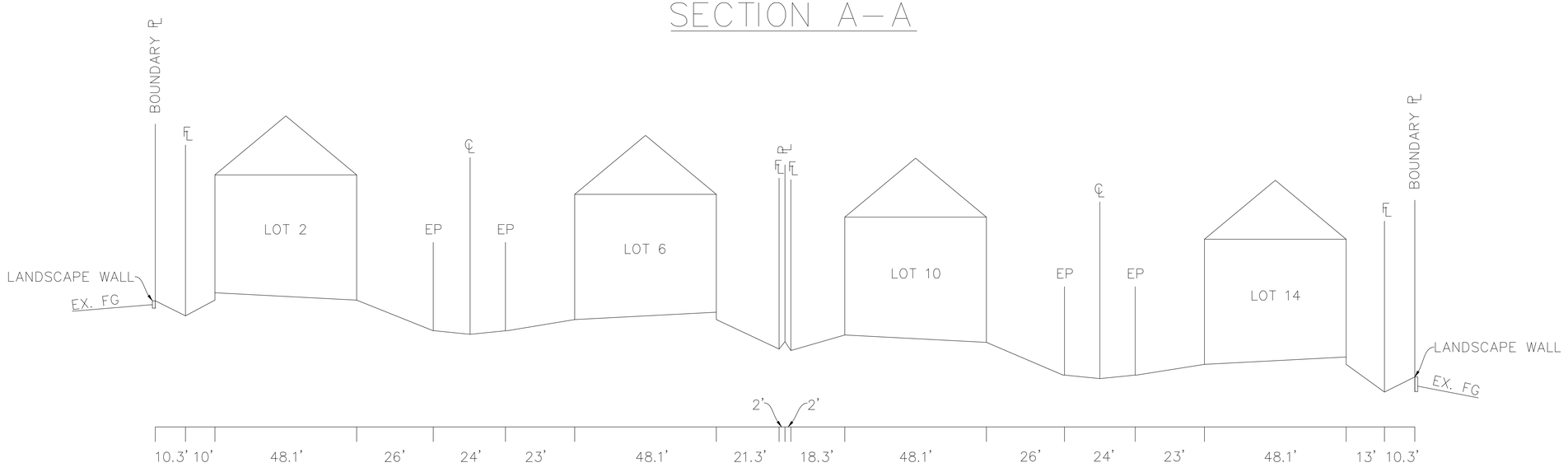
PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	1"=20'

SHEET 4 OF 6

GEICCNV01

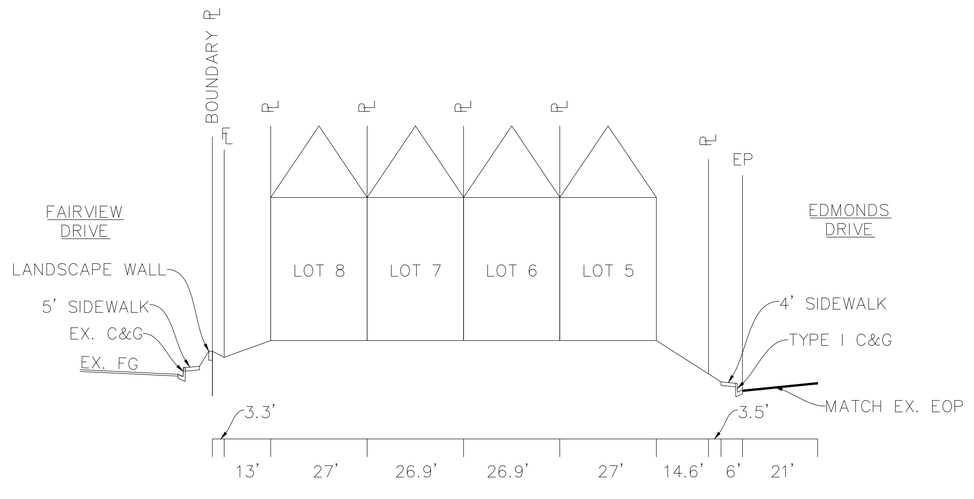
Apr 27, 2017 - 15:51 Dwg Name: P:\Ceiccnv01\data\Civil\Final Drawings\Prim Set\Tentative Map\04_Grading Plan.dwg Updated By: Sdryden

SECTION A–A



SCALE
HORIZ: 1"=20'
VERT: 1"=4'

SECTION B–B



SCALE
HORIZ: 1"=20'
VERT: 1"=4'

Apr 27, 2017 – 15:51 Data Name: P:\Cdocs\01\dwg\Eng\Plot Drawings\Plan Set\Tentative Map\04 Grading Plan.dwg Updated By: SJividen

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NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT

CARSON CITY, NEVADA

CROSS SECTIONS

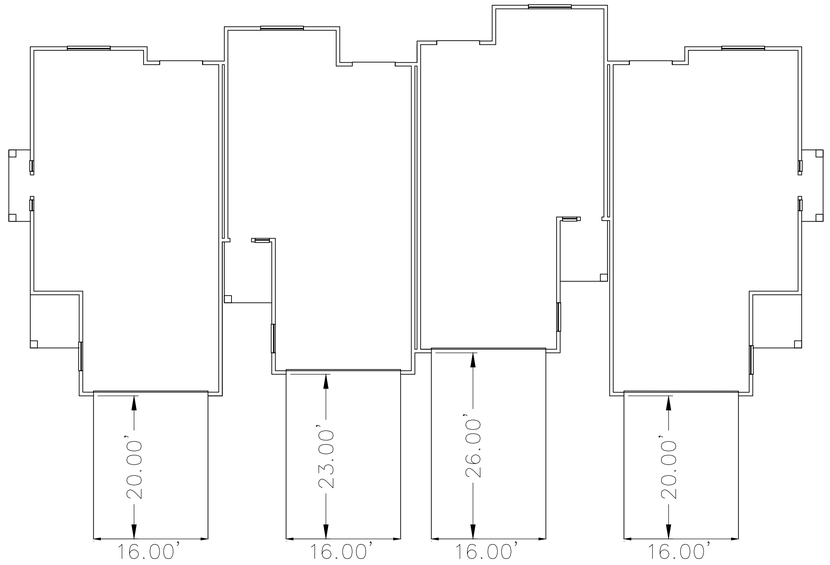
PROFESSIONAL ENGINEER - STATE OF NEVADA
DAVID M. KITCHEN
Exp: 06-30-17
CIVIL
No. 14483
04-28-17

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	AS SHOWN

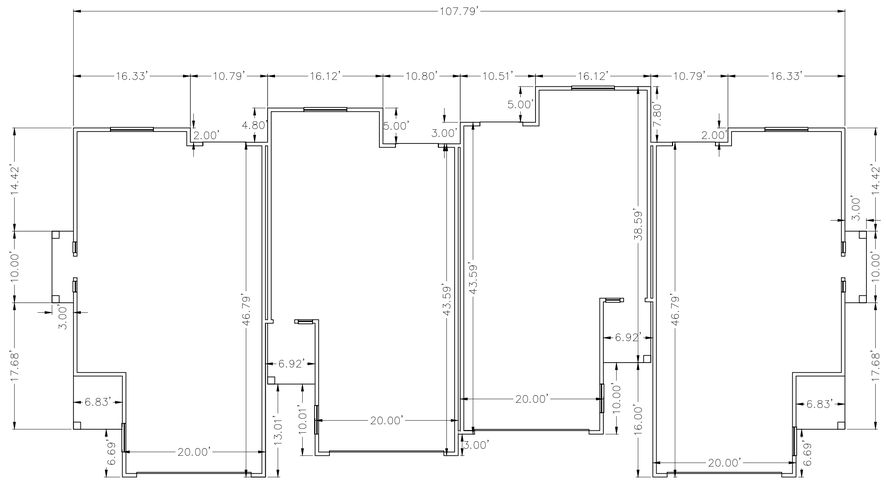
SHEET 5 OF 6

GEICCNV01

PENDING AGENCY APPROVAL

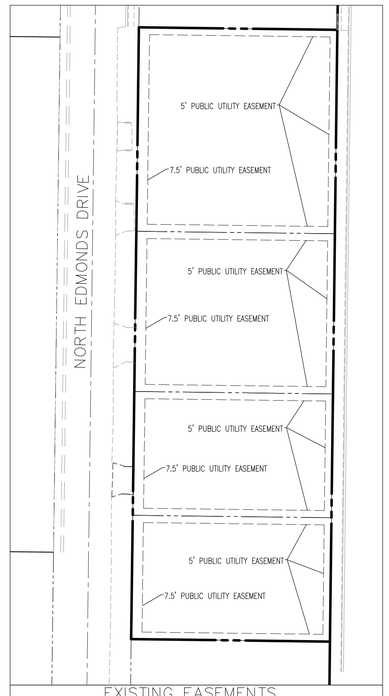


TYPICAL DRIVEWAY
DIMENSIONS
SCALE: 1"=10'

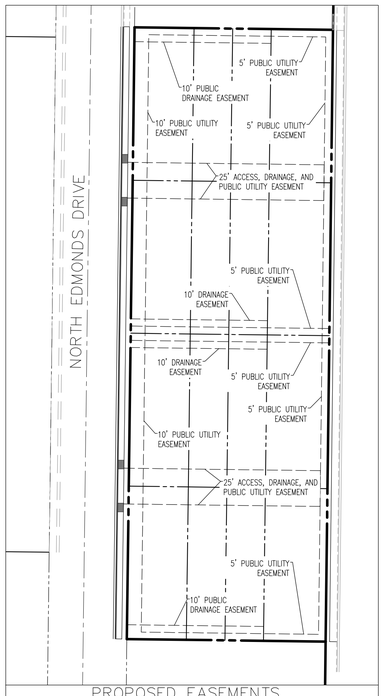


NOTE: ALL UNITS HAVE A 3.5" AIR GAP BETWEEN THEM

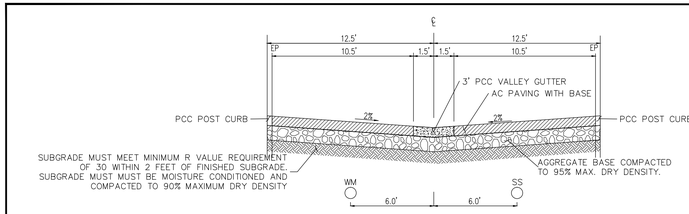
TYPICAL UNIT
DIMENSIONING
SCALE: 1"=10'



EXISTING EASEMENTS
SCALE: 1"=50'



PROPOSED EASEMENTS
SCALE: 1"=50'



TYPICAL ACCESS SECTION
NOT TO SCALE

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NORTH EDMONDS-COMMON OPEN SPACE DEVELOPMENT
CARSON CITY, NEVADA
DETAIL SHEET

DAVID M. KITCHEN
Exp 06-30-17
CIVIL
No 14487
STATE OF NEVADA
PROFESSIONAL ENGINEER
04-28-17

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	SWJ
DATE:	APR 2017
SCALE:	AS SHOWN

SHEET 6 OF 6
GEICCNV01

PENDING AGENCY APPROVAL

April 27, 2017 - 16:03 Dwg Name: P:\Geiccnv01\data\Civil\Final Drawings\Plan Set\Tentative Map\V2-Site Plan.dwg Updated By: Sullivan

UNIT "A"
3 BEDROOM

1st FLOOR:	688 S.F.
2nd FLOOR:	945 S.F.
TOTAL LIVING:	1633 S.F.
GARAGE:	502 S.F.
DECK:	51 S.F.

UNIT "B"
3 BEDROOM

1st FLOOR:	625 S.F.
2nd FLOOR:	891 S.F.
TOTAL LIVING:	1516 S.F.
GARAGE:	493 S.F.
DECK:	56 S.F.

UNIT "C"
3 BEDROOM

1st FLOOR:	625 S.F.
2nd FLOOR:	899 S.F.
TOTAL LIVING:	1524 S.F.
GARAGE:	493 S.F.
DECK:	56 S.F.

UNIT "D"
3 BEDROOM

1st FLOOR:	688 S.F.
2nd FLOOR:	945 S.F.
TOTAL LIVING:	1633 S.F.
GARAGE:	502 S.F.
DECK:	51 S.F.

1 OVERALL 1st FLOOR PLAN
SCALE: 1/4" = 1'-0"

DATE | REVISIONS: | DRAWN BY: | CHECK BY:

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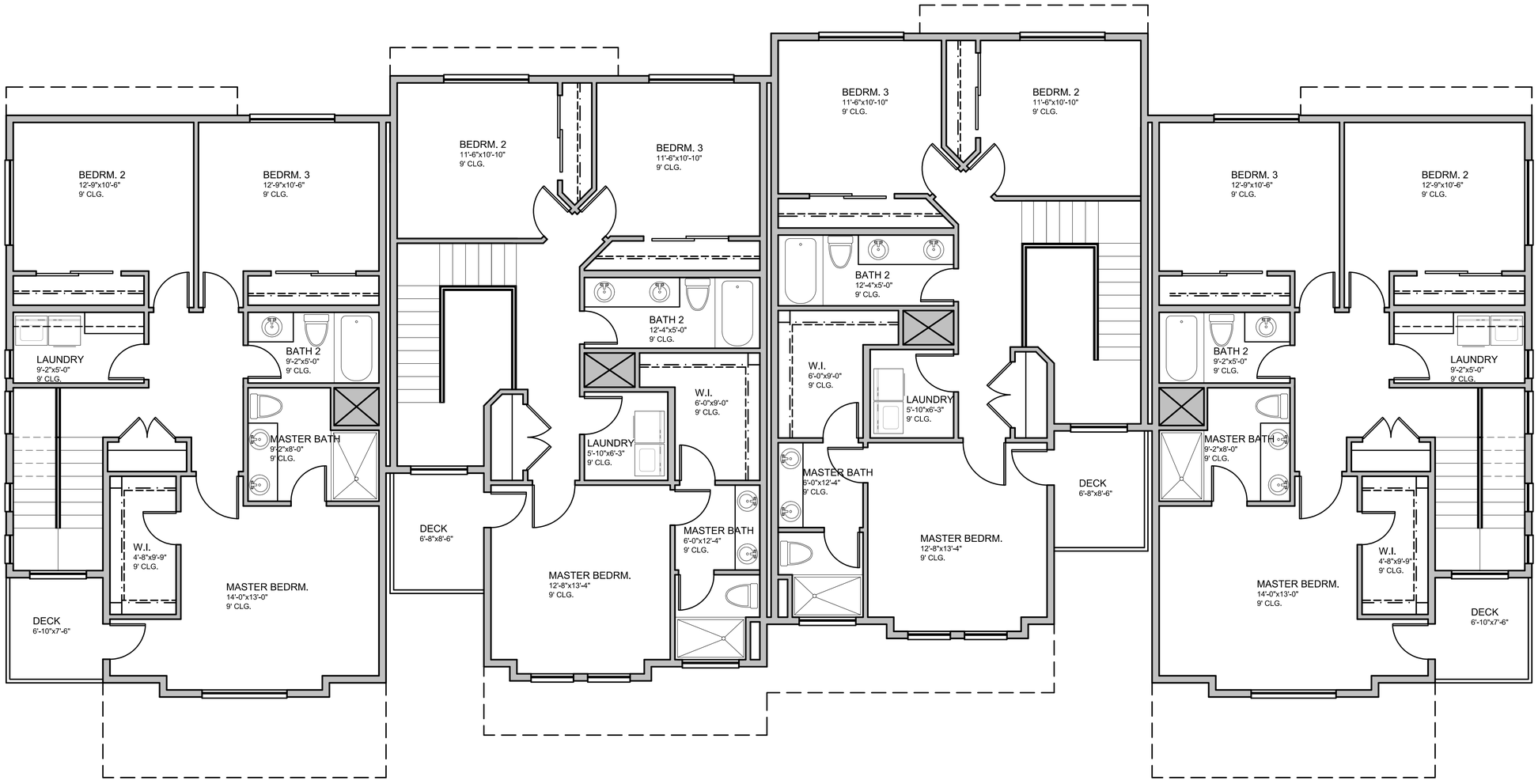
NORTH EDMONDS DRIVE
CARSON CITY, NV.
OVERALL CONCEPTION FIRST FLOOR PLAN

PROFESSIONAL ENGINEER - STATE OF NEVADA
KEITH R SHAFFER
Exp. 6-30-18
CIVIL
12106

PROJ. MGR.:	KRS
PROJ. ASSOC.:	
DRAWN BY:	RES
DATE:	04/10/17
SCALE:	1/4"=1'-0"

SHEET
A1
Geicnv01

March 14, 2017 - 15:16 Dwg Name: \\mdl-cc-nas\Projects-CC\Geicnv01\dwg\SD Dwgs\Final floor plans.dwg Updated By: RScott



1 OVERALL 2nd FLOOR PLAN
SCALE: 1/4" = 1'-0"

March 14, 2017 – 15:16 Dwg Name: \\md-cc-nas\Projects-CC\Geiccnv01\dwg\SD Dwgs\Final floor plans.dwg Updated By: RScott

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NORTH EDMONDS DRIVE
CARSON CITY, NV.
OVERALL CONCEPTION SECOND FLOOR PLAN

PROFESSIONAL ENGINEER - STATE OF NEVADA
KEITH R. SHAFFER
Exp. 6-30-18
CIVIL
12106

PROJ. MGR.:	KRS
PROJ. ASSOC.:	
DRAWN BY:	RES
DATE:	04/10/17
SCALE:	1/4"=1'-0"

SHEET
A2

Geiccnv01

2 ELEVATION 2

1 ELEVATION 1

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NORTH EDMONDS DRIVE

CARSON CITY, NV.

CONCEPTION EXTERIOR ELEVATIONS

PROJ. MGR.:	KRS
PROJ. ASSOC.:	
DRAWN BY:	RES
DATE:	03/14/17
SCALE:	3/16"=1'-0"

SHEET
A3

Geiccnv01

2 ELEVATION 4

1 ELEVATION 3

REVISIONS | DATE | DRAWN BY | CHECK BY

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Construction Managers • Environmental Scientists • Landscape Architects • Planners

NORTH EDMONDS DRIVE

CARSON CITY, NV.

CONCEPTION EXTERIOR ELEVATIONS

PROJ. MGR.:	KRS
PROJ. ASSOC.:	
DRAWN BY:	RES
DATE:	03/14/17
SCALE:	3/16"=1'-0"

SHEET
A4

Geiccnv01

2 PERSPECTIVE VIEW 2

1 PERSPECTIVE VIEW 1

DATE	REVISIONS	DRAWN BY	CHECK BY

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Construction Managers • Environmental Scientists • Landscape Architects • Planners

NORTH EDMONDS DRIVE

CARSON CITY, NV.

PERSPECTIVE VIEW EXTERIOR ELEVATIONS

PROJ. MGR.:	KRS
PROJ. ASSOC.:	
DRAWN BY:	RES
DATE:	04/10/17
SCALE:	N.T.S.

SHEET
A5

2 PERSPECTIVE VIEW 4

1 PERSPEVTIVE VIEW 3

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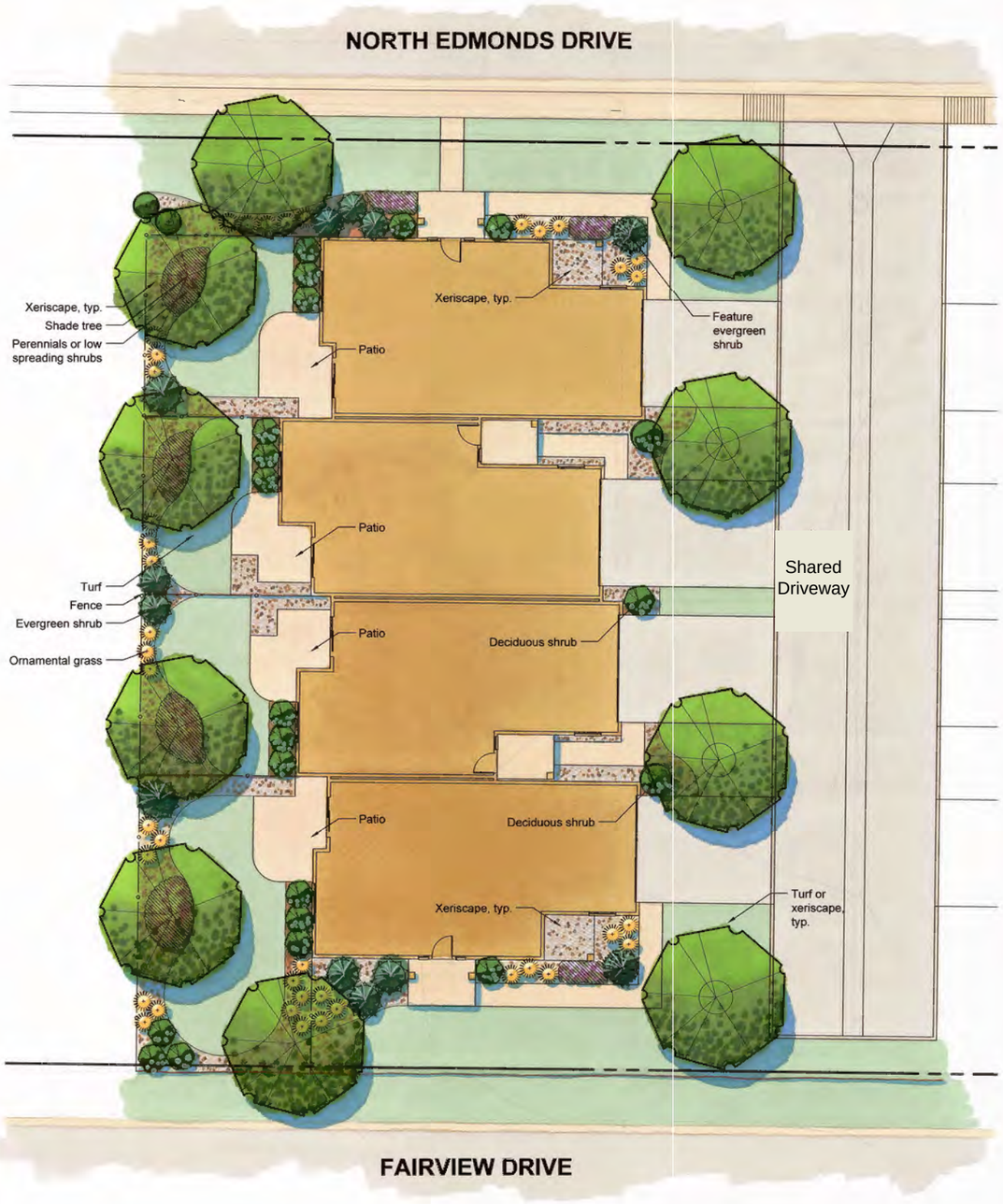
DATE | REVISIONS | DRAWN BY | CHECK BY

NORTH EDMONDS DRIVE
CARSON CITY, NV.
PERSPECTIVE VIEW EXTERIOR ELEVATIONS

PROJ. MGR.: KRS
PROJ. ASSOC.:
DRAWN BY: RES
DATE: 04/10/17
SCALE: N.T.S.

SHEET
A6



1 Typical Building Unit Landscaping

1" = 10-0"

GRAPHIC SCALE

10 0 5 10 20 40

(IN FEET)
1 inch = 10 ft.

NORTH

Manhard CONSULTING LTD

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DATE	REVISIONS	DRAWN BY	CHECK BY

NORTH EDMONDS TOWNHOUSES
CARSON CITY, NEVADA
PRELIMINARY LANDSCAPE PLAN

PROJ. MGR.:	DMK
PROJ. ASSOC.:	SWJ
DRAWN BY:	MN
DATE:	MAR 2017
SCALE:	1:10

SHEET L1 OF L1

GEICONV01

PENDING AGENCY APPROVAL

Apr 3, 2017 - 15:26 Dwg Name: R:\Projects\Carson\Design\Preliminary Landscape Plans\N Landscape Plans.dwg Updated By: mnace

PRELIMINARY DRAINAGE STUDY REPORT

FOR

NORTH EDMONDS

CARSON CITY, NEVADA

Prepared for:

G& E Investments
PO Box 2826
Minden, NV 89410

Prepared by:

Manhard Consulting Ltd.
9850 Double R Boulevard
Suite 101
Reno, Nevada 89521

Project: GEICCNV01

Date: 04/19/17

Table of Contents

Appendices

List of Figures

List of Tables

1 INTRODUCTION

1.1 Purpose of Analysis

This report presents the data, hydrologic and hydraulic analyses, and conclusions of a preliminary technical drainage study performed for North Edmonds to support the proposed development in Carson City, Nevada. In addition, in the interest of brevity and clarity, this report will defer to figures, tables, and the data and calculations contained in the appendices, whenever possible.

1.2 Project Location and Description

The North Edmonds development is approximately 1.37± acres in size with approximately 0.10± acres in offsite development and is located in the eastern portion of Carson City. The project is east of Edmonds Drive, south of Gordon Street, west of Fairview Drive, and north of Reeves Street. This site is situated within the North one-half of the South one-half of Section 10, Township 15 North, Range 20 East, Mount Diablo Meridian and Baseline (refer to Figure 1, Vicinity Map). The project site is within the existing parcels 008-30-609, 008-30-611 008-30-615, and 008-30-616.

1.3 Project Description

The North Edmonds development is a proposed subdivision which consists of 16 single-family residential units on a 1.37± acre parcel. The project site is currently zoned within the MFA zoning district.

According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Number 3200010111G, effective date December 22, 2016 the subject property is located in Non-Shaded Zone X, which is located within the 500-year floodplain.

The purpose of this report is to analyze the existing and proposed conditions of the subject property based on the 5-year and 100-year peak flow events. The report contains the following sections: (1) Methodologies and Assumptions, (2) Existing Hydrology, (3) Proposed Hydrology, and (4) Conclusion.

2 METHODOLOGIES AND ASSUMPTIONS

2.1 Hydrologic Modeling Methods

Hydrologic analyses were performed to determine the peak discharge for the 5-year and 100-year peak flow events. The *Rational Method* analysis to model the hydrologic basins that contribute in the existing and proposed conditions.

Parameters for peak storm flow and runoff volume estimates presented herein were determined using the data and methodologies presented in the *Carson City Municipal Code, Division 14 – Storm Drainage* section. In instances where the Carson City Municipal Code, Division 14 (CCMC-14) was lacking information or specificity, the *Truckee Meadows Regional Drainage Design Manual (2009)* and/or the other appropriate sources and software user manuals were referenced.

For the existing and proposed on-site hydrologic conditions, the Rational Method was utilized in accordance with the CCMC-14. A minimum time of concentration of 10-minutes was used for all sub-basins for a conservative analysis.

The rainfall characteristics were modeled using the NOAA database (http://dipper.nws.noaa.gov/hdsc/pfds/sa/nv_pfds.html) to determine site specific depth of precipitation (Appendix A).

Rational Formula: **Q=CiA**
Q=Peak Discharge (cfs)
C=Runoff Coefficient (dimensionless)
i=Precipitation Intensity (in/hr)
A=Watershed Area (Acres)

3 EXISTING HYDROLOGIC CONDITIONS

3.1 Existing On-Site Drainage

The existing site is currently developed for single family homes with several out buildings. A drainage swale that passes underneath the driveways for each property is currently in place. The swale drains North towards Gordon Street. For the existing catchment a time of concentration (Tc) of 10 minutes and the Rational Method coefficients were selected, taking into consideration the catchment characteristics, which include catchment area and land cover. A 5-year intensity of 1.44 in/hr and 100-year intensity of 3.51 in/hr were used. Table 1 and Figure 2 summarize the characteristics of on-site catchment of the study area. Reference Figure 2 (Existing Hydrologic Conditions) for existing hydrology drainage map and the associated hydrologic sub-areas.

Table 1 – Existing Conditions Rational Method Model Summary for the North Edmonds, Carson City, Nevada.

Sub-Basin	Affected Area (Ac.)	Rational Method Coefficient (C_5/C_{100})	Time of Concentration (min)	Rainfall Intensity (I_5/I_{100}) (in/hr)	5-Year Peak Flows (cfs)	100-Year Peak Flows (cfs)
EX1	1.455	0.45/0.60	10.00	1.44/3.51	0.94	3.06
TOTAL	**1.455**	-----	-----	-----	**0.94**	**3.06**

The combined 5-year and 100-year peak flows from on-site catchment in the existing condition are 0.94 cfs and 3.51 cfs, respectively. The existing flow from area EX1 discharges to Edmonds Drive Street. The flow from this area flows to North Edmonds Drive.

4 PROPOSED HYDROLOGIC CONDITIONS

4.1 Proposed On-Site Drainage

The sub-areas considered the proposed on-site flows that affect the site. All drainage for the site will be contained in swales and the roadway and will travel to Edmonds Drive. No on-site storm drain system is required. The associated calculated 5-year and 100-year peak flows can be found in Table 2 and Figure 3. A 5-year intensity of 1.44 in/hr and 100-year intensity of 3.51 in/hr were used.

Table 2 – Proposed Conditions Rational Method Model Summary for the North Edmonds, Carson City, Nevada.

Sub-Basin	Affected Area (Ac.)	Rational Method Coefficient (C_5/C_{100})	Time of Concentration (min)	Rainfall Intensity (I_5/I_{100}) (in/hr)	5-Year Peak Flows (cfs)	100-Year Peak Flows (cfs)
P1	1.455	0.60/0.78	10.00	1.44/3.51	1.26	3.98
TOTAL	**1.455**	-----	-----	-----	**1.26**	**3.98**

5 HYDRAULIC ANALYSIS

5.1 Proposed Drainage Conditions

All onsite storm drainage pipes and/or drainage features shall be designed to drain the 100-year storm flows to Edmonds Drive.

5.2 Retention/Detention

According to the existing and proposed hydrologic analysis, the existing 5-year and 100-year condition flows are 0.94 cfs and 3.06 cfs, respectively, and the proposed 5-year and 100-year condition flows are 1.26 cfs and 3.98 cfs. This is a 5-year increase of 0.32 cfs and a 100-year increase of 0.92 cfs. Even though there is not any existing public storm drain immediately adjacent to the discharge point in Edmonds Drive, the increase in flow for the project does not justify a retention pond.

6 CONCLUSION

6.1 Regulations and Master Plans

The proposed improvements and the analyses presented herein are in accordance with drainage regulations presented in *Carson City Municipal Code, Division 14 – Storm Drainage* section. In instances where the Carson City Municipal Code, Division 14 (CCMC-14) was lacking information or specificity, the *Truckee Meadows Regional Drainage Design Manual (2009)* and/or the other appropriate sources and software user manuals were referenced.

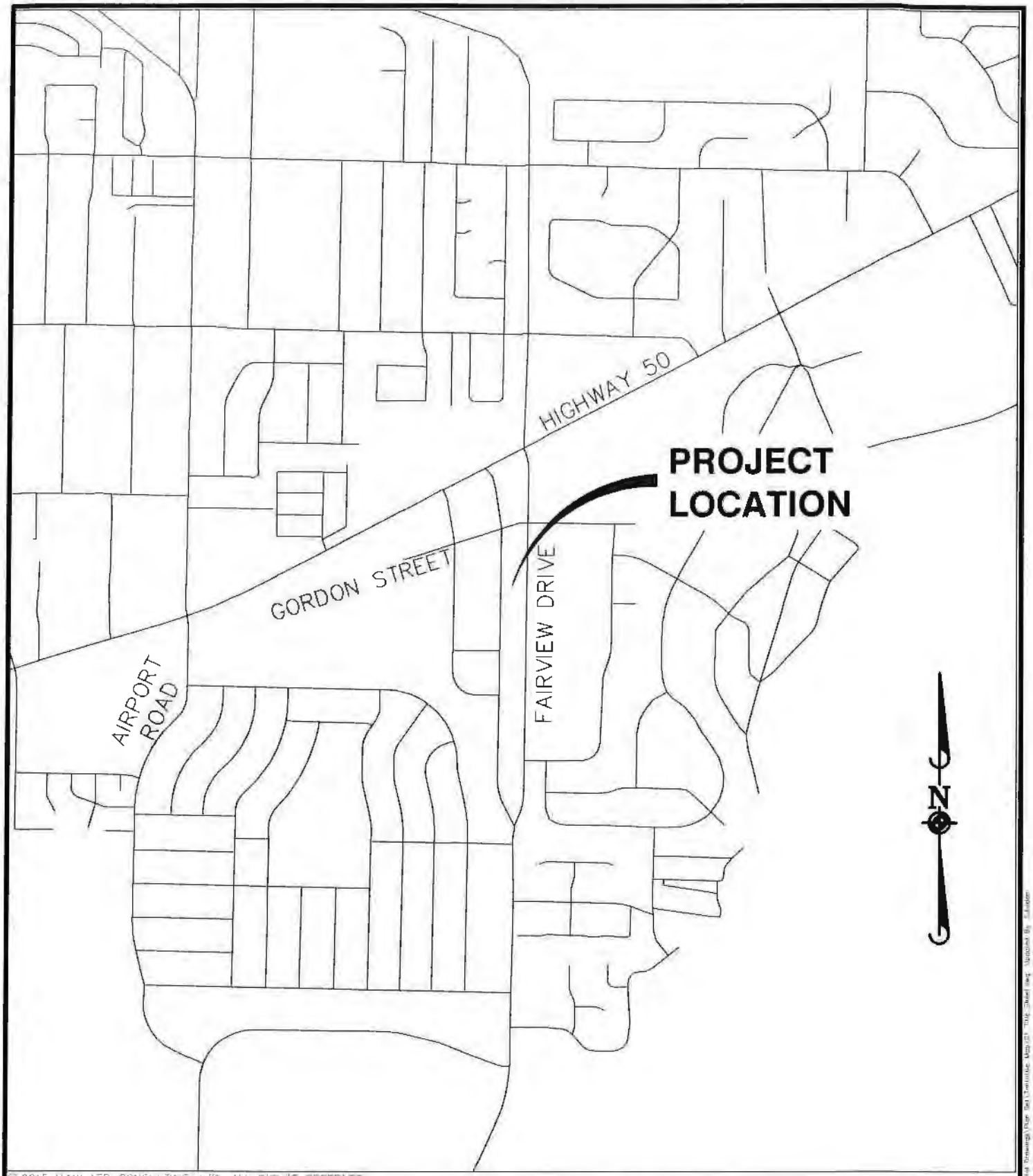
6.2 Impacts to Adjacent Properties

The performance of the proposed project improvements, roadways, and storm water conveyance facilities, once constructed, will not adversely impact upstream or downstream properties adjacent to this site. The development of this site for the uses proposed will increase downstream storm flow runoff rates, volumes, velocities, and depths, yet not by a significant amount. This development will not influence floodplain boundaries.

6.3 Standards of Practice

This study was prepared using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable professional engineers practicing in this and similar localities.

APPENDIX A
SUPPORTING DATA



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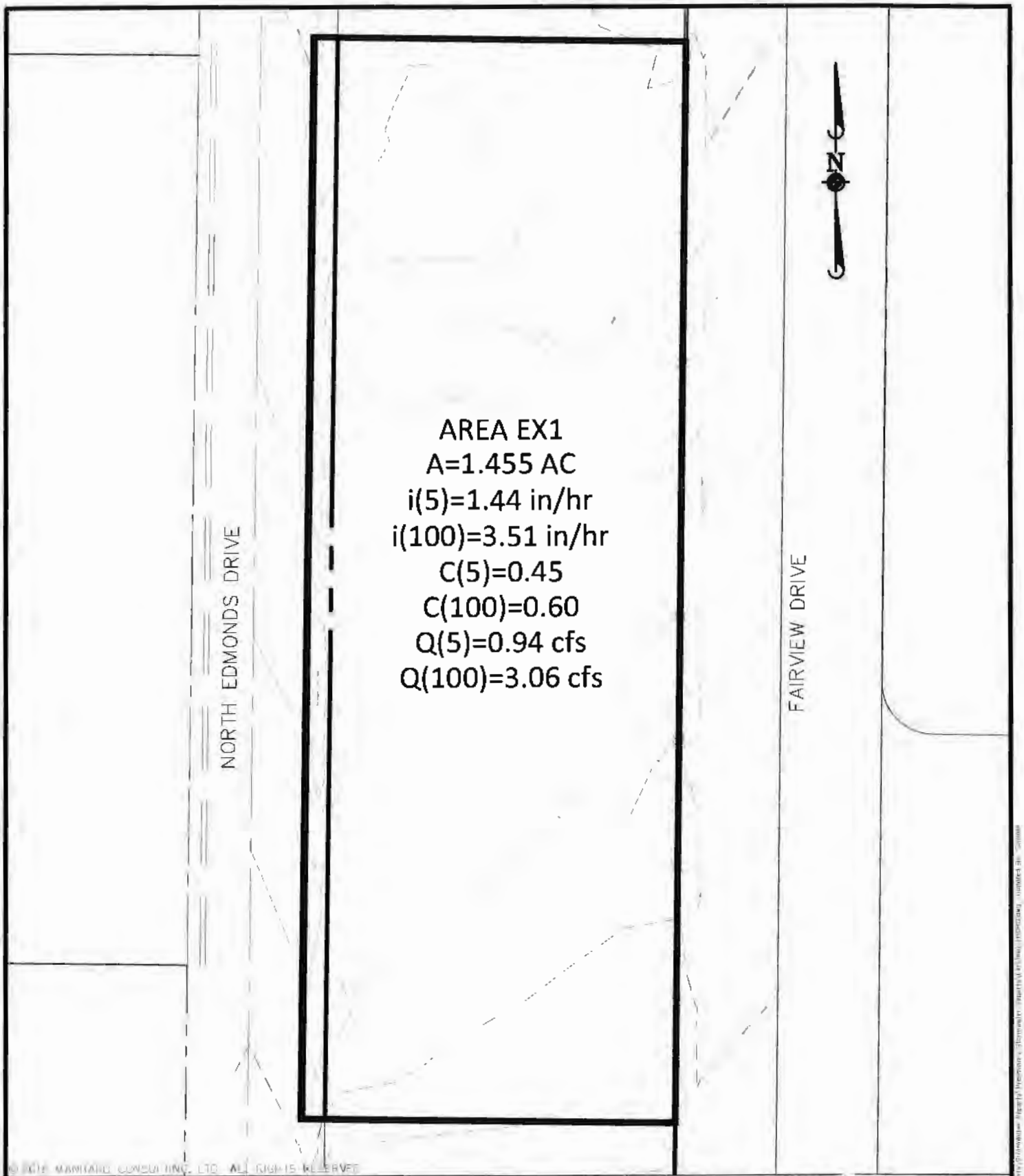
NORTH EDMONDS
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.:	DMK
DRAWN BY:	SWJ
DATE:	SWJ
SCALE:	1"=1000'

SHEET
FIGURE 1
GEICCNV01



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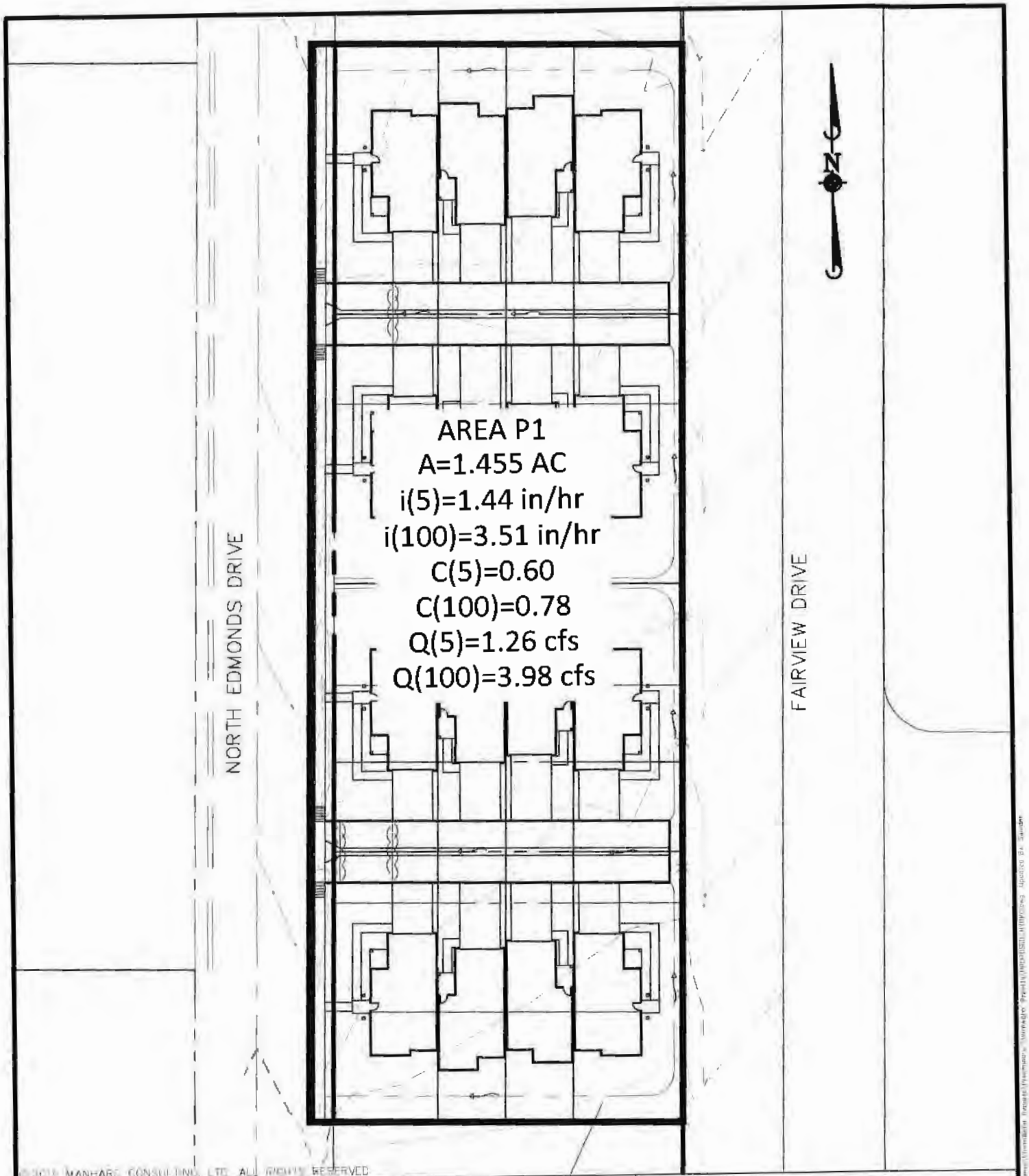
NORTH EDMONDS
CARSON CITY, NEVADA
PROPOSED HYDROLOGY CONDITIONS

PROJ. MGR.:	DMK
DRAWN BY:	SWJ
DATE:	SWJ
SCALE:	1"=50'

SHEET
FIGURE 2
GEICCNV01



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NORTH EDMONDS
CARSON CITY, NEVADA
PROPOSED HYDROLOGY CONDITIONS

PROJ. MGR.:	DMK
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DATE:	SWJ
SCALE:	1"=50'

SHEET
FIGURE 3
GEICCNV01

RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS

Land Use or Surface Characteristics	Aver. % Impervious Area	Runoff Coefficients 5-Year (C_5)	Runoff Coefficients 100-Year (C_{100})
Business/Commercial:			
Downtown Areas	85	.82	.85
Neighborhood Areas	70	.65	.80
Residential:			
(Average Lot Size)			
⅛ Acre or Less (Multi-Unit)	65	.60	.78
¼ Acre	38	.50	.65
⅛ Acre	30	.45	.60
½ Acre	25	.40	.55
1 Acre	20	.35	.50
Industrial:	72	.68	.82
Open Space:			
(Lawns, Parks, Golf Courses)	5	.05	.30
Undeveloped Areas:			
Range	0	.20	.50
Forest	0	.05	.30
Streets/Roads:			
Paved	100	.88	.93
Gravel	20	.25	.50
Drives/Walks:	95	.87	.90
Roof:	90	.85	.87

Notes:

1. Composite runoff coefficients shown for Residential, Industrial, and Business/Commercial Areas assume irrigated grass landscaping for all pervious areas. For development with landscaping other than irrigated grass, the designer must develop project specific composite runoff coefficients from the surface characteristics presented in this table.

NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1777°, Longitude: -119.7248°
Elevation: 4635.25 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.14 (0.984-1.34)	1.42 (1.22-1.68)	1.90 (1.62-2.26)	2.35 (2.00-2.80)	3.11 (2.56-3.70)	3.79 (3.02-4.54)	4.62 (3.56-5.57)	5.59 (4.14-6.88)	7.15 (4.99-8.96)	8.56 (5.70-10.9)
10-min	0.864 (0.744-1.03)	1.08 (0.930-1.28)	1.44 (1.24-1.72)	1.79 (1.52-2.12)	2.36 (1.94-2.81)	2.89 (2.30-3.46)	3.51 (2.71-4.24)	4.25 (3.15-5.23)	5.44 (3.80-6.83)	6.50 (4.33-8.30)
15-min	0.716 (0.616-0.848)	0.892 (0.772-1.06)	1.19 (1.02-1.42)	1.48 (1.26-1.76)	1.95 (1.61-2.32)	2.38 (1.90-2.86)	2.90 (2.24-3.51)	3.52 (2.60-4.32)	4.50 (3.14-5.64)	5.38 (3.58-6.86)
30-min	0.482 (0.414-0.570)	0.600 (0.520-0.714)	0.802 (0.688-0.954)	0.996 (0.848-1.18)	1.31 (1.08-1.56)	1.61 (1.28-1.92)	1.95 (1.51-2.36)	2.37 (1.75-2.91)	3.03 (2.12-3.80)	3.62 (2.41-4.62)
60-min	0.298 (0.257-0.353)	0.371 (0.321-0.441)	0.497 (0.426-0.591)	0.616 (0.524-0.733)	0.814 (0.670-0.968)	0.993 (0.794-1.19)	1.21 (0.933-1.46)	1.47 (1.09-1.80)	1.87 (1.31-2.35)	2.24 (1.49-2.86)
2-hr	0.202 (0.180-0.232)	0.251 (0.222-0.288)	0.320 (0.282-0.366)	0.382 (0.332-0.437)	0.475 (0.402-0.546)	0.558 (0.462-0.648)	0.651 (0.526-0.764)	0.764 (0.597-0.910)	0.960 (0.716-1.19)	1.14 (0.822-1.45)
3-hr	0.161 (0.144-0.181)	0.200 (0.180-0.226)	0.252 (0.224-0.284)	0.294 (0.260-0.331)	0.354 (0.308-0.401)	0.405 (0.346-0.463)	0.462 (0.387-0.534)	0.536 (0.438-0.628)	0.655 (0.519-0.799)	0.769 (0.594-0.972)
6-hr	0.111 (0.100-0.124)	0.139 (0.125-0.156)	0.173 (0.154-0.193)	0.199 (0.177-0.223)	0.236 (0.207-0.265)	0.265 (0.229-0.300)	0.293 (0.249-0.336)	0.327 (0.272-0.380)	0.377 (0.305-0.444)	0.420 (0.333-0.504)
12-hr	0.072 (0.064-0.081)	0.091 (0.081-0.102)	0.115 (0.102-0.129)	0.133 (0.118-0.150)	0.158 (0.138-0.179)	0.177 (0.153-0.202)	0.197 (0.167-0.227)	0.217 (0.181-0.253)	0.245 (0.198-0.291)	0.266 (0.211-0.321)
24-hr	0.047 (0.043-0.052)	0.059 (0.053-0.065)	0.074 (0.067-0.082)	0.086 (0.078-0.095)	0.103 (0.093-0.114)	0.117 (0.105-0.129)	0.131 (0.116-0.146)	0.146 (0.128-0.163)	0.166 (0.143-0.186)	0.181 (0.155-0.206)
2-day	0.028 (0.025-0.031)	0.035 (0.031-0.039)	0.044 (0.040-0.050)	0.052 (0.047-0.058)	0.063 (0.056-0.070)	0.071 (0.063-0.080)	0.080 (0.070-0.090)	0.089 (0.077-0.102)	0.102 (0.087-0.117)	0.112 (0.094-0.130)
3-day	0.020 (0.018-0.023)	0.026 (0.023-0.029)	0.033 (0.029-0.037)	0.038 (0.034-0.043)	0.047 (0.041-0.052)	0.053 (0.047-0.060)	0.060 (0.052-0.068)	0.067 (0.058-0.076)	0.077 (0.065-0.089)	0.085 (0.071-0.099)
4-day	0.017 (0.015-0.019)	0.021 (0.019-0.024)	0.027 (0.024-0.030)	0.032 (0.028-0.036)	0.038 (0.034-0.043)	0.044 (0.038-0.050)	0.050 (0.043-0.057)	0.056 (0.048-0.064)	0.065 (0.054-0.074)	0.072 (0.059-0.083)
7-day	0.011 (0.010-0.012)	0.014 (0.012-0.016)	0.018 (0.016-0.020)	0.021 (0.019-0.024)	0.026 (0.023-0.029)	0.029 (0.026-0.033)	0.033 (0.029-0.037)	0.037 (0.032-0.042)	0.042 (0.036-0.049)	0.046 (0.039-0.054)
10-day	0.008 (0.008-0.010)	0.011 (0.010-0.012)	0.014 (0.012-0.016)	0.016 (0.015-0.018)	0.020 (0.017-0.022)	0.022 (0.020-0.025)	0.025 (0.022-0.028)	0.028 (0.024-0.032)	0.032 (0.027-0.036)	0.034 (0.029-0.040)
20-day	0.005 (0.005-0.006)	0.007 (0.006-0.007)	0.008 (0.008-0.009)	0.010 (0.009-0.011)	0.012 (0.010-0.013)	0.013 (0.012-0.015)	0.015 (0.013-0.016)	0.016 (0.014-0.018)	0.018 (0.016-0.020)	0.019 (0.017-0.022)
30-day	0.004 (0.003-0.004)	0.005 (0.004-0.005)	0.006 (0.006-0.007)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.011 (0.010-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)
45-day	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.007)	0.007 (0.007-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.010 (0.009-0.011)
60-day	0.003 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.007 (0.007-0.008)	0.008 (0.007-0.009)	0.008 (0.007-0.009)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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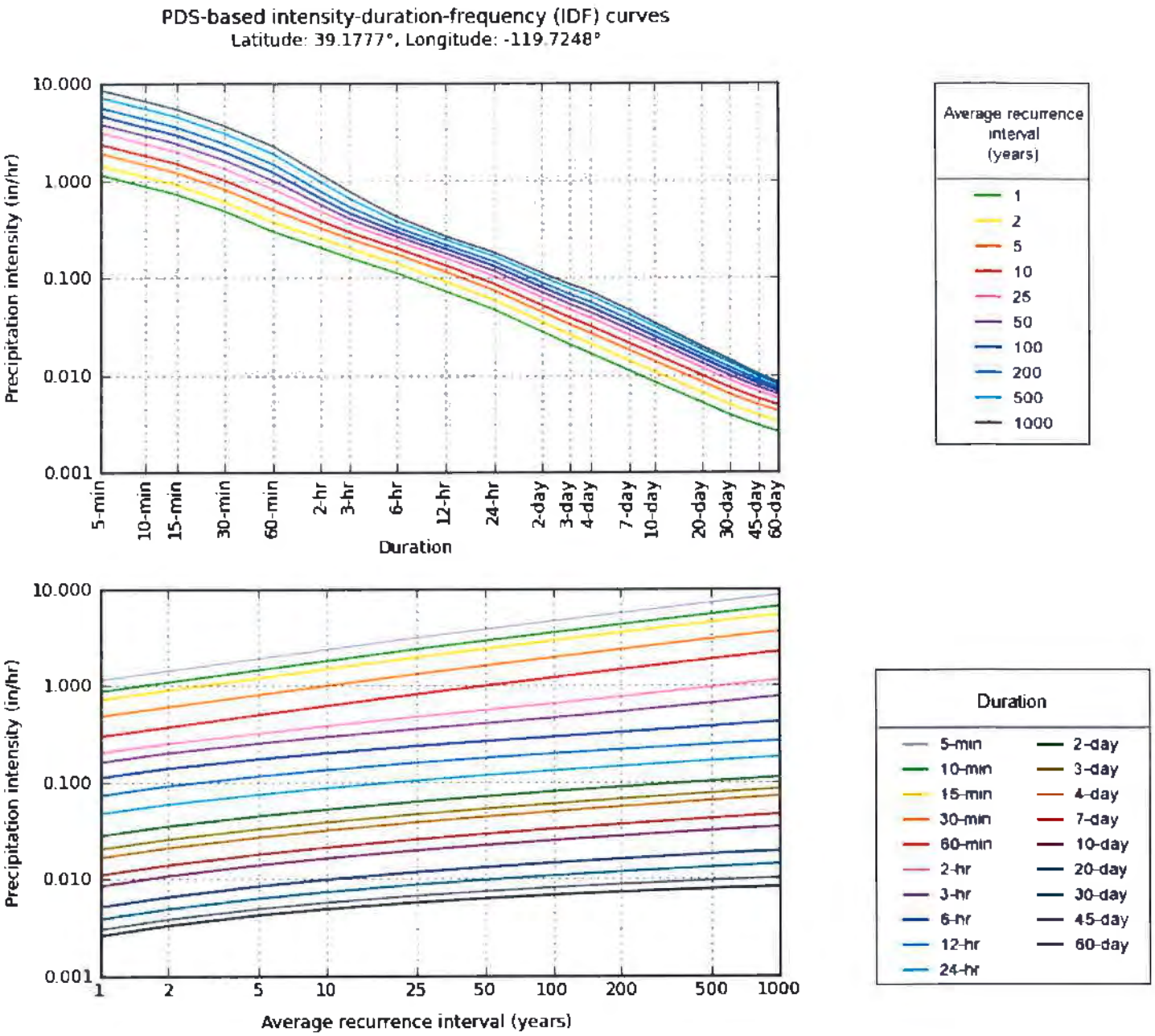
PF graphical



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Created (GMT): Fri Mar 17 16:12:48 2017

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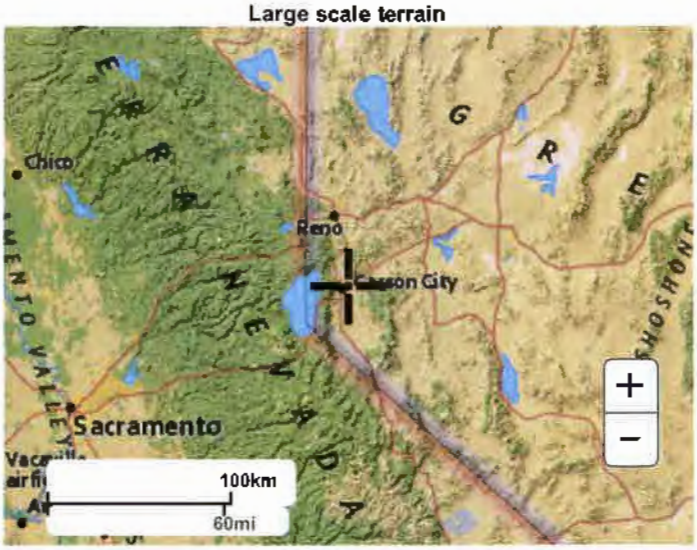
Maps & aerials

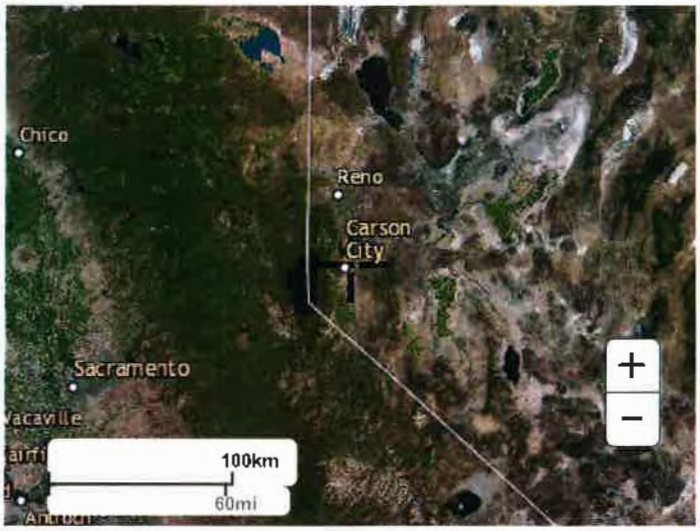
Small scale terrain

Large scale terrain



Large scale map

Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

CONCEPTUAL WATER SYSTEM ANALYSIS

FOR

NORTH EDMONDS

CARSON CITY, NEVADA

Prepared for:

G&E Investments
PO Box 2826
Minden, NV 89410

Prepared by:

Manhard Consulting Ltd.
9850 Double R Boulevard
Suite 101
Reno, Nevada 89521

Project: GEICCNV01

Date: 04/19/17

INTRODUCTION

The North Edmonds project at Edmonds Drive project is approximately 1.37+ acres in size and is proposed to consist of approximately 16 residential units located along Edmonds Drive (See figure1).

The water facilities plan will incorporate connections to the existing 8" water main at two locations in Edmonds Drive.

The North Edmonds water system was analyzed for the worst-case scenario to ensure that the proposed water system would meet pressure and velocity requirements in accordance Carson City Standards.

EXISTING SYSTEM

As presented in Figure 2, the existing water system consists of one 8" waterline located in Edmonds Drive that will be used as a connection point for the proposed residential portion of the development

The flow test fire hydrants are located on Edmonds Drive in Carson City. "Flow 1" is located on the north property line of the project, while "Flow 2" is located near the parking lot for the apartments across the street. The flow test data for both hydrants was provided by Carson City Utilities and has been included in the appendix for reference.

PROPOSED SYSTEM

As presented in Figure 2, the infrastructure to be added for North Edmonds at North Edmonds Drive will be 8" water distribution mains. The 8" water main connections to the existing system will be at locations as mentioned above. Each unit is assumed to have an average daily demand of 875 gallons per day.

The flow tests fire hydrant data is included in the back of this report. From that data, there is an average flow of 3800 gpm at 20 residual psi. The actual test pumping was approximately 1708 gpm with a residual pressure of 87 psi. Static pressure was at 107 psi.

The water system was analyzed to ensure that the Fire and Maximum Day Flow of 1500 gpm could be maintained at 20 psi. The simplified one connection, one line system from the South-most Edmonds Drive fire hydrant accounts for the greatest headloss within the proposed water system. At the hydrant in the simplified system, 1500gpm would be provided. By satisfying the fire flow requirements of the hydrant scenario with the largest headloss, the simplified system verifies that the entire system meets fire flow requirements as well as the residential demands.

SUMMARY

The hydrant test flow data (see attached documents) verify the existing water system in Edmonds Drive provides the required pressure and flow for this infill development. Through analysis and field tests, it was verified that the existing water system can meet the performance standards of NAC 445A.6672 to NAC 445A.6673 inclusive and NAC 445A.6711 when the domestic and fire demands of the proposed development are superimposed onto the water system as shown in the design and that the following criteria were met in regards to the residual pressure in the distribution system:

- Minimum 20 psi during conditions of fire flow and fire demand experienced during maximum day demand;
- Minimum 30 psi during peak hour demand;
- Minimum 40 psi during maximum day demand.

Appendix

Figures, Calculations and
Fire Hydrant Flow Data

Demand Calculations

Residential Demand

Average Day

$$16\ Units\left(\frac{3.5\ capita}{Unit}\right)=56\ capita$$

$$\left(\frac{250\ gal}{day\cdot capita}\right)(56\ capita)=14{,}000\ \frac{gal}{day}$$

$$\left(\frac{14{,}000\ gal}{day}\right)\left(\frac{day}{1440\ \text{min}}\right)=9.72\ gpm$$

Maximum Day

$$(Ave\ Day)(Peaking\ Factor)=(14{,}000\ gal)(1.5)=28{,}000\ gal$$

$$\left(\frac{28{,}000\ gal}{day}\right)\left(\frac{day}{1440\ \text{min}}\right)=19.44\ gpm$$

Peak Hour

$$(Ave\ Day)(Peaking\ Factor)=(14{,}000\ gal)(3.0)=42{,}000\ gal$$

$$\left(\frac{42{,}000\ gal}{day}\right)\left(\frac{day}{1440\ \text{min}}\right)=29.17\ gpm$$

Fire Demand

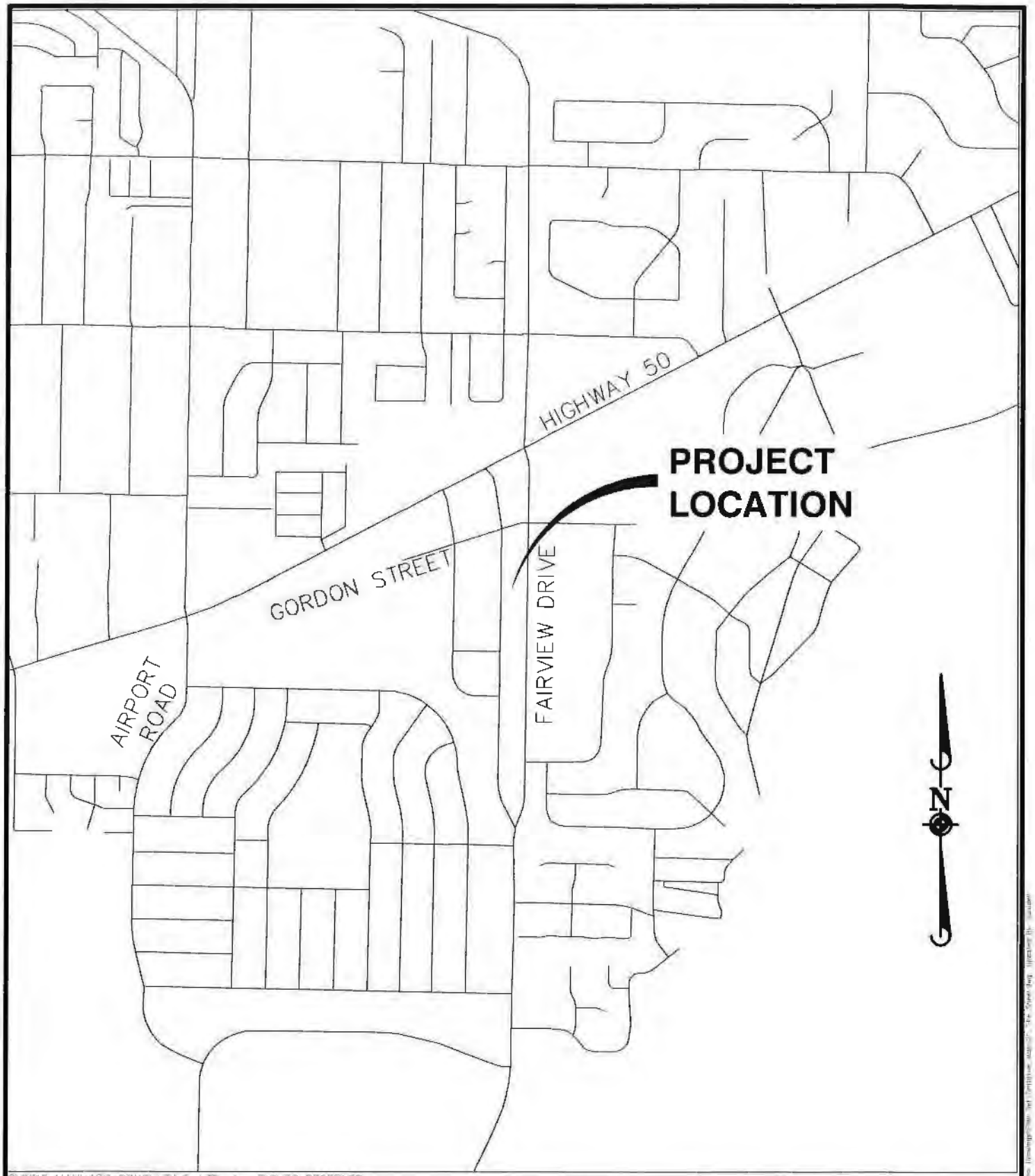
$$(Max\ Day)+(Fire\ Flow)(2\ hr\ duration)=Fire\ Demand$$

$$(21{,}000\ gal)+\left(\frac{1500 gal}{\text{min}}\right)(2hr)\left(\frac{60\ \text{min}}{hour}\right)=201{,}000\ gal$$

$$(Max\ Day)+(Fire\ Flow)=Fire\ Flow$$

$$14.58\ gpm+1500\ gpm=1514.58\ gpm$$

The required 1500gpm will be used to design the water system, accommodating the fire flow with the max day demand.



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NORTH EDMONDS
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VICINITY MAP

PROJ. MGR.:	DMK
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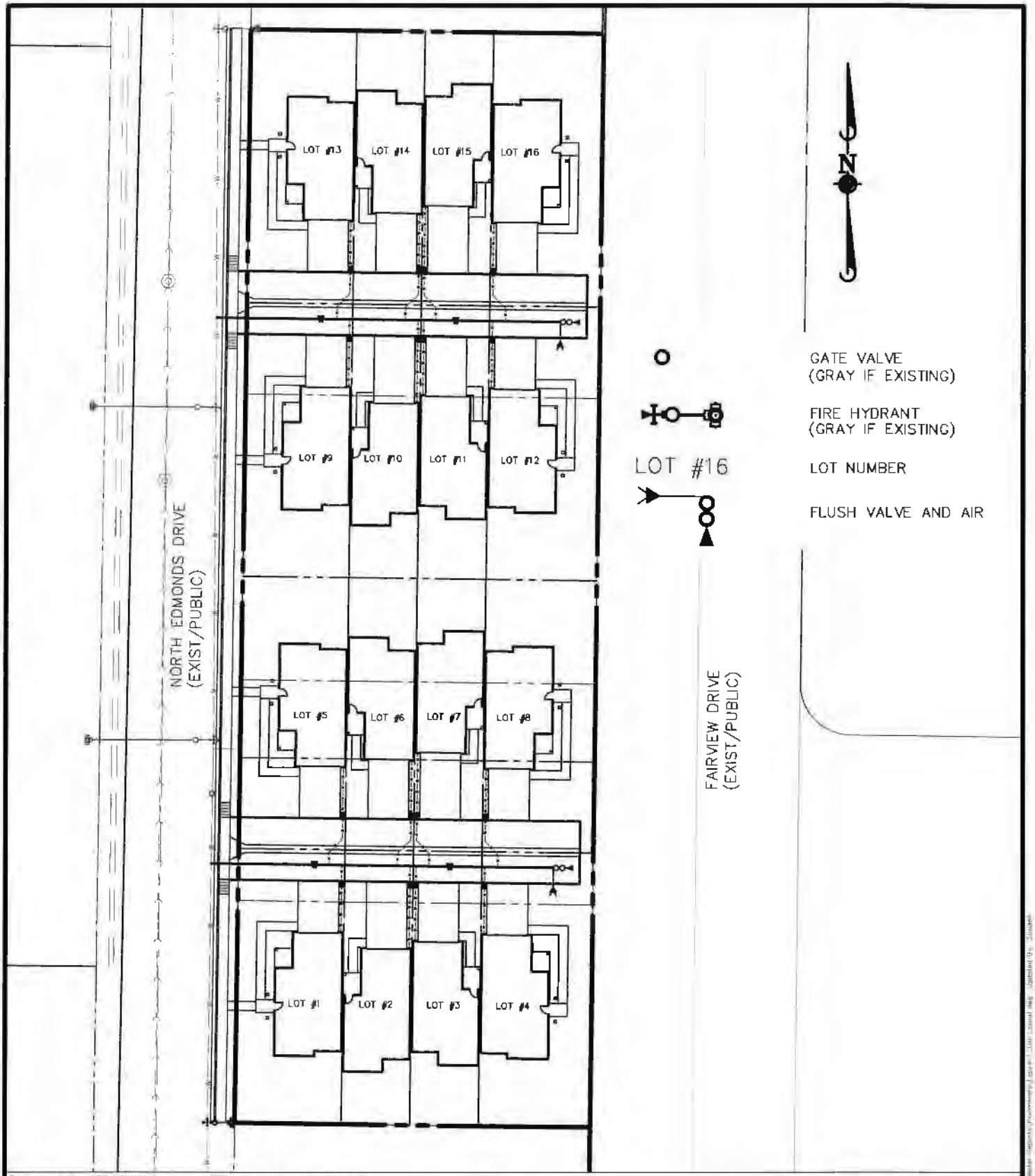
SHEET
FIGURE 1
GEICCNV01



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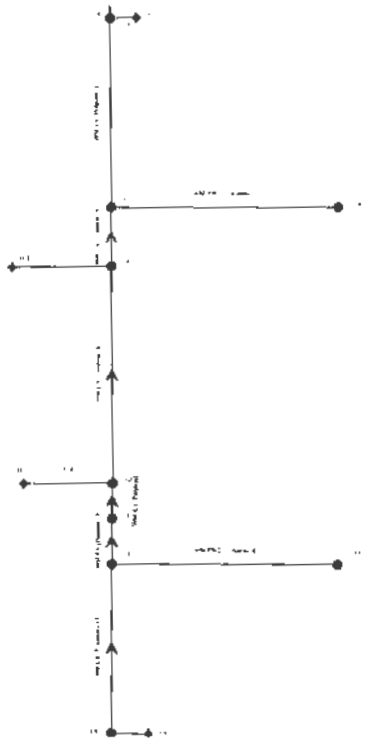
Civil Engineers · Surveyors · Water Resources Engineers · Water & Wastewater Engineers
Construction Managers · Environmental Scientists · Landscape Architects · Planners

NORTH EDMONDS
CARSON CITY, NEVADA
EXISTING AND PROPOSED WATERLINES

PROJ. MGR:	DMK
DRAWN BY:	SWJ
DATE:	SWJ
SCALE:	1"=50'

SHEET
FIGURE 2
GEICCNV01

Scenario: Base



Scenario Summary Report
Scenario: ADD

Scenario Summary	
ID	59
Label	ADD
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Base Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
SCADA	Base SCADA
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Base Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

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FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Material	Hazen-Williams C
WM-EX (Polyline)-7	J-1	J-2	8.0	21	5	0.03	0.000	PVC	150.0
WM-EX (Polyline)-5	J-3	J-1	8.0	27	5	0.03	0.000	PVC	150.0
WM-EX (Polyline)-9	J-4	J-5	8.0	35	5	0.03	0.000	PVC	150.0
WM-EX (Polyline)-12	J-6	J-7	8.0	38	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-13	J-8	J-3	8.0	101	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-6	J-5	J-9	8.0	113	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-10	J-9	J-10	8.0	119	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-8	J-2	J-4	8.0	131	5	0.03	0.000	PVC	150.0
WM-EX (Polyline)-11	J-10	J-6	8.0	140	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-1	J-11	J-8	8.0	251	10	0.06	0.000	PVC	150.0
WM-PRO (Polyline)-4	J-3	J-12	8.0	134	0	0.00	0.000	PVC	150.0
WM-PRO (Polyline)-3	J-5	J-13	8.0	135	0	0.00	0.000	PVC	150.0
P-1	R-2	J-11	8.0	768	10	0.06	0.000	PVC	150.0
P-2	H-1	J-4	6.0	59	0	0.00	0.000	PVC	150.0
P-3	H-2	J-9	6.0	15	0	0.00	0.000	PVC	150.0
P-4	H-3	J-2	6.0	53	0	0.00	0.000	PVC	150.0
P-5	H-4	J-8	6.0	22	0	0.00	0.000	PVC	150.0

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	4,634.31	<Collection: 0 items>	0	4,879.36	106
J-2	4,633.74	<Collection: 0 items>	0	4,879.36	106
J-3	4,634.55	<Collection: 1 items>	0	4,879.36	106
J-4	4,632.65	<Collection: 0 items>	0	4,879.36	107
J-5	4,632.11	<Collection: 1 items>	0	4,879.36	107
J-6	4,627.58	<Collection: 0 items>	0	4,879.36	109
J-7	4,627.12	<Collection: 0 items>	0	4,879.36	109
J-8	4,635.09	<Collection: 0 items>	0	4,879.36	106
J-9	4,630.73	<Collection: 0 items>	0	4,879.36	108
J-10	4,629.28	<Collection: 0 items>	0	4,879.36	108
J-11	4,638.12	<Collection: 0 items>	0	4,879.36	104
J-12	4,635.35	<Collection: 1 items>	5	4,879.36	106
J-13	4,632.92	<Collection: 1 items>	5	4,879.36	107

FlexTable: Hydrant Table

Label	Hydrant Status	Emitter Coefficient (gpm/psi^n)	Lateral Length (ft)	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	Closed	0.000	20	4,632.65	<None>	<Collection: 0 items>	0	4,879.36	107
H-2	Closed	0.000	20	4,630.73	<None>	<Collection: 1 items>	0	4,879.36	108
H-3	Closed	0.000	20	4,633.74	<None>	<Collection: 1 items>	0	4,879.36	106
H-4	Closed	0.000	20	4,635.09	<None>	<Collection: 1 items>	0	4,879.36	106

Scenario Summary Report
Scenario: MDD

Scenario Summary

ID	60
Label	MDD
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Base Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
SCADA	Base SCADA
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Base Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Material	Hazen-Williams C
WM-EX (Polyline)-7	J-1	J-2	8.0	21	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-5	J-3	J-1	8.0	27	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-9	J-4	J-5	8.0	35	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-12	J-6	J-7	8.0	38	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-13	J-8	J-3	8.0	101	20	0.13	0.000	PVC	150.0
WM-EX (Polyline)-6	J-5	J-9	8.0	113	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-10	J-9	J-10	8.0	119	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-8	J-2	J-4	8.0	131	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-11	J-10	J-6	8.0	140	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-1	J-11	J-8	8.0	251	20	0.13	0.000	PVC	150.0
WM-PRO (Polyline)-4	J-3	J-12	8.0	134	10	0.06	0.000	PVC	150.0
WM-PRO (Polyline)-3	J-5	J-13	8.0	135	10	0.06	0.000	PVC	150.0
P-1	R-2	J-11	8.0	768	20	0.13	0.000	PVC	150.0
P-2	H-1	J-4	6.0	59	0	0.00	0.000	PVC	150.0
P-3	H-2	J-9	6.0	15	0	0.00	0.000	PVC	150.0
P-4	H-3	J-2	6.0	53	0	0.00	0.000	PVC	150.0
P-5	H-4	J-8	6.0	22	0	0.00	0.000	PVC	150.0

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	4,634.31	<Collection: 0 items>	0	4,879.35	106
J-2	4,633.74	<Collection: 0 items>	0	4,879.35	106
J-3	4,634.55	<Collection: 1 items>	0	4,879.35	106
J-4	4,632.65	<Collection: 0 items>	0	4,879.35	107
J-5	4,632.11	<Collection: 1 items>	0	4,879.35	107
J-6	4,627.58	<Collection: 0 items>	0	4,879.35	109
J-7	4,627.12	<Collection: 0 items>	0	4,879.35	109
J-8	4,635.09	<Collection: 0 items>	0	4,879.35	106
J-9	4,630.73	<Collection: 0 items>	0	4,879.35	108
J-10	4,629.28	<Collection: 0 items>	0	4,879.35	108
J-11	4,638.12	<Collection: 0 items>	0	4,879.35	104
J-12	4,635.35	<Collection: 1 items>	10	4,879.35	106
J-13	4,632.92	<Collection: 1 items>	10	4,879.35	107

FlexTable: Hydrant Table

Label	Hydrant Status	Emitter Coefficient (gpm/psi^n)	Lateral Length (ft)	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	Closed	0.000	20	4,632.65	<None>	<Collection: 0 items>	0	4,879.35	107
H-2	Closed	0.000	20	4,630.73	<None>	<Collection: 1 items>	0	4,879.35	108
H-3	Closed	0.000	20	4,633.74	<None>	<Collection: 1 items>	0	4,879.35	106
H-4	Closed	0.000	20	4,635.09	<None>	<Collection: 1 items>	0	4,879.35	106

Scenario Summary Report
Scenario: PHD

Scenario Summary	
ID	61
Label	PHD
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Base Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
SCADA	Base SCADA
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Base Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary			
Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Material	Hazen-Williams C
WM-EX (Polyline)-7	J-1	J-2	8.0	21	15	0.09	0.000	PVC	150.0
WM-EX (Polyline)-5	J-3	J-1	8.0	27	15	0.09	0.000	PVC	150.0
WM-EX (Polyline)-9	J-4	J-5	8.0	35	15	0.09	0.000	PVC	150.0
WM-EX (Polyline)-12	J-6	J-7	8.0	38	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-13	J-8	J-3	8.0	101	29	0.19	0.000	PVC	150.0
WM-EX (Polyline)-6	J-5	J-9	8.0	113	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-10	J-9	J-10	8.0	119	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-8	J-2	J-4	8.0	131	15	0.09	0.000	PVC	150.0
WM-EX (Polyline)-11	J-10	J-6	8.0	140	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-1	J-11	J-8	8.0	251	29	0.19	0.000	PVC	150.0
WM-PRO (Polyline)-4	J-3	J-12	8.0	134	15	0.09	0.000	PVC	150.0
WM-PRO (Polyline)-3	J-5	J-13	8.0	135	15	0.09	0.000	PVC	150.0
P-1	R-2	J-11	8.0	768	29	0.19	0.000	PVC	150.0
P-2	H-1	J-4	6.0	59	0	0.00	0.000	PVC	150.0
P-3	H-2	J-9	6.0	15	0	0.00	0.000	PVC	150.0
P-4	H-3	J-2	6.0	53	0	0.00	0.000	PVC	150.0
P-5	H-4	J-8	6.0	22	0	0.00	0.000	PVC	150.0

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	4,634.31	<Collection: 0 items>	0	4,879.34	106
J-2	4,633.74	<Collection: 0 items>	0	4,879.34	106
J-3	4,634.55	<Collection: 1 items>	0	4,879.34	106
J-4	4,632.65	<Collection: 0 items>	0	4,879.34	107
J-5	4,632.11	<Collection: 1 items>	0	4,879.34	107
J-6	4,627.58	<Collection: 0 items>	0	4,879.34	109
J-7	4,627.12	<Collection: 0 items>	0	4,879.34	109
J-8	4,635.09	<Collection: 0 items>	0	4,879.34	106
J-9	4,630.73	<Collection: 0 items>	0	4,879.34	108
J-10	4,629.28	<Collection: 0 items>	0	4,879.34	108
J-11	4,638.12	<Collection: 0 items>	0	4,879.34	104
J-12	4,635.35	<Collection: 1 items>	15	4,879.34	106
J-13	4,632.92	<Collection: 1 items>	15	4,879.33	107

FlexTable: Hydrant Table

Label	Hydrant Status	Emitter Coefficient (gpm/psi^n)	Lateral Length (ft)	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	Closed	0.000	20	4,632.65	<None>	<Collection: 0 items>	0	4,879.34	107
H-2	Closed	0.000	20	4,630.73	<None>	<Collection: 1 items>	0	4,879.34	108
H-3	Closed	0.000	20	4,633.74	<None>	<Collection: 1 items>	0	4,879.34	106
H-4	Closed	0.000	20	4,635.09	<None>	<Collection: 1 items>	0	4,879.34	106

Scenario Summary Report
Scenario: MDD plus Fire

Scenario Summary

ID	62
Label	MDD plus Fire
Notes	
Active Topology	Base Active Topology
Physical	Base Physical
Demand	Base Demand
Initial Settings	Base Initial Settings
Operational	Base Operational
Age	Base Age
Constituent	Base Constituent
Trace	Base Trace
Fire Flow	Base Fire Flow
Energy Cost	Base Energy Cost
Transient	Base Transient
Pressure Dependent Demand	Base Pressure Dependent Demand
Failure History	Base Failure History
SCADA	Base SCADA
User Data Extensions	Base User Data Extensions
Steady State/EPS Solver Calculation Options	Base Calculation Options
Transient Solver Calculation Options	Base Calculation Options

Hydraulic Summary

Time Analysis Type	Steady State	Use simple controls during steady state?	True
Friction Method	Hazen-Williams	Is EPS Snapshot?	False
Accuracy	0.001	Start Time	12:00:00 AM
Trials	40	Calculation Type	Hydraulics Only

FlexTable: Pipe Table

Label	Start Node	Stop Node	Diameter (in)	Length (Scaled) (ft)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Material	Hazen-Williams C
WM-EX (Polyline)-7	J-1	J-2	8.0	21	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-5	J-3	J-1	8.0	27	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-9	J-4	J-5	8.0	35	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-12	J-6	J-7	8.0	38	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-13	J-8	J-3	8.0	101	20	0.13	0.000	PVC	150.0
WM-EX (Polyline)-6	J-5	J-9	8.0	113	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-10	J-9	J-10	8.0	119	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-8	J-2	J-4	8.0	131	10	0.06	0.000	PVC	150.0
WM-EX (Polyline)-11	J-10	J-6	8.0	140	0	0.00	0.000	PVC	150.0
WM-EX (Polyline)-1	J-11	J-8	8.0	251	1,520	9.70	0.030	PVC	150.0
WM-PRO (Polyline)-4	J-3	J-12	8.0	134	10	0.06	0.000	PVC	150.0
WM-PRO (Polyline)-3	J-5	J-13	8.0	135	10	0.06	0.000	PVC	150.0
P-1	R-2	J-11	8.0	768	1,520	9.70	0.030	PVC	150.0
P-2	H-1	J-4	6.0	59	0	0.00	0.000	PVC	150.0
P-3	H-2	J-9	6.0	15	0	0.00	0.000	PVC	150.0
P-4	H-3	J-2	6.0	53	0	0.00	0.000	PVC	150.0
P-5	H-4	J-8	6.0	22	-1,500	17.02	0.121	PVC	150.0

FlexTable: Junction Table

Label	Elevation (ft)	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	4,634.31	<Collection: 0 items>	0	4,848.37	93
J-2	4,633.74	<Collection: 0 items>	0	4,848.37	93
J-3	4,634.55	<Collection: 1 items>	0	4,848.37	93
J-4	4,632.65	<Collection: 0 items>	0	4,848.37	93
J-5	4,632.11	<Collection: 1 items>	0	4,848.37	94
J-6	4,627.58	<Collection: 0 items>	0	4,848.37	96
J-7	4,627.12	<Collection: 0 items>	0	4,848.37	96
J-8	4,635.09	<Collection: 0 items>	0	4,848.37	92
J-9	4,630.73	<Collection: 0 items>	0	4,848.37	94
J-10	4,629.28	<Collection: 0 items>	0	4,848.37	95
J-11	4,638.12	<Collection: 0 items>	0	4,856.01	94
J-12	4,635.35	<Collection: 1 items>	10	4,848.37	92
J-13	4,632.92	<Collection: 1 items>	10	4,848.37	93

FlexTable: Hydrant Table

Label	Hydrant Status	Emitter Coefficient (gpm/psi^n)	Lateral Length (ft)	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
H-1	Closed	0.000	20	4,632.65	<None>	<Collection: 0 items>	0	4,848.37	93
H-2	Closed	0.000	20	4,630.73	<None>	<Collection: 1 items>	0	4,848.37	94
H-3	Closed	0.000	20	4,633.74	<None>	<Collection: 1 items>	0	4,848.37	93
H-4	Closed	0.000	20	4,635.09	<None>	<Collection: 1 items>	1,500	4,845.74	91

Fire Flow Test Data Sheet

Location of Test (Street and Cross Street): N. Edmonds / Gordon Dr.

Address Nearest Residual Hydrant: 1740 N. Edmonds

Test Date: 1/17/2017 Test Time: 1030

Testing Personnel: KA, KJR, NR

Pressure Zone: 4880 Main Size: 6"

Comments:

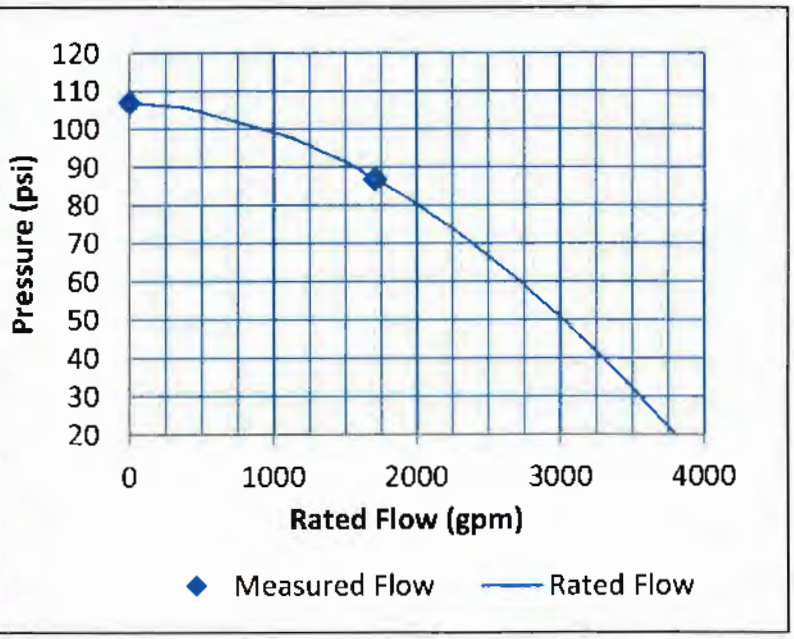
Test Results:

Residual Hydrant	
Static:	107 psi
Residual:	87 psi
Pressure Drop:	20 psi
	19 %

Flow Hydrant(s)	Hydrant Tester	Pitot Pressure (psi)	Discharge Diameter (in)	Outlet Coeff. (c)	Pitot Flow (gpm)
Flow 1	HM1	32	2	1.307	882
Flow 2	HM2	28	2	1.307	825
Flow 3					
				Total	1708

Area Map

Rated Flow



Rated Pressure (for Rated Capacity Calculation) 20 psi

Rated Capacity at 20 psi residual pressure. 3,800 gpm

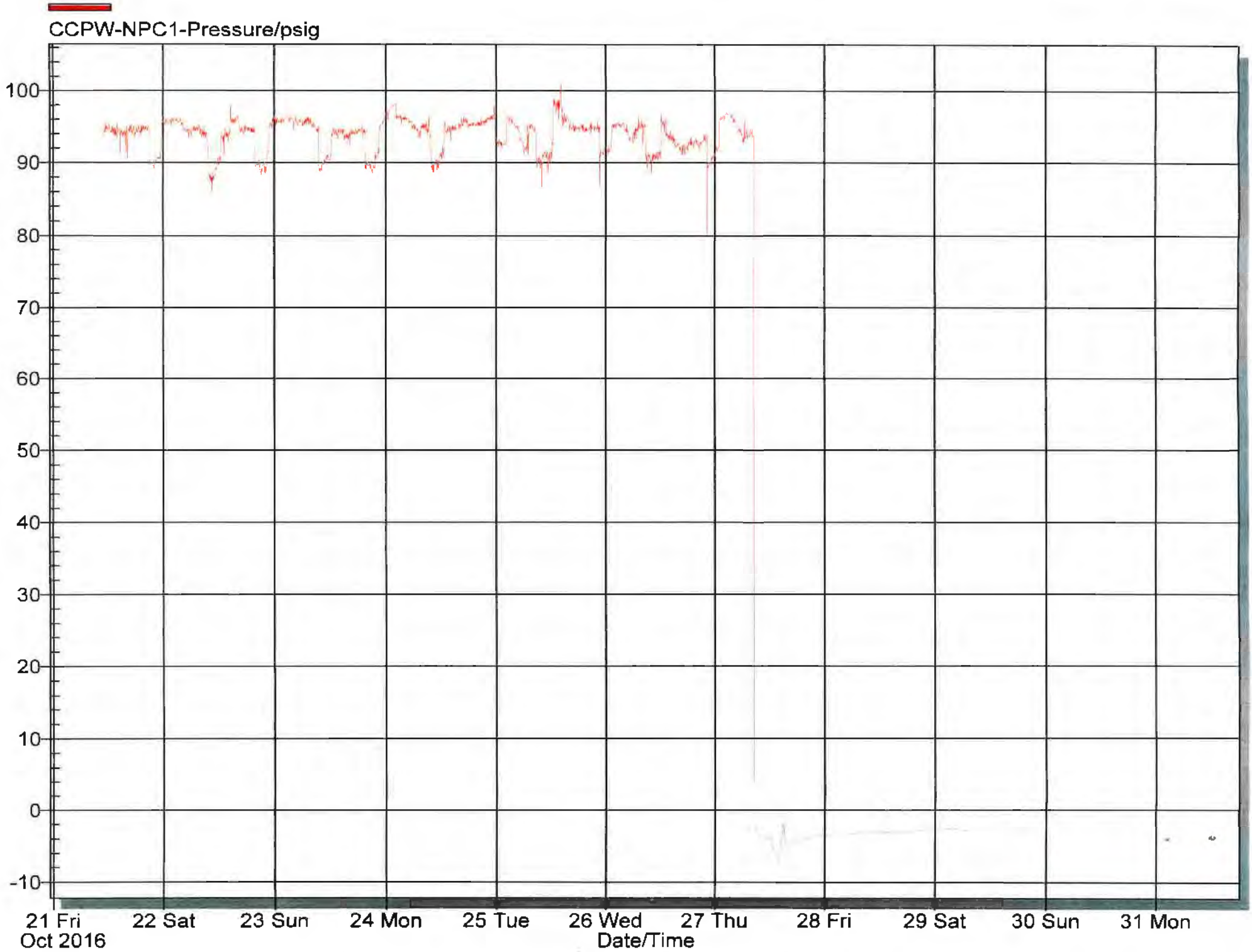
Based on NFPA 291 - 2016 Edition and APWA Manual 17 - Fourth Edition

Pursuant to NFPA 291, fire flow test data over five years old should not be used.

Hydrant OBJECTID: 2622 FD Runbook Page: 249X00

Data Sheet File Name: Edmonds-Gordon2.pdf

Downloaded Data - Monday, October 31, 2016



N

N. Edmonds Dr.

0 25 50 100 Feet

1 inch = 100 feet

THIS MAP IS FOR ILLUSTRATIVE PURPOSES ONLY. IT DOES NOT REPRESENT A SURVEY

Manhard CONSULTING LTD

PRELIMINARY SANITARY SEWER REPORT

FOR

NORTH EDMONDS

CARSON CITY, NEVADA

Prepared for:

G&E Investments
PO Box 2826
Minden, NV 89410

Prepared by:

Manhard Consulting Ltd.
9850 Double R Boulevard
Suite 101
Reno, Nevada 89521

North Edmonds– Sanitary Report

North Edmonds is a residential development located in Carson City, east of Edmonds Drive, south of Gordon Street, west of Fairview Drive, and north of Reeves Street (See Vicinity Map, Exhibit 1). The total developed area is approximately 1.37 acres.

The proposed sanitary sewer flow from North Edmonds and the capacity of the existing sanitary system have been analyzed and included in this report. The following analysis has found that the proposed 8-inch sanitary mains will provide adequate capacity for the 16 single-family residences at North Edmonds (see attached calculations). The proposed sanitary sewer has been designed at minimum slope of 0.5%, which provides a half full velocity of 2.8 ft/s.

The existing area is developed with 4 single family homes connected to the public sewer, so there is only a net increase of 12 new homes being added to the existing system. Two 8-inch mains from the project will connect to the existing 8-inch sanitary main in Edmonds Drive. The existing 8-inch main in North Edmonds Drive becomes a 10-inch main at the existing manhole where the main serving Lots 9 through 16 ties in. The existing 10-inch main flows North to Gordon Street and continues east to Fairview Drive. From the Gordon street and Fairview Drive intersection, it continues north to U.S. 50 to the trunk main.

The calculated sanitary flow from North Edmonds will generate the peak flow of 0.027cfs (see attached calculations). Considering the scale of the build-out scenario used and the existing trunk main's capacity, the additional flow from North Edmonds is marginal.

In conclusion, the existing sanitary system has the capacity to accept the estimated flows from the 16 single-family residences at North Edmonds.

North Edmonds– Sanitary Calculations

Sanitary Design

Design Criteria:

100 GPD/Capita
3.5 Capita per Unit
3.0 Peaking Factor
16 Units (Lots)

Average Design Flow:

$$(16 units)\left(\frac{3.5 capita}{unit}\right)\left(\frac{100 gpd}{capita}\right) = 5{,}600 gpd$$

$$\left(\frac{5{,}600 gal}{day}\right)\left(\frac{day}{86{,}400 \sec}\right)\left(\frac{1 ft^3}{7.481 gal}\right) = 0.009 cfs$$

Peak Design Flow:

Peak Design Flow = (Ave Flow) (Peaking Factor)

$$Q_{PEAK} = (0.009 cfs)(3.0) = 0.027 cfs$$

The proposed sanitary design for North Edmonds connects to the existing 8" sanitary main in Edmonds Drive at 0.005 ft/ft, which conveys the Peak Design Flow through an 8" diameter main. Using Manning's Equation, the maximum capacity of the 8" diameter sanitary main at 0.5% will be calculated to verify the pipe has the capacity to handle the Peak Design Flow from North Edmonds.

Manning's Equation

$$Q = \frac{K}{n} A R^{2/3} S^{1/2}$$

Where:

K=1.486, $A = \frac{\pi r^2}{2}$ (half-full), $R = \frac{A}{P}$, P = πr (half-full)

Pipe Size Capacity - 8" Half-full Capacity @ 0.5%

Design Criteria:

8" Diameter SDR-35
n = 0.013
S = 0.005 ft/ft
d/D = 0.5 (half full design)

$$Q_{CAP} = \left(\frac{1.486}{0.013}\right)(0.17)(0.16)^{2/3}(0.005)^{1/2}$$

$$Q_{CAP} = 0.40cfs$$

Since,

$$Q_{CAP} \geq Q_{PEAK}$$

$$0.40cfs \geq 0.027cfs$$

The 8" SDR-35 main installed at 0.5% provides more than enough capacity for the peak flow from the 16 lots at the North Edmonds.

The half-full capacity provided by the 10" main in Edmonds Drive has been calculated to be 1.12cfs (see attached calculations).

Existing Pipe Size Capacity - 10" Half-full Capacity @ 1.05 %

Design Criteria:

10" Diameter PVC
n = 0.013
S = 0.0105 ft/ft
d/D = 0.5 (half full design)

$$Q_{CAP} = \left(\frac{1.486}{0.013}\right)(0.27)(0.21)^{2/3}(0.0105)^{1/2}$$

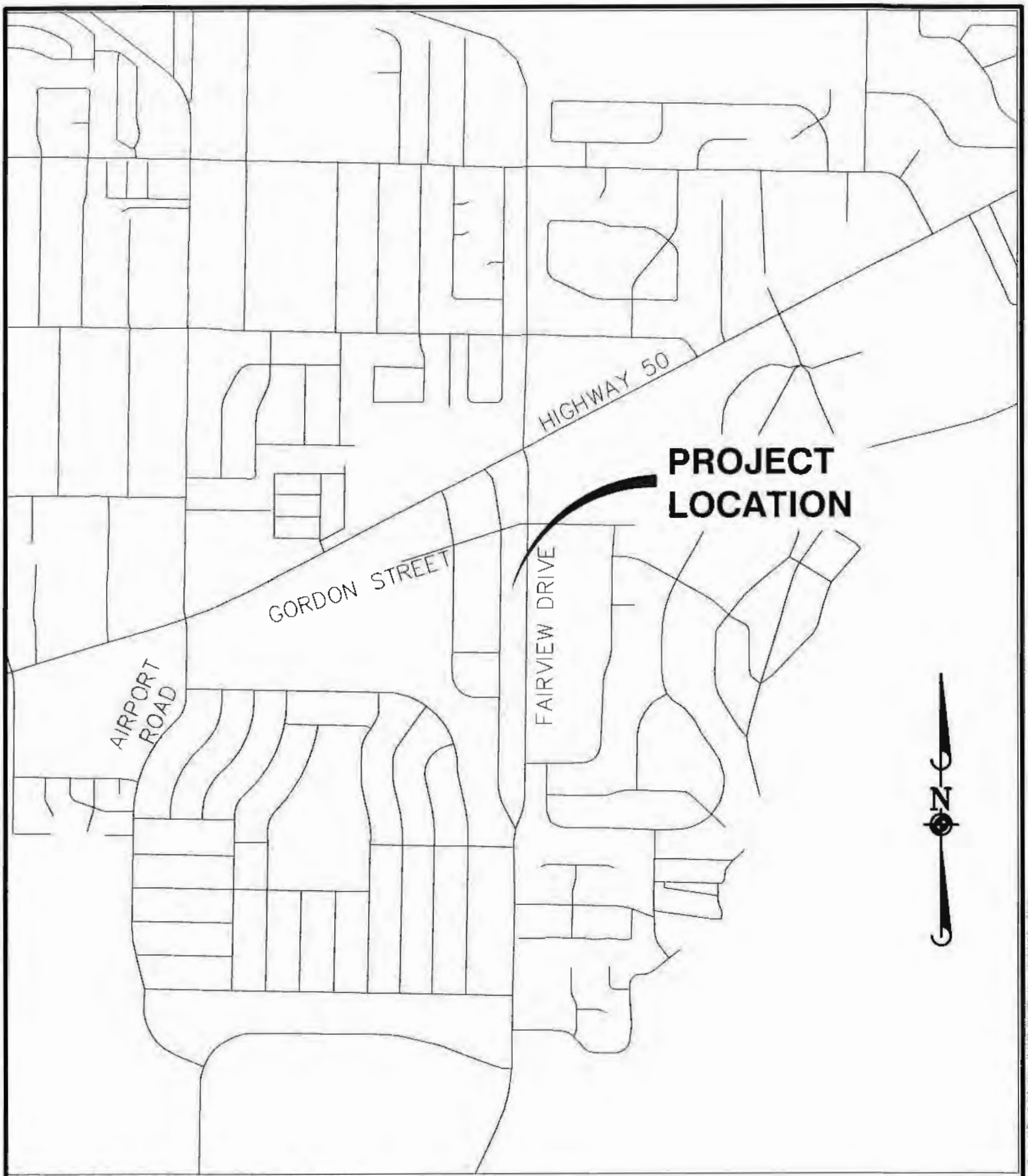
$$Q_{CAP} = 1.12cfs$$

Since,

$$Q_{CAP} \geq Q_{PEAK}$$

$$1.12cfs \geq 0.027cfs$$

The existing 10" PVC main installed at approximately 1.05% in Edmonds Drive provides significantly more capacity than needed for the peak flow from the 16 lots at the North Edmonds.



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Civil Engineers · Surveyors · Water Resources Engineers · Water & Wastewater Engineers
Construction Managers · Environmental Scientists · Landscape Architects · Planners

NORTH EDMONDS
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR:	DMK
DRAWN BY:	SWJ
DATE:	SWJ
SCALE:	1"=1000'

SHEET
EXHIBIT 1
GEICCNV01

PRELIMINARY GEOTECHNICAL INVESTIGATION

NORTH EDMONDS MULTIUNIT RESIDENTIAL DEVELOPMENT

CARSON CITY, NEVADA

PREPARED FOR:

G & E INVESTMENTS LLC

JANUARY 2017
FILE: 1946

CME CONSTRUCTION MATERIALS ENGINEERS, INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

January 19, 2017
File: 1946

Chris Bonafede
G & E Investments LLC
PO Box 2826
Minden, NV 89423

RE: Preliminary Geotechnical Investigation
North Edmonds Multiunit Residential Development
Carson City, Nevada

Dear Mr. Bonafede:

Construction Materials Engineers Inc. (CME) is pleased to submit the results of our preliminary geotechnical investigation report for the proposed North Edmonds Multiunit Residential Development to be located in Carson City, Nevada.

The following report includes the results of our field and laboratory investigations and presents our recommendations for the design and construction of the project.

Please feel free to contact our office should you have any questions or require additional information.

Sincerely,

CONSTRUCTION MATERIALS ENGINEERS, INC.

01-19-2017

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SAM/RAR/sam
Enclosures
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CC: David Kitchen, PE- Manhard Consulting

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PRELIMINARY GEOTECHNICAL INVESTIGATION
NORTH EDOMONDS MULTIUNIT RESIDENTAL DEVELOPMENT
CARSON CITY, NEVADA

1.0 INTRODUCTION

Presented herein are the results of Construction Materials Engineers, Inc. (CME) preliminary geotechnical exploration, laboratory testing, and preliminary geotechnical design recommendations for the proposed North Edmonds Multiunit Residential development to be located on the east side of North Edmonds Drive in Carson City, Nevada. The project site is comprised of four adjoining residential parcels located in Township 15 North, Range 20 East, and Section 10 (M.D.M).

Preliminary recommendations are based on surface and subsurface conditions encountered during our field exploration, and on details of the proposed project as described in this report. The objectives of this study were twofold:

- Investigate general soil and groundwater conditions; and
- Provide preliminary geotechnical recommendations for conceptual design and construction.

The area covered by this report is shown on Plate A-1 (Field Exploration Location Map) in Appendix A. Our study included subsurface field exploration, onsite geophysical testing, laboratory testing, and engineering analysis to identify the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

The recommendations provided in this preliminary report shall not be used for final design purposes. A design-level report can be completed when design parameters are known including grading (cut depths and fill thicknesses) and foundation types and loading.

2.0 SITE AND PROJECT DESCRIPTION

2.1 PROJECT DESCRIPTION

Based on conversations with Mr. Chris Bonafede (client representative), it is understood that the proposed development will include:

- Construction of our multiunit residential structures. Structures will be two to three stories in height, wood framed, and supported on either shallow spread footings with raised floor construction or post-tension (PT) slabs. PT slabs will have thickened edges for frost protection. Structures may include both foundation systems: slab-on-grade may be designed for proposed attached garages and PT slabs for the residential structures;
- Two common access driveways will be constructed. It is assumed that ingress and egress will be on the east side of North Edmonds Drive.
- Structural section improvements will be required on the east side of North Edmonds Drive to provide turn lane(s) and approaches to the proposed driveway entrances;
- Improvements to the west side of Fairview Drive will include sidewalk, curb and gutter; and

- Appurtenant construction will likely include installation of underground utilities, community transformers, sidewalks, curb-and-gutter, storm water controls, and landscape common areas.

Site grading is in the conceptual phases and cut depths and fill thicknesses across the development have not been determined. For the purposes of this preliminary investigation, maximum cuts depths and fill thicknesses are assumed to be on the order of 3 to 4 feet.

It is anticipated that structural loads for the proposed multiunit structures will be light. For the purposes of this preliminary investigation, assumed structural loading including dead and fulltime live loading is on the order of 4 to 6 kips per lineal foot for continuous foundations and column loads on the order of 40 kips for isolated spread foundations.

2.2 SITE DESCRIPTION

The project site consists of a four adjoining residential lots ranging from 0.28 to 0.44 acres in size located on the east side of Carson City. The project site will have a total combined parcel area of 1.36 acres.

Figure 1 (Vicinity Map) shows the general project vicinity.

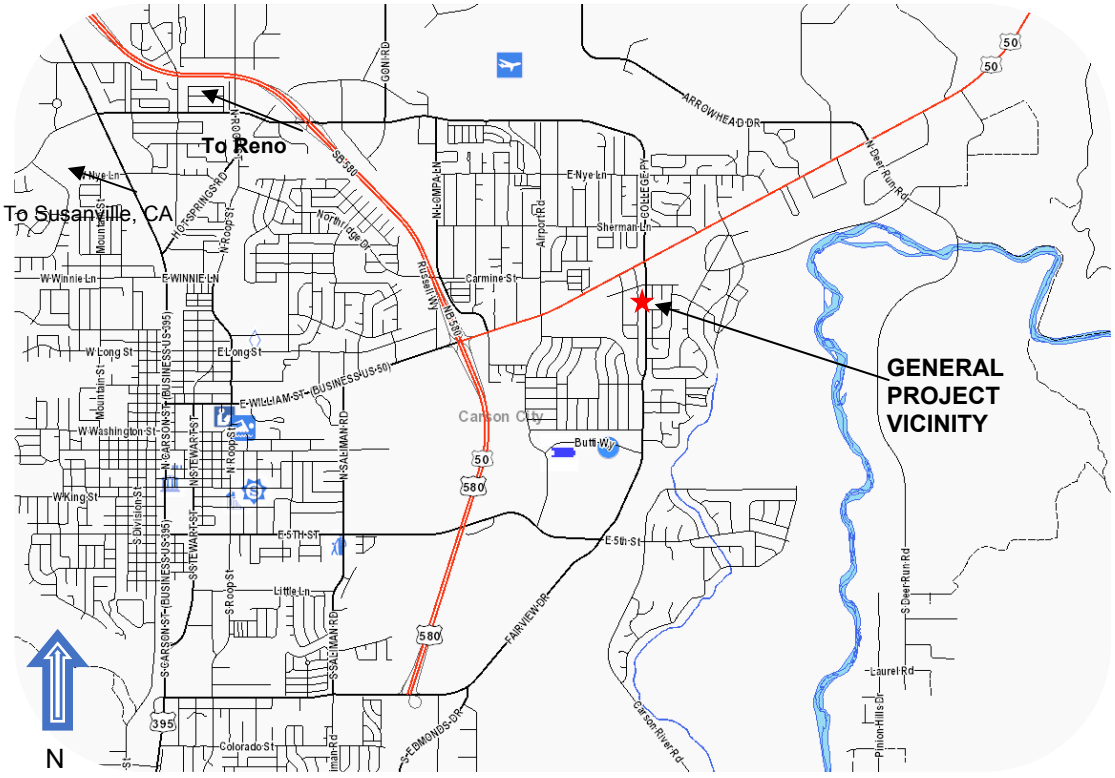

Figure 1: Vicinity Map[1]
N.T.S

The project site is bound to the north by business development, to the south by an existing residence, the east by Fairview Drive, and the west by North Edmonds Drive. The subject parcels are currently

[1] (Reference: Carson City GIS, http://ccapps.org/publicgis/,accessed January 2017)

developed. The northernmost parcel is occupied by a small daycare center and the southern parcels are occupied by single family residences. Each residential parcel is fully fenced. Figure 2 (Site Plan), highlights the approximate limits of the proposed development.

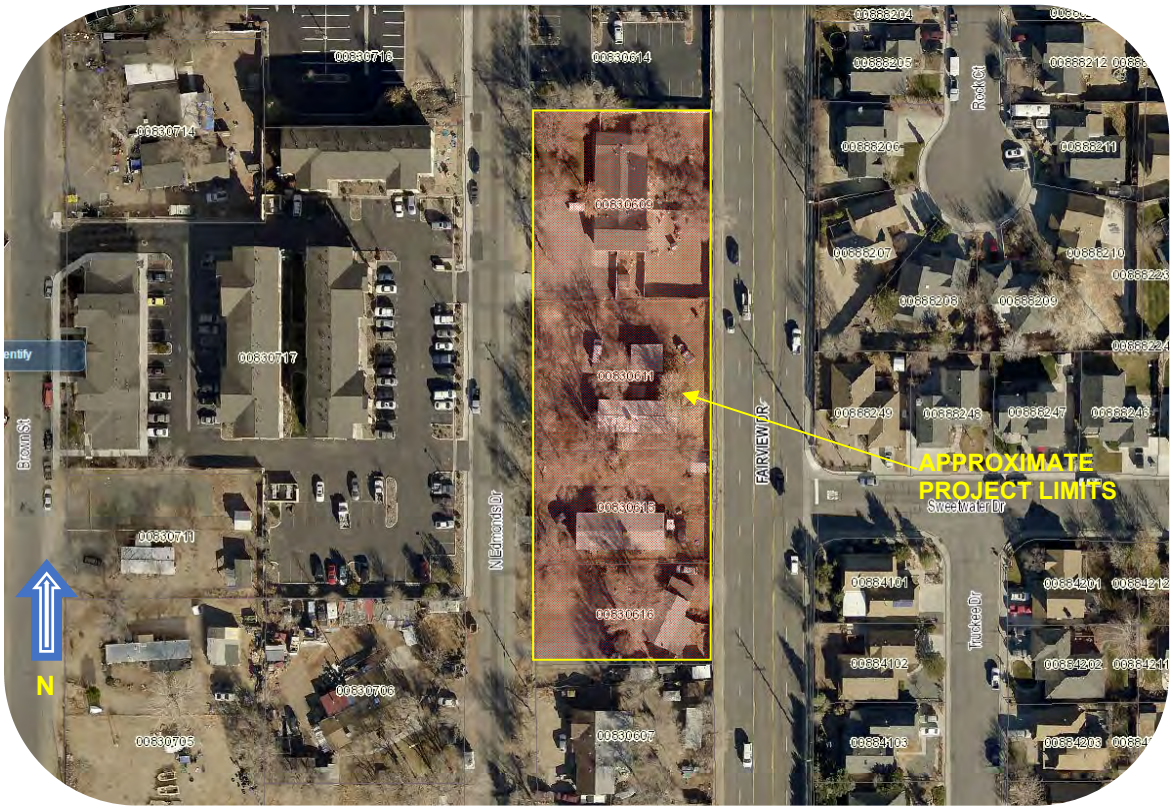

Figure 2: Site Plan
N.T.S

Vegetation consists of sparse landscape trees, weeds, and grass. Site topography is gently sloping to the northeast over a majority of the parcel. The site is drained via sheet flow which directs some of the flows to the existing onsite swales.

Gas and sewer utilities run parallel to the east side of North Edmonds Drive. A shallow swale runs parallel to North Edmonds Drive.

3.0 GEOTECHNICAL EXPLORATION INFORMATION

3.1 SUBSURFACE EXPLORATION

Two (2) exploratory borings were completed on December 20, 2016. Borings were drilled using a truck-mounted CME 55 drill rig equipped with 6-inch outside diameter (O.D.), 3¼-inch inside diameter (I.D.) continuous-flight hollow-stem augers. The maximum depth of exploration was 21½ feet below existing ground surface (bgs). Approximate exploration locations are presented on Plate A-1 (Field Exploration Location Map).

The underlying soils were sampled in-place every 2½ feet using a standard 2-inch OD split-spoon sampler[2] or 3-inch diameter split-spoon with brass liners driven by a rope and pulley cathead hammer. Boring locations were determined in the field based on existing infrastructure and site access.

Photograph 1: Looking north toward Boring B-1

The borings were backfilled with the cuttings and rapid set cement using the equipment at hand. Stratification lines on the logs represent the approximate boundary between soil types and the transition should be considered gradual.

[2] The number of blows to drive the sampler the final 12 inches of an 18-inch penetration into undisturbed soil is an indication of the density and consistency of the material (Standard Penetration Test (SPT) - ASTM D 1586).

3.2 GEOPHYSICAL FIELD MEASUREMENTS

One geophysical array was completed adjacent to North Edmonds Drive, near the west boundary of the project site. The geophysical array was completed using ReMi. Geophysical measurements were performed in general accordance with the method described by Louie (2001). The ReMi method provides an effective and efficient means to obtain basic subsurface profile information on an essentially continuous basis across the explored location.

The DAQlink III 24-bit acquisition system (Seismic Source/Optim) utilizing a multichannel geophone cable with twelve geophones, placed at an approximate spacing of 13 feet were used to obtain surface wave data which was then analyzed to obtain a S-wave vertical profile. Vertical geophones with resonant frequencies of 10 Hz measure surface wave energy from broad band ambient site noise across the geophone array (i.e. ReMi setup location) for multiple 30-second iterations.

The resulting data files were sent to Optim, Inc. for processing and analysis. SeisOpt® ReMi™ Version 4.0 software (© Optim, 2013) was used to analyze data files collected in the field. Dispersion curve picks can either be interactively modeled using trial-and-error adjustments or using an automatic inversion code to obtain a one-dimensional shear-wave (S-wave) velocity versus depth profiles. The shear-wave profile can further be calibrated and fine-tuned using any existing logs or blow counts information.

The approximate ReMi array location is presented on Plate A-1 (Field Exploration Location Map); results are included on Plate A-4 (Geophysical Results).

3.3 LABORATORY TESTING

Soils testing performed in CME's laboratory was conducted in general accordance with the standards and methodologies described in Volume 4.08 of the ASTM Standards.

Significant soil types were selected and analyzed to determine index properties and engineering properties. The following laboratory tests were completed as part of this investigation:

- *Insitu* moisture content (ASTM D 2216) (Appendix A);
- Plasticity Index and Liquid Limit (ASTM D 4318) (Appendix A);
- Grain size distribution (ASTM C136/C117) (Appendix B);
- Corrosion testing (soluble sulfates, resistivity, and pH) was completed by an outside laboratory (Appendix B).

4.0 GEOLOGIC AND GENERAL SOIL PROFILE DESCRIPTIONS

Based on a review of the New Empire Geologic Map (E.C. Blinger, 1977), the project site is underlain by old alluvial plain deposits. These deposits are described as grayish orange to dark yellow brown, finer grained muddy sand.

The NRCS Web Soil Survey maps the subject site as predominately Dalzell fine sandy loam, which is described as fine sandy loam underlain by stratified fine sandy loam to sandy clay loam.

4.1 GENERAL ONSITE SOIL PROFILE

Soils encountered on the north end of the site (Boring B-1) consisted of an uppermost silty sand **(SM)** soil horizon underlain by sandy lean clay **(CL)** to a depth of 5 feet below ground surface (bgs). Stratified interbedded layers of silty sand **(SM),** sandy lean clay **(CL)**, lean clay **(CL)**, and silty, clayey sand **(SC-SM)**, ranging in thickness from about 1 to 3 feet, were encountered to a depth of 17½ feet. Poorly graded sand **(SP)** was encountered at a depth of about 17½ to 20 feet underlain by lean clay **(CL)** to the depth of the exploration.

Soils encountered on the south end of the site (Boring B-2) consisted of a similar interbedded stratified profile consisting predominately of clayey sand **(SC)**, silty, clayey sand **(SC-SM)**, lean clay **(CL)**, and sandy lean clay **(CL)**. An intermittent layer of poorly graded sand was encountered at a depth of 8½ to 11 feet bgs.

4.2 GROUNDWATER CONDITIONS

Groundwater was encountered at depths of about 12 feet bgs in Boring B-1 to 14 feet bgs in Boring B-2. The groundwater elevation appears to be relatively consistent across the subject site. It should be noted that fluctuations in groundwater elevation may occur due to seasonal runoff, precipitation and landscape irrigation.

5.0 SEISMIC AND GEOLOGIC HAZARDS

5.1 SEISMICITY

The Western United States is a region of moderate to intense seismicity related movement of the crustal masses (plate tectonics). The most active regions outside of Alaska are along the San Andres Fault zone of western California and the Wasatch Front in Salt Lake City.

Figure 3: Overview Map Showing the Great Basin
(N.T.S)

The Wasatch Front in Salt Lake City, Utah, forms the eastern boundary of the Basin and Range physiographic province, and the eastern front of the Sierra Nevada Mountains, which is the western margin of the province. The proposed residential development is located within the New Empire fault zone of Carson City, Nevada, within the western extreme of the Basin and Range physiographic province.

5.2 FAULTS

Based on a review of the New Empire Geologic Map (Blinger, 1977), the project site lies within the limits of the New Empire Fault zone. The nearest fault trace is mapped adjacent to or crossing the west project boundary. The age of the latest rupture along the fault trace, as currently mapped, ranges from mid to late Pleistocene. An excerpt of the referenced geologic map is included as Figure 4 (Excerpt New Empire Geologic Map (Blinger, 1977).

Black bold dashed lines are a group of faults associated with the New Empire Fault zone. The nearest mapped lineament is approximately shown near the west boundary of the project site. Refer to Appendix D for the site specific preliminary fault investigation by Pedimont Geosciences, Inc.

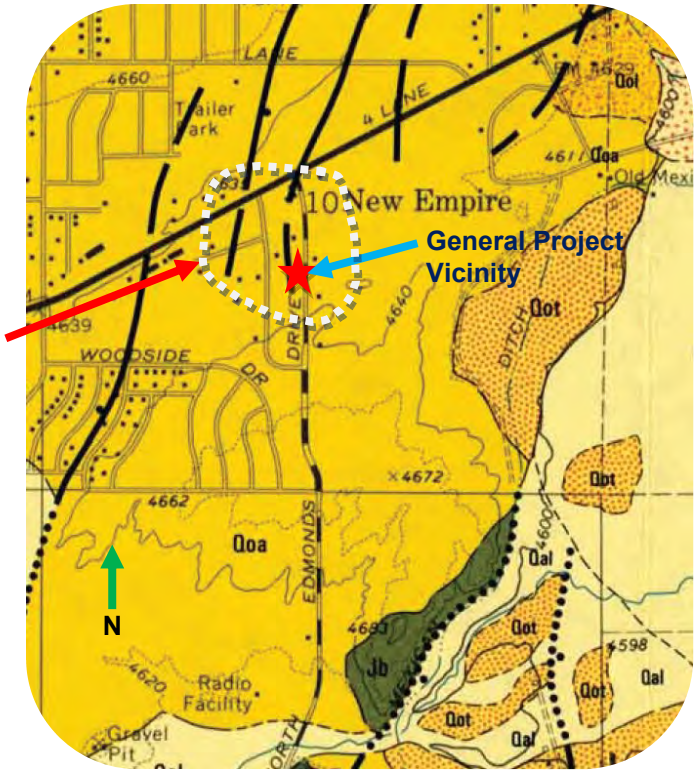

Figure 4: Excerpt New Empire Geologic Map (Blinger, 1977)
N.T.S

Due to the close proximity of the mapped fault trace, CME coordinated with a subconsultant, Piedmont Geosciences, to complete a preliminary fault investigation. This investigation assessed the proximity of the mapped fault traces in relationship to the project site and determined if additional fault studies would be warranted for project design.

The preliminary fault investigation included a review of existing published geologic and fault maps; review of previous fault studies completed by Piedmont Geosciences east of the project site; detailed stereoscopic examination and interpretation of various aerial photographs; and a site visit to complete field mapping of the visible geomorphic features near the project site.

The Preliminary Fault Investigation Report is attached as Appendix D. Based on the findings of the Preliminary Fault Investigation (Peidmont Geosciences, 2017), there is no visible surficial evidence

indicating the existence of a Holocene-active[3] fault trace at or near the project site. Additionally, a subsurface investigation involving extensive exploratory trenches is not recommended based on the assumption that the structures proposed are not considered essential facilities, as defined by the International Building Code (IBC, 2012).

5.3 SLOPE INSTABILITY HAZARDS

Rock fall hazards and other associated forms of mass movement occur in areas of active and/or relict mass wasting features (e.g. landslides, debris flows, rock slides, and avalanche). Many debris flow events are associated with a triggering event such as:

- Earthquakes;
- Poorly bonded snowpack from multiple events;
- Change in slope of the terrain (cutting or filling);
- Increased load on the land;
- Groundwater movement;
- Significant storm events and/or periods of significant snow and ice melt; and
- Wildfires and/or change to existing site vegetation.

The most susceptible sites are those with a slope gradient greater than 33 percent. Site topography in the vicinity of the proposed residential development is gently sloping in a northerly direction at a gradient less than 2 percent over a majority of the site. No steep slopes, hillsides, or bluffs are located in the general project vicinity; therefore, the potential for slope instability is considered low.

5.4 LIQUEFACTION AND LATERAL DISPLACEMENT

Liquefaction is nearly a complete loss of soil shear strength that can occur during an earthquake, as cyclic shear stresses generate excessive pore water pressure between the soil grains. The higher the ground acceleration caused by a seismic event or the longer the duration of shaking, the more likely liquefaction will occur.

The soil types most susceptible to liquefaction are loose to medium dense cohesionless sands, soft to stiff non-plastic to low plastic silts, or any combination of silt-sand mixtures lying below the groundwater table. Liquefaction is generally limited to depths of 50 feet or less below the existing ground surface.

In general site soils encountered consisted of stratified layers of medium dense to dense silty and clayey sands (**SM** and **SC**) interbedded with stiff to hard sandy lean clay (**CL**) to lean clay (**CL**). Based on our preliminary exploration and analysis, the potential for liquefaction at the subject site is judged to be low.

Lateral displacement, or lateral spread, is the horizontal movement of soil layers as a consequence of soil liquefaction. Horizontal soil movement is due to the effect of dynamic earthquake generated inertial forces and static gravitational forces. Lateral spread occurs on sloped terrain or movement to a free face, such as a steep embankment or creek bed.

No steep slopes, bluffs or embankments are located at or near the site; the potential for lateral spread is also judged to be minimal.

[3] Quaternary earthquake fault evaluation criteria have been formulated by a professional committee for the State of Nevada Seismic Safety Council. These guidelines are consistent with the State of California Alquist-Priolo Act of 1972, which defines Holocene Active Faults as those with evidence of displacement within the past 10,000 years (Holocene time). Those faults with evidence of displacement during Pleistocene time (10,000 to 1,600,000 years before present) are classified as either later Quaternary Active Fault (10,000 to 130,000 years) or Quaternary Active Fault (>130,000 years). Both of the latter fault designations are considered to have a decreased potential for activity compared to the Holocene Active Fault.

6.0 SEISMIC DESIGN PARAMETERS

Seismic design parameters are based on site-specific estimates of spectral response ground acceleration as designated in the 2012 IBC. The benefit of this approach is that a response spectrum can be developed from this data and based on the period of the structure, a spectral acceleration for that structure can be determined. These values are based on two criteria:

1) Site classification; and

2) Site location (latitude and longitude).

Site classification is based on the substrata soil profile type, as presented in Table 1 (Site Classification Definition.)

Table 1 – Site Classification Definition

Site Classification	Soil Profile Type Description
A	Hard Rock
B	Rock
C	Very Dense Soil and Soft Rock
D	Stiff Soil Profile
E	Soft Soil Profile
F	Soil Type Requiring Site-Specific Evaluation

The soil/bedrock profile classification is based on two criteria: density (based on SPT blow count data) or hardness (based on shear wave velocity). These two criteria have to be determined to a depth of 100 feet below the ground surface.

Shear wave (S-wave) velocity measurements were completed using the Refraction Microtremor (ReMi) along the northwest and northeast side of the proposed development. The resulting S-wave velocity profile was evaluated to determine the soil Site Class.

Results of the ReMi indicate that the S-wave weighted average (Vs) of the upper 100 feet was 1,063 feet per second. Based on the soil conditions encountered within the borings and the results of the geophysical array, a Site Class D is recommended for project design.

Spectral response acceleration values (S_s & $S_{1)}$ are based on structures underlain by bedrock with a site classification of B. Acceleration values may amplify or attenuate depending on the subsurface geologic conditions. Therefore, the building code provides correction factors to modify the acceleration values depending on the subsurface geologic conditions. These correction factors (F_a & F_v) are used if the site is located overlying subsurface geologic conditions with a site classification other than B. Spectral response acceleration values were determined from the USGS website: *USGS Seismic Design Maps* (Refer to Appendix D). Table 2 (Seismic Design Parameters) provides a summary of seismic design parameters.

Table 2– Seismic Design Parameters	
PARAMETER DESCRIPTION	**PARMATERS**
Approximate Latitude of Site	39.1772
Approximate Longitude of Site	119.7242
Peak Ground Acceleration[1]-MCE_R PGA_M (ASCE 7-10 Standard)	0.891 g
Spectral Response Acceleration at Short period(0.2 sec.) S_s (for Site Class B)	2.371 g
Spectral Response Acceleration at 1-second Period, S_1 (for Site Class B)	0.824 g
Site Class Selected for this Site	D
Site Coefficient F_a, decimal	1.0
Site Coefficient Fv, decimal	1.5
Design Spectral Response Acceleration at Short period, S_{Ds} (Adjusted to Site Class D, SDs= 2/3 SMs)	1.581 g
Design Spectral Response Acceleration at 1-second Period, S_{D1} (Adjusted to Site Class D, SD1=2/3 SM1)	0.824 g

Notes:
1) MCE_R PGA_M- Maximum credible earthquake geometric mean peak ground acceleration adjusted for site class.

7.0 DISCUSSION AND PRELIMINARY RECOMMENDATIONS

Based on the results of our field observations, subsurface exploration and laboratory test program, the project site may be developed as currently proposed. The following definitions shall apply for this project:

- Structural areas referred to in this report include all areas that will be used for the support of foundations, concrete slabs, retaining walls, flat work, and asphalt pavements;
- All compaction requirements presented in this report are relative to ASTM D1557[4];
- Unless otherwise stated in this report, all related construction should be in general accordance with the Standard Specifications for Public Works Construction (SSPWC), dated 2016.
- Fine-grained soil is defined as a soil with more than 40 percent by weight passing the number 200 sieve and a plasticity index less than 15.
- Clay soil is defined as a soil, where more than 10 percent of the soil particles are less than 5 micrometers in size having a plasticity index equal to or greater than 15. A hydrometer test is required to determine the percentage of soil particles less than 5 micrometers in size, in the absence of hydrometer testing, an alternative classification method for clay soil is based on the percentage of fines passing the number 200 sieve (#200). For the purposes of this project, where hydrometer testing has not been completed on a soil, the soil will be considered a clay soil if 20 percent of the soil (by weight) passes the #200 sieve and has a plasticity index equal or greater than 15,.
- Granular soil is defined as a soil not meeting the requirement for a fine-grained or clay soil and having a particle size of 4-inches or less.
- Subgrade is defined as the elevation directly below the aggregate base layer for both concrete slabs-on-grade and pavements.
- Potentially expansive soils for the purposes of this report are defined as soil complying with all of the following properties:
    - A plasticity index of 15 of greater;
    - More than 10 percent passing the #200 sieve; and
    - More than 10 percent passing the 5 micrometer sieve.

The primary construction concerns include the presence of potentially expansive near surface soils, as those encountered in Boring B-1 at a depth of 1½ feet. These soils were classified as clayey sand (**SC**) with 46 percent passing the No. 200 sieve and having a plasticity index of 16. Our subsurface field exploration was limited to two borings. The soils profile encountered in each boring varied significantly, however; it should be noted that site soils are stratified consisting of several different soil types including clayey sand (**SC**), lean clay to sandy lean clay (**CL**), and silty clayey sand (**SC-SM**).

It is recommended that structural elements do not bear directly on expansive soils and are separated from potentially expansive soils by structural fill. Based on the material properties of the potentially

[4] Relative compaction refers to the ratio percentage of the in-place density of a soil divided by the same soil's maximum dry density as determined by the ASTM D1557 laboratory test procedure. Optimum moisture content is the corresponding moisture content of the same soil at it maximum dry density.

expansive soils encountered, a 2 foot separation[5] is recommended for foundations and a 1½ foot separation is recommended for flat work and slabs-on-grade. This separation is generally completed by removing existing expansive soils (i.e. overexcavation) and replacing them with granular structural fill or by raising the site elevations using earthwork fills. Maintaining the recommended separation may require the use of imported materials, depending on final site grading. Based on the variable soil layers encountered, it is recommended that additional field exploration and laboratory testing be completed prior to construction to better define the near surface soil profile and identify areas with near-surface, potentially expansive soils.

Recommendations provided herein, and particularly under **Site Preparation and Grading, Preliminary Foundation Design, Site Drainage** and **Construction Observation and Testing** are intended to reduce risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the planned structure(s) and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Sufficient construction observation and testing should be performed to document that the recommendations presented in this report are followed.

7.1 SITE PREPARATION AND GRADING RECOMMENDATIONS

7.1.1 Site Clearing and Preparation

Surface vegetation and topsoil located below proposed structures, pavement, embankment, or any structural area should be stripped and grubbed prior to initiating fill placement or construction activities. Topsoil, surface vegetation, or other deleterious organic material should be disposed of outside the construction limits or stockpiled onsite for use in ***non-structural*** landscape areas. Stripped and grubbed material ***should not*** be incorporated into structural fill.

Based on the soil conditions encountered during our field exploration, stripping and grubbing depths on the order of 4 to 6 inches will likely be required across the majority of the site. Localized areas of deeper stripping and grubbing may be required to remove zones of concentrated roots.

Tree removal will be required. Tree root balls and stumps will require complete removal. Voids resulting from grubbing should be cleaned of loose material, widened to permit access to compaction equipment, and backfilled with properly compacted structural fill.

It should be noted that buried tanks (septic/fuel) may be present at the site. Tank locations (if present) should be identified in the field and removed prior to placement of structural elements. Resulting excavation voids should be backfilled with densified structural fill or sand cement slurry.

Prior to placement of structural fill, soils shall be scarified 8-inches, moisture conditioned and densified to at least 90 percent.

[5] If PT slabs are proposed, it is assumed they will be designed for potentially expansive soil conditions and a separation will not be required unless stated in the design assumptions.

7.1.2 Subgrade Preparation

Subgrade soils should be densified to at least 90 percent relative compaction for a minimum depth of 8 inches. Soils should have moisture contents of plus or minus 3 percent of optimum moisture (ASTM D1557) prior to densification. Higher moisture contents will be acceptable if the soil horizon is stable and density can be achieved in subsequent structural fill lifts. Scarification and moisture conditioning may be required to achieve the required soil moisture content recommendations. It is recommended that prior to densification the moisture content of the soils shall be determined to evaluate the need for moisture conditioning. After the densification process, a firm, stable surface should be produced.

It is recommended that a large vibratory roller is used to densify subgrade soils. The roller shall make at least 3 to 4 passes over the soils.

7.1.3 Grading and Filling

Structural fill is defined as supporting soil placed below foundations, concrete slabs-on-grade, pavements, or any structural element that derives support from the underlying sub-soils. Structural fill free of debris, vegetation, and organics shall meet the requirements for a granular soil or if imported shall meet the requirements given in Table 3 (Guideline Specifications for Imported Structural Fill).

Table 3 – Guideline Specifications For Imported Structural Fill

Sieve Size	**Percent Passing by Weight**
4 inch	100
¾ inch	70 - 100
No. 40	20 - 65
No. 200	5 - 30
Maximum Liquid Limit	**Maximum Plastic Index**
35	10

Near-surface soils encountered in Boring B-1 from a depth of 0 to 1½ feet bgs and Boring B-2 at a depth of 2 to 5 feet bgs appear to meet the requirements for structural fill, provided site soils preparation has been completed in general accordance with Section 7.1.1 (Site Clearing and Preparation). Further laboratory testing to determine the soil index properties should be completed during construction due to the multitude of different stratified soil types encountered during the subsurface exploration.

Structural fill should be uniformly moisture conditioned within three percent of optimum moisture content, placed in layers of 8 inches or less in loose thickness, and densified to at least 90 percent relative compaction. Thicker structural fill lifts, up to 12-inches, could be used if the contractor can demonstrate achieving required density. Moisture contents greater than 3 percent of optimum moisture are acceptable if the soil lift is stable and required relative compaction can be attained in the soil lift and succeeding lifts.

No fill material should be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions.

7.1.4 Reuse of Onsite Materials

Depending on the depths of proposed cuts, it is expected that a majority of the onsite material in the upper soil horizons can be stockpiled for reuse in non-structural landscape areas or as structural fill (provided they meet the requirements of Table 3-Guideline Specifications for Structural Fill or granular fill).

1) **Non-Structural Fill for Landscape Areas:** Stripped topsoil and clayey site soils not meeting the requirements of a structural fill should be carefully processed to remove oversized material, construction debris or other unsuitable materials and stockpiled onsite for future use in non-structural landscape areas. Care should be taken not to mix non-structural fill with onsite soils meeting the requirements of a structural fill (Table 3–Guideline Specifications for Imported Structural Fill).

2) **Structural Fill:** Soils meeting the requirements of a granular soil, free of deleterious and oversized materials, should be stockpiled onsite for use in structural areas on site. Processed uncontrolled fill meeting the requirements of a granular soil may be incorporated into structural fill provided organics and other deleterious material are removed.

Stock pile areas should be protected from erosion and runoff. Temporary erosion control measures should be implemented during project construction.

7.1.5 Trenching and Confined Excavations

All excavations regardless of depth should be evaluated to check the stability prior to occupation by construction personnel. Shoring or sloping of trench walls may be required to protect construction personnel and provide temporary stability. The presence of loose saturated sandy soils may make confined excavations below the water table difficult.

In areas where temporary confined excavations may be unstable, trench boxes may be used to provide safe ingress and egress for construction personnel.

Excavations should comply with current OSHA safety requirements (Federal Register 29 CFR, Part 1926). Soils or bedrock are classified as Type A, B or C, which requires different temporary excavation cut slope gradients. Maximum allowable slopes for excavations less than 20 feet deep are presented in Table 4 (Maximum Allowable Temporary Slopes). Excavations should comply with current OSHA safety requirements for soil **Type B** (for lean clay (CL) and sandy lean clay (CL)) and/or **Type C** (for silty sand (SM) and poorly graded sand (SP-SM)). Soil conditions should be verified during construction to assess required cut slope gradients. For interbedded/stratified soil profiles similar to those encountered during our subsurface exploration, the most restrictive maximum allowable excavation slope for the soil types present within the cut face should be used for excavations.

Table 4 - Maximum Allowable Temporary Slopes		
Soil or Rock Type	**Maximum Allowable Slopes[1] For Excavations Less Than 20 Feet Deep[2]**	
Stable Rock	Vertical	90º
Type A	3H:4V	53º
Type B	1H:1V	45º
Type C	3H:2V	34º

NOTES:
1. Angles expressed in degrees from the horizontal and have been rounded off.

2. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

3. In general, Type A soils are cohesive, non-fissured soils, with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater. Type B are cohesive soils with an unconfined compressive strength between 0.5 and 1.5 tsf, while those designated as Type C have an unconfined compressive strength below 0.5 tsf. Numerous additional factors and exclusions are included in the formal definitions. For detailed description of the soil types outlined above visit the US Department of Labor Safety and Health Topics website at: https://www.osha.gov/SLTC/trenchingexcavation/construction.html

Trench excavations should be protected from surface water/runoff. Temporary drainage swales should be excavated to divert surface flows into a collection area away from the open excavation. If warranted, dewatering of pipe trench excavations can be accomplished by use of a temporary dewatering system.

If subsurface water conditions differ from those encountered during our subsurface exploration, the geotechnical engineer should be notified immediately to determine if alternative dewatering recommendations are warranted.

7.1.7 Excavatability

Based on the conditions encountered during the preliminary subsurface exploration, confined excavations may be completed using conventional excavation equipment such as a track mounted excavator or rubber-tired backhoe.

7.2 PRELIMINARY FOUNDATION RECOMMENDATIONS

The project is in the preliminary planning phases, and structural loads were not available at the time this report was prepared. It is unclear if the proposed structures will be supported on shallow spread footings with raised floor construction or post tension slab-on-grade flooring. ***Preliminary*** recommendations for both foundation support options are provided. Based on the soils encountered during the subsurface exploration, foundation recommendations may be modified depending on proposed finished grade elevations (i.e. cut/fill elevations).

For the purposes of this report, it is assumed that structural loads will be light to moderate for proposed structures. Recommendations for foundation grade soils preparation and foundation design are based on loading and foundation design assumptions of this report. If alternate foundations are proposed, additional recommendations can be provided upon request.

7.2.1 Foundation Grade Soils Preparation

Foundations excavations should be cleaned of loose materials prior to the placement of reinforcing steel. Loose or soft zones should be removed to a depth that exposes a firm non-yielding surface. The resulting excavation can be backfilled with lean concrete or structural fill densified to at least 90 percent.

Foundation grade soils preparation will be dependent on proposed finished grade, foundation grade soils conditions, anticipated structural loads, and proposed foundation type[6]. In general, foundation grade soils shall be prepared in accordance with the recommendations given in Section 7.1.3 (Grading and Filling).

It is recommended that differential fill depths below the structure foundations be limited to a thickness of 5 feet or less. If shallow spread foundations or slab-on-grade construction are proposed, it is recommended that a minimum 2 foot vertical separation between the moderately plastic clayey sand **(SC)** soils be maintained. Depending on the final proposed grades and soils present at the site these soils may require removal and replacement will densified structural fill. It is recommended that additional exploration and laboratory testing be completed once site grading has been determined. For the final design investigation, it is recommended that expansion potential be evaluated. This testing can be completed during the design level exploration[7] phase.

Removal of clay soils shall extend at least 3 feet laterally from the outside edge of the foundation. The depth of the overexcavation will be dependent on the proposed bottom of foundation elevation and will be determined as part of the final geotechnical exploration.

Preliminary recommendations for shallow spread foundation design are included in Section 7.2.2.1 (Preliminary Shallow Spread Foundation Design Recommendations) and the preliminary PT slab design recommendations are included in Section 7.2.2.2 (Preliminary PT Slab Analysis).

[6] Failure to remediate the site soils in accordance with the recommendations of this report may result in increased settlements or differential movements across the building pad.

[7] Expansive soils as defined by the IBC includes soils meeting all of the requirements listed under potentially expansive soils (as defined in this report) and having an expansion index greater than 20.

7.2.2 Foundation Design

7.2.2.1 Preliminary Shallow Spread Foundation Design Recommendations

Provided that the foundation soils preparation has been performed in accordance with the recommendation given in Section 7.2.1 (Foundation Grade Soil Preparation), shallow spread foundation design parameters presented in Table 5 (Preliminary Foundation Design Parameters) can be utilized for the preliminary design of individual column and continuous wall footings.

Table 5 –Preliminary Shallow Foundation Design Parameters

Allowable Bearing Pressures (psf)[1,2]:	
Footings bottomed at least 2 feet[3] below the finished grade on properly compacted structural fill or on a granular native bearing strata meeting the requirements of an imported structural fill.	2,000
Allowable Friction Coefficient:	
Between foundation bottom and supporting soil consisting of properly compacted structural fill or native granular soils	0.40
Allowable Passive Soil Pressure (psf)[1]	
Backfill soils consisting of properly compacted structural fill	350[4]

(1) (psf)-Pounds per square foot

(2) The allowable bearing pressure may be increased by one-third for total loading conditions including wind and seismic forces (2012 IBC). The allowable bearing pressure is a net value; therefore, the weight of the foundation which extends below grade and backfill may be neglected when computing dead loads. The allowable bearing pressure includes a FOS of 3.0 against bearing failure.

(3) Allowable bearing pressures may be increased for foundations bottomed at greater depths. Once the final loads and footing elevations have been determined, the project geotechnical engineer should be contacted to evaluate the net allowable bearing pressure.

(4) The upper one-foot of the soils profile should be neglected when designing for passive pressure, unless confined by a concrete slab or pavement. Design values are based on footings backfilled with properly compacted structural fill.

Lateral loads (such as wind or seismic) may be resisted by passive soil pressure and friction at the bottom of the footing. A design value for passive soil pressure of 350 psf per foot of depth and a friction factor of 0.40 may be utilized for sliding resistance at the base of the footing. The friction coefficient of 0.40 assumes that structural elements will be bottomed on at least 1 foot of properly compacted structural fill or granular, non-expansive native soils.

Overturning moments and uplift loading can be resisted by the weight of the foundation, weight of the structure, and any soil overlying the foundation. A unit weight of 125 pounds per cubic foot may be assumed for backfill soils consisting of properly compacted structural fill.

It is recommended that footing excavations be observed by the project soils engineer prior to placing concrete reinforcing steel to confirm the subsurface conditions are similar to those described in this report.

7.2.2.2 Preliminary PT Slab Analysis

PT slab-on-grade foundation systems are designed to decrease plane deflection of the floor slab caused by differential movements (i.e. heaving or shrinking soils). The PT foundation slabs may bear on several different soil profiles including: imported structural fill, native silty, clayey sand **(SC-SM)**, clayey sand **(SC)**, sandy lean clay **(CL)** or a stratified combination profile. This preliminary analysis will consider three potential soil profiles for conceptual design that could provide support for the PT slab:

1) ***Soil Profile 1***: Soils Profile 1 is based on the soils profile encountered in Boring B-2. Soil types assumed in the model by depth are as follows:

   - 0-2 feet: Clayey sand (**SC**)
   - 2-5 feet: Silty clayey sand (**SC-SM**).
   - 5-8½ feet: Sandy lean clay (**CL**)

2) ***Soil Profile 2***: Soils Profile 2 is based on the soils profile encountered in Boring B-1. Soil types assumed in the model by depth are as follows:

   - 0-1½ feet: Silty claye**y** sand **(SC-SM)**
   - 1½-5 feet: Clayey sand (**SC)**
   - 5-8½ feet: Silty clayey sand **(SC-SM)** Sandy lean clay (**CL**)

3) ***Soil Profile 3***: Soils Profile 3 is based on utilizes the moderately plastic clayey sand as the primary soil type. Soil types assumed in the model by depth are as follows:

   - 0-½ feet: Silty claye**y** sand **(SC-SM)**
   - ½-8½ feet: Clayey sand (**SC)**
   - 5-8½ feet: Silty clayey sand **(SC-SM)** Sandy lean clay (**CL**)

Additional analysis and exploration will be required once final proposed grades have been determined. The predominant soil profile present at the site will be dependent on the final proposed grades, as areas with significant fill soils will influence the PT slab design. The design level analysis will provide additional profile information which can be used to refine the PT slab design parameter analysis.

7.2.2.2.1 PT Slab Design Parameters

PT foundation slab design is based on two different parameters: edge lift and center lift. Edge lift occurs when, due to an increase in moisture content, the perimeter soils swell causing the outside edge of the slab to lift upward. Center lift occurs when the moisture content of the soil around the perimeter of the slab gradually decreases and the perimeter soil shrinks relative to the soil beneath the interior of the slab. Because of anticipated increases in the soil moisture content due to irrigation of landscape features (common within residential developments), edge lift is the primary differential movement mechanism anticipated for project design.

To develop PT foundation slab-on-grade design parameters, VOLFLO Win 1.5 computer software (PTI - Post Tension Institute) was used to provide estimates of differential

movements. VOLFLO Win 1.5 computer software considers the effects of multi-soil layers below foundations and the effects of moisture variations caused by seasonal and long-term environmental changes which may occur after development.

Primary design considerations for the edge and center lift analysis include:

- Constant Soil Suction: Typically measured by the Thornwaite Moisture Index (TMI), which is defined as the amount of water which would be returned to the atmosphere by evaporation from the ground surface and transpiration by plants if there was an unlimited supply of water to the plants and soils. The TMI for the Carson City area is - 40[8] with a corresponding soil suction value of 4.1 pF. Based on the anticipated use of landscape irrigation and other artificial moisture conditions typically present within a residential development, it is our opinion that a lower soil suction value is appropriate for the preliminary analysis. A value of 3.8 was incorporated in our analysis.

- Depth of Constant Soil Suction: The depth to constant soil suction (active soil zone) is the depth in which changes in moisture content will cause changes in soil volume. The depth to constant soil suction will be estimated by developing a plot of moisture content with depth with subsequent field investigations. For this preliminary analysis, the depth to constant soil suction is assumed at about 8 feet.

- Edge Moisture Variation: This is the distance measured inward from the edge of the slab over which the moisture content of the soil varies. These distances depend on several soil properties including fracturing/cracking, soil index properties, and density. The PTI method utilizes a coefficient (unsaturated diffusion coefficient) to estimate edge moisture variation based on the soil properties. In general, these distances vary from about 5 to 9 feet. Edge moisture (Em) variation can be reduced if a full perimeter vertical moisture barrier is used. Reductions are based on the installed depth of the full perimeter vertical moisture barrier.

- Matrix Suction Compression Index: The VOLFLO program uses this index to calculate the change of soil volume for a change in suction. This index is based on laboratory testing including Atterberg Limits and particle size analysis. The index is a measurement of the activity of the clay fines. Soils with higher active clay fines will have a higher matrix suction compression index and consequently an increased ability for volume changes with changes in moisture. Laboratory test data collected during this preliminary investigation will be used for the assumed profile types. Reductions in the calculated shrink/swell (Ym) values can be achieved if a full perimeter vertical moisture barrier is used. This analysis will be refined once the final exploration is completed.

[8] A negative TMI indicates a net soil moisture deficit and a corresponding high soil suction value. It should be understood that Reno-Sparks climatic area has one of the highest net soil suction values in the nation, which correlate directly with higher swell and shrinkage values.

7.2.2.2.2 PT Slab Preliminary Results

The VOLFLO program accounts for non-climatic conditions by varying the initial suction and final suction values. PTI (2012) recommends the following typical suction values to determine edge and center lift values. The following suction values [9] along with the assumptions for landscape irrigation, vertical barrier, and drainage conditions were used in our analysis:

- An initial soil suction value of 4.5 pF was used for edge lift conditions in an area with vegetation adjacent to the foundation.
- An initial soil suction value of 2.5 pF (Flower Bed Envelope) was used for center lift conditions in areas with landscape irrigation and/or poor drainage adjacent to the foundation.
- A constant soil suction value of 3.8 pF was used for both center lift and edge lift conditions.
- The final soil suction values used were 2.5 pF (Flower Bed Envelope) for edge lift and 4.5 pF for center lift conditions.

The thickened slab edge required for frost depth will act as a vertical barrier to prevent the migration of moisture below the slab. It also recommended to extend the moisture barrier that will be placed below the slab behind the thickened slab edge. A vertical barrier of 2 feet to account for the thickened edge slab was assumed in our analysis and reduced both the calculated swell and shrinkage values. Results from the preliminary analysis are included in Table 6 (Preliminary PT Foundation Slab Evaluation Results).

Table 6 - Preliminary PT Foundation Slab Evaluation Results

Soil Profile	Assumed Pad Grade Soils[1]	Y_m		E_m	
		Swell[2] (Inches)	Shrink[3] (Inches)	Edge Lift[4] (feet)	Center Lift[5] (feet)
1	Stratified **SC**, **SC-SM**, and **CL**	0.84	-0.79	5.1	9.0
2	**SC-SM** over **SC**	0.87	-0.69	5.2	9.0
3	Thin layer of **SC-SM** over **SC**	1.09	-0.9	5.1	9.0

Notes:

1) Soil Profile Assumptions (based on limited laboratory testing completed as part of this preliminary exploration):
   a. **SC-SM**: Liquid Limit=26, PI=6, -200 sieve=28.5%, -2μm=8%
   b. **SC**: Liquid Limit=32, PI=16, -200 sieve=45.7%, -2μm=18%
   c. **CL :** Liquid Limit=49, PI=22, %-200=58.7%, -2μm=25%
2) Edge Lift Condition
3) Center Lift Condition
4) Edge Lift Moisture Variation Distance
5) Center Lift Moisture Variation Distance. This value is predominantly determined by.....
6) A detailed analysis will be required for final project design, values presented in Table 6 are for conceptual design consideration only.

[9] It should be advised that suction values may vary and are dependent on landscape and drainage conditions adjacent to the foundation.

7.2.3 Static Settlement

An elastic settlement response is expected for foundations bottomed on properly compacted structural fill or medium dense native granular material. The majority of the settlement is expected to occur rapidly, generally during the construction timeframe.

Once loading is determined for the structure, settlement can be estimated. However, based on the assumed lightly loaded residential structures and foundation grade material[10], settlement on the order of ¾-inch or less is expected. Differential settlement for foundations with similar loads is anticipated to be about ½ of the total settlement provided the foundations are all bottomed on similar material (e.g. all on suitable native material or properly compacted structural fill).

7.3 LATERAL EARTH PRESSURE

Static lateral earth pressures are dependent on the relative rigidity and allowable movement of the retaining structure as well as the strength properties of the backfill soil and drainage conditions behind the retaining wall. The lateral earth pressure is strongly dependent on the lateral deformations which occur in the soil.

A restrained retaining wall will experience higher lateral earth pressures than a retaining wall that is free to move (cantilever conditions). The restrained retaining wall lateral earth pressure is based on the at-rest soil coefficient (K_o), and lateral earth pressure values for the retaining wall that is free to rotate with the ability to deflect at the top (wall movement greater than 0.001H for cohesion less soils and greater than 0.01H for cohesive soils) are based on active soil coefficient (K_a[11]). Lateral earth pressure values are presented in Table 7 (Preliminary Lateral Earth Pressures).

Table 7 – Preliminary Lateral Earth Pressures

Earth Pressure Condition	Earth Pressure Coefficient	Equivalent Fluid Density (psf) (1,2)
Active (P_a)	0.29 (K_a)	32
At-Rest (P_o)	0.46 (K_o)	60
Passive (P_p)	-	350(3)

(1) Pounds per square foot per foot of depth
(2) Lateral pressures for level backfill calculated using Coulomb Equations for active/passive earth pressure. Assuming maximum unit weight of 130 pcf and a friction angle of at least 33 degrees.
(3) Assumes a factor of safety of 1.2.

Subterranean structures and short retaining walls, including foundations, should be designed to resist the lateral earth pressure exerted by the retained soil plus any additional lateral force that will be applied to the wall due to surface loads placed at or near the wall.

[10] Provided foundation grade soil preparation recommendations are adhered to.
[11] Assumes a deflection equal to 0.5 percent of the total wall height.

Table 7 (Preliminary Lateral Earth Pressures) provides lateral earth pressures based on the assumption that granular soils are used as backfill. Retained soils should consist of non-expansive granular soils with a minimum friction angle of 33 degrees and a maximum unit weight of 130 pounds per cubic foot.
Existing native granular soils meeting the requirements for an imported structural fill may be used as backfill. The backfill shall extend laterally behind the retaining wall at least the height of the retaining wall.

Backfill placed behind the retaining wall should be compacted to at least 90 percent. Over-compaction should be avoided as it will result in increased lateral forces exerted on the wall by the soil. Heavy equipment should not be used for placing and/or compacting backfill adjacent to the retaining wall and should be kept a minimum of three feet or at a distance determined by a 1H:1V slope away from the base of the wall, whichever is greater.

7.4 CONCRETE SLABS

All concrete slabs should be directly underlain by aggregate base material with a thickness of at least 6 inches. Aggregate base courses should be densified to at least 95 percent relative compaction.

Subgrade soils shall be prepared in accordance with recommendations presented in the grading and filling section of this report (Section 7.1.3-Grading and Filling).

For slabs-on-grade which do not comply with post tension construction, it is recommended that a minimum 1½ foot vertical separation be maintained between potentially expansive soils as previously described

Removal of potentially expansive soils shall extend at least 2 feet laterally from the outside edge of the concrete slab. The depth of the overexcavation will be dependent on the proposed bottom of slab elevation and will be determined as part of the final geotechnical exploration.

Prior to construction, the slab subgrade soils should be scarified to a minimum depth of 8 inches, uniformly moisture conditioned to within 3 percent of optimum moisture content and densified to at least 90 percent relative compaction. The subgrade should be protected against drying until the concrete slab is placed.

Type II cement is recommended for project design. Due to the potential exposure to freeze/thaw conditions the project design engineer should consider air entrainment for the project mix design.

All concrete floor slabs should have a minimum thickness of 4-inches. The design engineer should determine the slab thickness and structural reinforcing requirements. Placement and curing should be performed in accordance with procedures outlined by the American Concrete Institute (ACI). Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing should be provided to minimize any damage resulting from shrinkage.

7.4.1 Moisture Vapor Retarder

Water vapor can be transmitted through the slab. The transmission of moisture to the base of the slab can occur through two physical processes:

1. Water vapor transmission; and/or

2. Capillary action of the underlying soils.

The rate of transmission depends on the difference in water vapor pressure between the air voids in the slab and the air above the slab. Water vapor pressure and the subsequent transmission rate are affected by the difference in the humidity and temperature of these two elements.

In floor slab areas where moisture sensitive floor coverings are planned, a moisture vapor retarder system is recommended. Moisture vapor migrating through the slab can cause debonding and discoloration of tile, linoleum, or other products placed directly on the concrete slab. To reduce moisture migration a Stego Wrap Moisture Barrier[12] (15 mil), or approved product that meet or exceed specifications presented in ASTM E-1745 for a Class B water vapor retarder shall be placed directly below the concrete slab-on-grade base course layer.

7.4.2 Vapor Barrier Installation

Regardless of the type of vapor retarder system chosen, installation shall be completed in accordance with the manufacturer's recommendations. The vapor barrier shall be attached to the basement wall.

During placement care shall be taken not to puncture or tear the vapor membrane[13]. In general, the moisture vapor membrane can be placed directly on densified subgrade soils. Prior to placement, all sharp or angular rocks shall be removed from the ground surface.

The membrane shall be tensioned by hand until taut, free of wrinkles and lying flat. All seams, punctures, and penetrations shall be sealed in accordance with the manufacturer recommendations, a minimum 10-mil polyethylene tape is recommended. The membrane overlap shall be in accordance with the manufacture recommendations.

Vehicle traffic shall not be allowed directly on the membrane. Care shall be taken in the placement of fill material over the membrane. Fill materials shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the membrane. It will be essential for the contractor and crews to work with care so that the membrane is not punctured or damaged during installation.

[12] If a product other than the Stego Wrap is used, the manufacturer should approve the use of the moisture vapor directly below the base course layer.

[13] Water-based floor adhesives are extremely sensitive to slab moisture. Under some conditions, a small amount of moisture vapor that bypasses the membrane or excess water remaining in the slab from the original concrete placement can be sufficient to cause debonding and discoloration. Therefore, it is essential that the contractor and crews work with care to ensure seams and penetrations are sealed and the moisture vapor retarder is not punctured or damaged during installation.

7.5 CORROSION POTENTIAL

A soil sample from Boring B-2 at a depth of 5 to 6½ feet was submitted to Silver State Analytical Laboratories for soil chemistry testing including soluble sulfate testing, pH, and resistivity testing. These tests were completed to determine the potential corrosiveness of the soils to concrete. A brief summary of the results is presented below.

- **Soluble sulfates (ASTM 1580C):** Soluble sulfate test results detected a level 0.12 percent indicating that site soils have a negligible potential for sulfate exposure for concrete in direct contact with native soils. Therefore, Type II cement can be used for project design.
- **pH (EPA 9045D):** The pH test result of 8.5 indicates the site soils are alkaline and have a moderate potential for corrosion with ferrous metal in direct contact with the soil (Baboian, 2005).
- **Resistivity (ASTM G57):** Resistivity test results of 270 (ohms centimeter) were detected. Resistivity results indicate that the site soils have a ***very severe*** potential corrosion to ferrous metal in direct contact with the soil (Baboian, 2005).

A corrosion specialist should review the results of the soil testing to determine if or what type of corrosion mitigation may be required for project design.

7.6 PRELIMINARY FLEXIBLE PAVEMENT RECOMMENDATIONS

Traffic counts and loading information were not available at the time this preliminary report was prepared. In general, it is anticipated that the multiunit development will be primarily subject to light automobile traffic and occasional light truck traffic from single or tandem axel delivery or disposal trucks (estimated at one to two trips per day).

7.6.1 Common Driveways

Based on the anticipated vehicle loading assumptions, the preliminary recommended structural asphalt concrete pavement section should be a minimum of 3 inches of asphalt concrete pavement underlain by 6 inches of aggregate base. This structural section should only be considered for common driveway areas within the proposed development.

This recommendation excludes any proposed improvements to North Edmonds Drive or Fairview Drive.

7.6.2 Flexible Pavement Design Life

Asphalt pavement sections are calculated for a theoretical 20-year design life. This design life assumes that the common driveways and parking areas will be totally reconstructed at around 20-years. Prior to reconstruction, the asphalt concrete pavement will be in a deteriorated condition and likely show substantial structural distress including but not limited to: alligator cracking, potholes, possible rutting and depressions, transverse and longitudinal cracking, and surface raveling. Based on pavement design theory, significant structural distress (alligator cracking and rutting) generally begins at about 15 years. Additionally, due to the quality of aggregate available and extreme climate conditions Northern Nevada, premature deterioration of the pavement can occur prior to 15 years. However, it has been shown that a proper maintenance program[14] will reduce pavement deterioration and could extend the life of the pavement.

[14] Maintenance is **mandatory** to long-term pavement performance. Maintenance refers to any activity performed on the pavement that is intended to preserve its original service life or load-carrying capacity. Examples of maintenance activities include patching, crack or joint sealing, and seal coats. If these maintenance activities are ignored or deferred, premature failure of the pavement **will occur**.

Premature failure of asphaltic concrete pavement frequently occurs adjacent to poorly graded ponding areas and/or landscape areas. Failures may occur due to excessive precipitation, freeze/thaw, irrigation and landscaping water infiltrating into the subgrade soils causing subgrade failure.

Based on the proposed site layout, the project site has limited areas where site drainage can be directed and infiltrated onsite via sheet flow. In areas where the design team suspects that saturation of the subgrade soils beneath asphaltic pavement may occur, it is strongly recommended the owner/project manager install a subdrain system to eliminate the potential for saturation of subgrade soils. The subdrain system should discharge into a properly designed infiltration basin, drainage swale, or infiltration gallery.

Care should be taken not impede drainage flow to prevent system back-up. Appropriate maintenance procedures should be implemented to ensure the subdrain system does not plug and allow drainage of surface and subsurface water beneath paved areas. Subdrain location and configuration should be evaluated once final grading and landscaping plans have been prepared. The project civil engineer and landscape designer should review all potential areas for subdrain installation.

7.6.3 Structural Section Construction

Subgrade soil should be prepared in accordance with the recommendations of Section 7.1.2 (Subgrade Soil Preparation) of this report. Base Material should be densified to at least 95 percent relative compaction. Base thickness will be dependent on the structural section type and subgrade properties.

The contractor should submit a pavement mix design to the owner at least ten working days prior to construction for approval. Where pavement is placed adjacent to concrete flatwork, it is recommended that the finish compacted grade of the pavement be at least ¼ to ½ of an inch higher than the edge of the adjacent concrete surface. This is to allow adequate compaction of the pavement without damaging the concrete.

It is recommended that a *12 inch* vertical separation be maintained between the proposed subgrade elevation and existing potentially expansive soils similar to the clayey sand (SC) encountered in Boring B-1 at a depth of 1 ½ feet bgs. Removal/replacement of unsuitable subgrade soils may be required and will be dependent on the finished grade and thickness of the structural section (i.e. asphalt concrete pavement and aggregate base course).

7.7 SITE DRAINAGE CONSIDERATIONS

Final grades should be planned such that surface drainage is constructed and maintained to fall away from the structure. The permanent finish slope grade away from the structure should be at least 5 percent for a minimum distance of 10 feet away from the building. The slope gradient can be reduced to 2 percent for impervious surfaces, such as concrete slabs-on-grade and pavement, constructed adjacent to the building.

It is recommended that runoff from roofs, flat work, parking areas, and other pervious and impervious surfaces be collected using permanent drainage paths that can convey water off the property. These drainage pathways should direct flows away from the structure and moisture sensitive areas. A system of roof gutters and downspouts is good construction practice to collect roof drainage and direct it away from the foundations.

Stem wall backfill shall be densified to the requirements given in Section 7.1.3 (Grading and Filling) to decrease permeability and reduce the potential for irrigation and storm water to enter under floor areas. This will also reduce the potential for settling of backfill soils causing a reduction in the slope gradient away from the structure.

7.7.1 Crawlspace Moisture (Raised Floor Construction)

Crawl space moisture is commonly associated with raised floor construction. Introduction of this moisture can be due to several sources: excessive landscape irrigation, poor site drainage, excessive precipitation, or leakage from other adjacent water sources (pools, ponds, irrigation lines, water features, etc.). In addition, it is common for water to seep into fill material, perch on the native or compacted soils, travel along the surface of the native or compacted soils, and daylight where the cut/fill line is exposed. Perched water can daylight in any number of locations such as slope faces, roadway subgrade, and crawl spaces. There are several methods of crawl space moisture mitigation and prevention measures that can be incorporated into construction such as foundation drains, under-slab drains, and other commercially available vapor barrier systems. Construction recommendations to reduce the infiltration of groundwater into crawl space can be given upon request.

Property owners/managers should be aware that regular maintenance of sprinkler and drip irrigation systems are critical to reduce the infiltration of moisture below structural elements and could save money on water bills. Inspection of irrigation lines should be performed on a regular basis. Broken sprinklers heads and leaking irrigation lines should be repaired immediately. Overwatering should also be avoided

It is also recommended that the disclosures to future buyers include a copy of the site drainage plan and specific instructions to maintain drainage away from the structure.

8.0 CONSTRUCTION OBSERVATION AND MATERIALS TESTING SERVICES

The recommendations presented in this report are based on the assumption that the owner/project manager provide adequate field testing and construction review during all phases of construction. These tests and observations shall include, but not be limited to:

- Earthwork observation and materials testing;
- Observation and testing of construction utility trench backfill;
- Observation and testing of concrete; and
- Special Inspection of foundations and other structural elements;

It is also recommended that the project geotechnical engineer complete a design level geotechnical investigation prior to construction and conduct a general review of the project plans and specifications to determine if the earthwork and foundations recommendations presented in this report have been properly interpreted and implemented during design.

CME maintains one of the region's largest accredited labs and employs a full staff of qualified inspectors. CME can provide additional information concerning the scope and cost of these services upon request.

9.0 LIMITATIONS

This report has been prepared in accordance with generally accepted local geotechnical practices. The analyses and recommendations submitted are based our subsurface exploration, the results of our laboratory testing and analysis.

This preliminary report has been prepared to provide information allowing the engineer to design the project. The owner/project manager is responsible for distribution of this report to all designers and contractors whose work is affected by the recommendations contained herein. In the event of changes in the design, location, or ownership of the project after presentation of this report, our recommendations should be reviewed and possibly modified by the geotechnical engineer[15]. The engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report[16].

This report was prepared by CME for G & E Investments, LLC. The material in it reflects our best judgment in light of the information available to us at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based upon it, are the responsibility of such third parties. CME accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

[15] If the geotechnical engineer is not accorded the privilege of making this recommended review, they can assume no responsibility for misinterpretation or misapplication of the recommendations contained herein or their validity in the event changes have been made to the original design concept.

[16] All structures are subjected to deterioration from environmental and manmade exposures. As a result, all structures require regular and frequent monitoring and maintenance to prevent damage and deterioration. Such monitoring and maintenance is the sole responsibility of the Owner. CME Inc. shall have no responsibility for such issues or resulting damages.

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Appendix A

CME
CONSTRUCTION MATERIALS ENGINEERS, INC.

G & E INVESTMENTS, LLC

NORTH EDMONDS MULTIUNIT RESIDENTIAL DEVELOPMENT

FIELD EXPLORATION LOCATION MAP

CARSON CITY, NEVADA

PROJECT NO.: 1946 DATE: 1/10/2017

PLATE

A-1

CME CONSTRUCTION MATERIALS ENGINEERS INC.

6980 Sierra Center Parkway, Suite 90

Reno, NV 89511

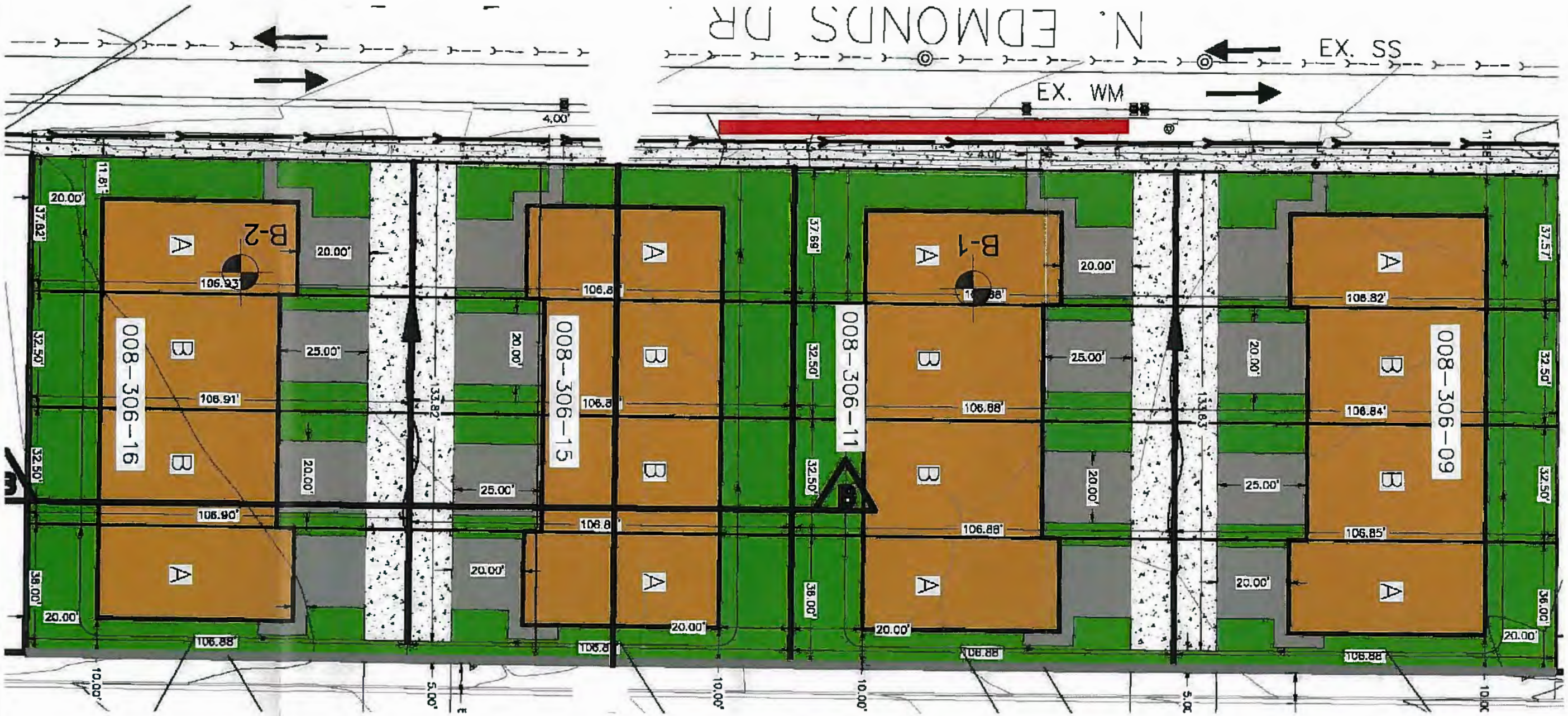
V:\Active\1946\Autocad\PLATES.dwg

LEGEND

B-1 APPROXIMATE BORING LOCATION

APPROXIMATE LOCATION OF REMI ARRAY

REFERENCE: BASE MAP CONCEPTUAL MAP, NORTH EDMONDS, CARSON CITY NEVADA, BY MANHARD CONSULTING, 06/22/2016



SCALE 1"=30'

30 15 0 15 30

LOG OF TEST BORING NO. B-1

PROJECT N EDMONDS DRIVE-MULTIUNIT RESIDENTIAL DEVELOPMENT **RIG & BORING TYPE** CME 55
LOCATION 1759 N. EDMONDS-NW SIDE OF PROPERTY
CLIENT: G & E INVESTMENTS, LLC. **DATE** 12/20/16
PROJECT NO. 1946 **LOGGED BY:** SAM **SURFACE ELEVATION** ≅4,637.5' (PLATE A-1)
BLOW COUNTS: Corrected / Not Corrected NC **HAMMER TYP.:** CATHEAD

Depth In Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Specific Gravity	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM							MOIST	0'-1½': SILTY SAND, mostly fine to medium sand, low plasticity, trace gravel, brown								
									Note: Frozen soils to a depth of 1 foot								
	SC							MOIST									
							STIFF	MOIST	1½'-5': CLAYEY SAND, mostly fine to medium sand, few thin stratified sand lenses, dark brown to brown								
2.5				S	1A	11				45.7	32	16	2.78			19.2	A, G, SG
5	SM						MED. DENSE	MOIST	5'-7½': SILTY SAND, some fine to medium sand, non-plastic, brown								
				U	1B	25											
7.5	CL						VERY STIFF	MOIST	7½'-9': SANDY LEAN CLAY, little very fine to fine sand, redox streaking throughout sample, brown to greyish brown					2.5			
				S	1C	34											
	CL							MOIST	9'-10.75': LEAN CLAY, trace very fine to fine sand, greyish brown								
10							HARD										
	SM			U	1D	69	VERY DENSE	MOIST	10.75'-12': SILTY SAND, mostly fine to medium sand, non-plastic, reddish brown								
▽	CL						STIFF	WET	12'-15': SANDY LEAN CLAY, some fine to medium sand, grey-brown								
12.5				S	1E	12				61.1	41	22		3.0		26.5	A, G
15	SC-SM						MED. DENSE	WET	15'-17½': SILTY, CLAYEY SAND, mostly fine to coarse sand, low plasticity, brown								
				S	1F	27											

GROUNDWATER

	DEPTH	HOUR	DATE
▽	12'-2"	10:07AM	12/20/16
▼			

SAMPLE TYPE
A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial

PLATE NO.: A-2A

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST BORING NO. B-1

PROJECT N EDMONDS DRIVE-MULTIUNIT RESIDENTIAL DEVELOPMENT **RIG & BORING TYPE** CME 55
LOCATION 1759 N. EDMONDS-NW SIDE OF PROPERTY
CLIENT: G & E INVESTMENTS, LLC. **DATE** 12/20/16
PROJECT NO. 1946 **LOGGED BY:** SAM **SURFACE ELEVATION** ≅4,637.5' (PLATE A-1)
BLOW COUNTS: Corrected / Not Corrected NC **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Specific Gravity	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
17.5	SP-SM			S	1G	34	DENSE	WET	17½'-20': POORLY GRADED SAND WITH SILT, mostly fine to coarse sand, non- plastic, brown								
20	CL			S	1H	13	STIFF	WET	20'-21½': LEAN CLAY, little to trace fine to coarse sand, olive grey-brown								
									TERMINATED AT 21½ FEET, WATER ENCOUNTERED AT ABOUT 12.2 FEET								
22.5																	
25																	
27.5																	
30																	
32.5																	

GROUNDWATER

	DEPTH	HOUR	DATE
▽	12'-2"	10:07AM	12/20/16
▼			

SAMPLE TYPE
A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial

PLATE NO.: A-2A

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST BORING NO. B-2

PROJECT N EDMONDS DRIVE-MULTIUNIT RESIDENTIAL DEVELOPMENT **RIG & BORING TYPE** CME 55
LOCATION 1709 NORTH EDMONDS DRIVE, NW YARD
CLIENT: G & E INVESTMENTS, LLC. **DATE** 12/20/16
PROJECT NO. 1946 **LOGGED BY:** SAM **SURFACE ELEVATION** ≅4.639.5' (PLATE A-1)
BLOW COUNTS: Corrected / Not Corrected NC **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Specific Gravity	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SC							MOIST	0'-2': CLAYEY SAND, mostly fine to medium sand, low plasticity, brown								
2.5	SC-SM			S	2A	12	MED. DENSE	MOIST	2'-5': SILTY, CLAYEY SAND, mostly fine to medium sand, low plasticity, olive brown.	28.5	26	6				12.2	A, G
5	CL			U	2B	36	HARD	MOIST	5'-8½': SANDY LEAN CLAY, some very fine to fine sand, low plasticity, brown	58.7	49	22		>4.5		24.5	A, G
7.5				S	2C	37											
	SP						DENSE	MOIST	8½'-11': POORLY GRADED SAND, mostly fine to medium sand, non-plastic, yellow-brown								
10				U	2D	65											
	CL						HARD	MOIST	11'-12½': LEAN CLAY, trace very fine to fine sand, brown					>4.5			
12.5	CL			S	2E	12	STIFF	VERY MOIST to	12½'-15': SANDY LEAN CLAY, little very fine to fine sand, mottled brown to light grey/bluish grey					3.5			
15	CL			S	2F	10	STIFF	WET	15'-17½': SANDY LEAN CLAY, some fine to medium sand, few thin stratified sand lenses, mottled olive-grey					1.5			

GROUNDWATER

	DEPTH	HOUR	DATE
▽	14'-2"	12:04PM	12/20/16
▼			

SAMPLE TYPE
A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial

PLATE NO.: A-2b

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST BORING NO. B-2

PROJECT N EDMONDS DRIVE-MULTIUNIT RESIDENTIAL DEVELOPMENT **RIG & BORING TYPE** CME 55
LOCATION 1709 NORTH EDMONDS DRIVE, NW YARD
CLIENT: G & E INVESTMENTS, LLC. **DATE** 12/20/16
PROJECT NO. 1946 **LOGGED BY:** SAM **SURFACE ELEVATION** ≅4,639.5' (PLATE A-1)
BLOW COUNTS: Corrected / Not Corrected NC **HAMMER TYP.:** CATHEAD

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Blow Counts (SPTs)	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Specific Gravity	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
17.5	CL			S	2G	26	MED. DENSE	WET	17½'-21½': CLAYEY SAND, mostly fine to coarse sand, low plasticity, dark bluish grey								
20				S	2H	25											
22.5									TERMINATED AT 21½ FEET, WATER ENCOUNTERED AT 14.2 FEET								
25																	
27.5																	
30																	
32.5																	

GROUNDWATER

	DEPTH	HOUR	DATE
▽	14'-2"	12:04PM	12/20/16
▽			

SAMPLE TYPE
A - Drill Cuttings B - Bulk Sample
R - 3" O.D. 2.42" I.D. Ring Sample
S - 2" O.D. 1.38" I.D. Sampler
U - 3" O.D. 2.42" I.D. Tube Sample
T - 3" O.D. Thin-Walled Shelby Tube

LABORATORY TESTS
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear
TX - Triaxial

PLATE NO.: A-2b

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

UNIFIED SOIL CLASSIFICATION CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES BASED ON VISUAL DESCRIPTION

TRACE	<5%
FEW	5%-15%
LITTLE	15%-30%
SOME	30%-50%
MOSTLY	>50%

SOIL STRUCTURE COMMON DESCRIPTIVE TERMS

FISSURED: SHRINKAGE OR RELIEF CRACKS OFTEN FILLED WITH SILT OR SAND

POCKET: INCLUSION OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM THE MAIN SOIL LAYER

LAMINATED: THIN ALTERNATING SOIL LAYERS WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION.

SEAM: THIN LAYER OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM MAIN SOIL LAYER.

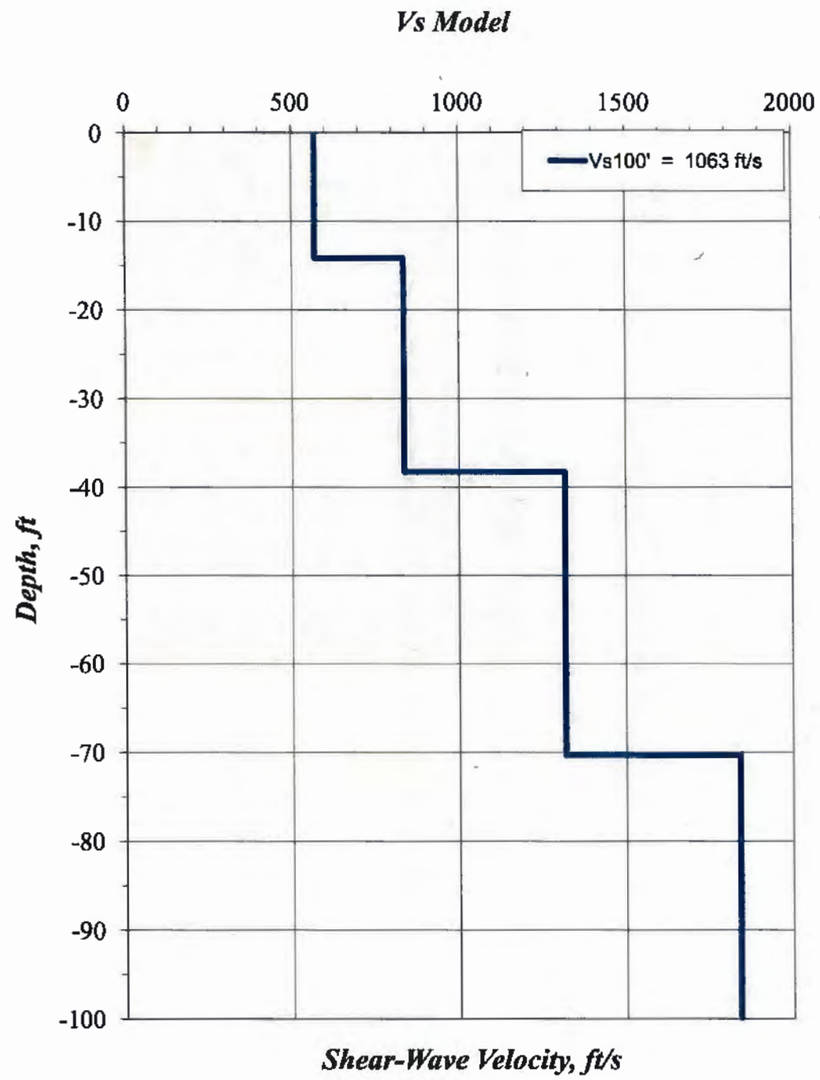
MOTTLED: SOILS WITH IRREGULAR MARKS OR SPOTS OF DIFFERENT COLORS. USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. MAY INDICATE A MARKER HORIZON OF A PREVIOUS GROUNDWATER LEVEL.

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

G & E INVESTMENTS, LLC
N. EDMONDS MULTIUNIT RESIDENTIAL DEVELOPMENT
SOIL CLASSIFICATION CHART
CARSON CITY, NEVADA

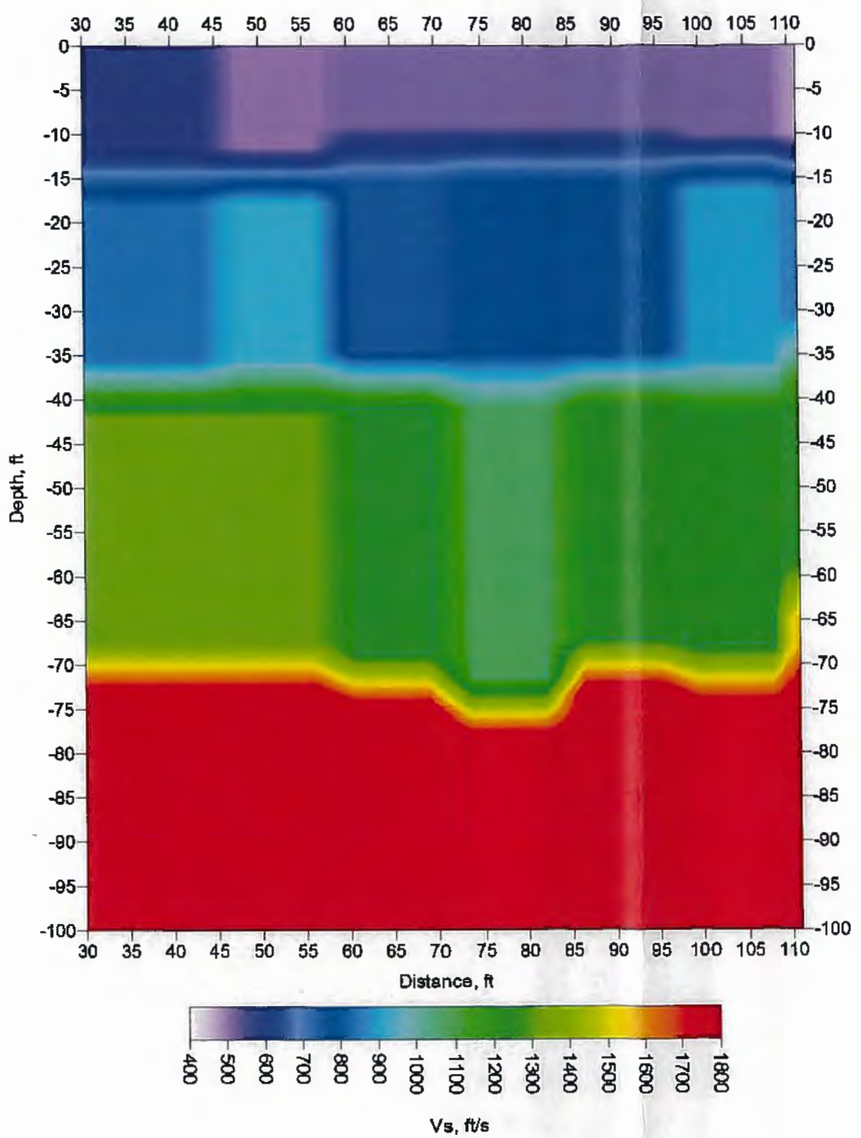
PROJECT NO.:1946 DATE: 01/10/2017

PLATE
A-3



1-DIMENSIONAL SHEAR WAVE VELOCITY PROFILE

N.T.S



2-DIMENSIONAL SHEAR WAVE VELOCITY PROFILE

N.T.S

CONSTRUCTION MATERIALS ENGINEERS INC.
CME
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

G & E INVESTMENTS, LLC
NORTH EDMONDS MULTIUNIT RESIDENTIAL DEVELOPMENT
GEOPHYSICAL FIELD MEASUREMENTS
CARSON CITY, NEVADA
DATE: 1/10/2017

PROJECT NO.: 1946

PLATE

A-4

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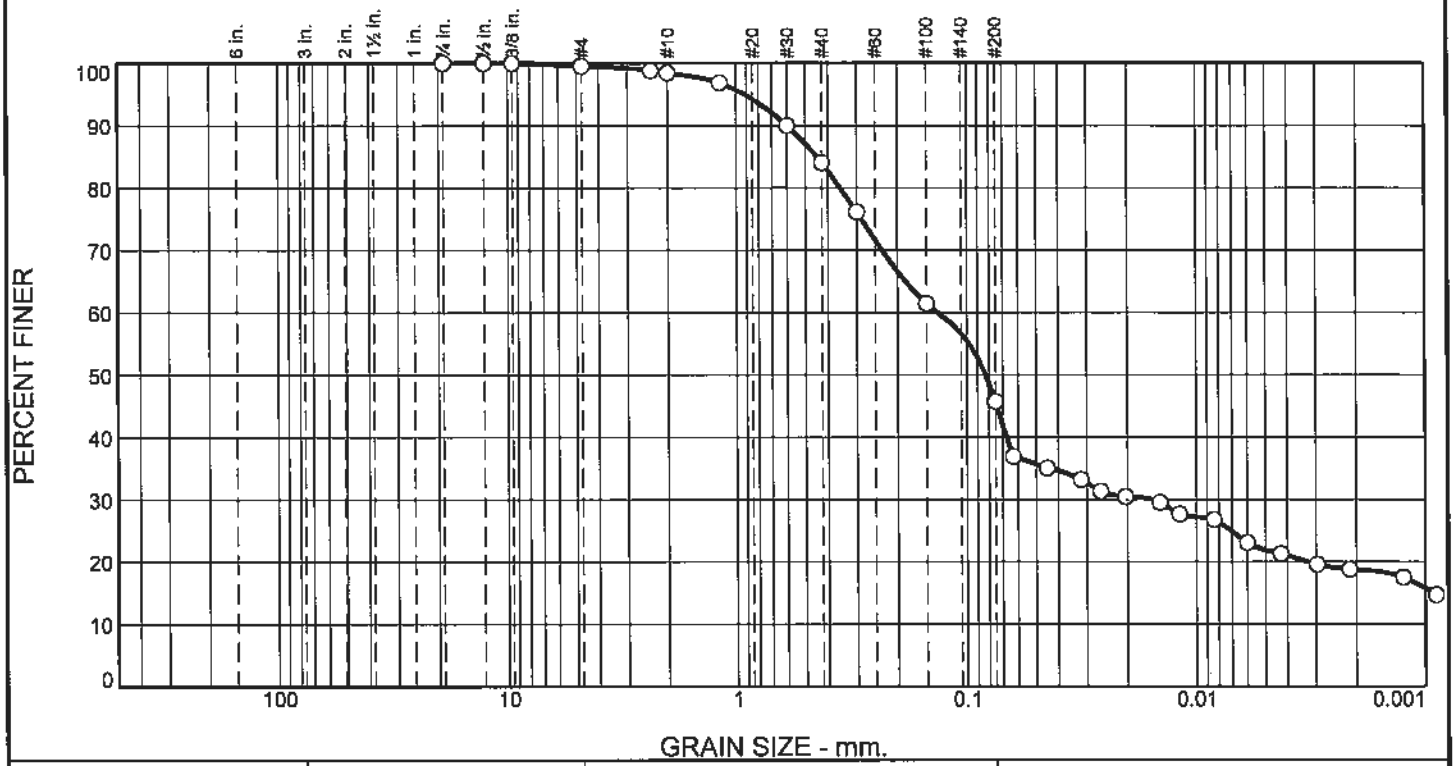
Appendix B

CME
CONSTRUCTION MATERIALS ENGINEERS, INC.

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	1.0	14.4	38.4	23.8	21.9

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.5		
#8	98.8		
#10	98.5		
#16	96.9		
#30	90.0		
#40	84.1		
#50	76.1		
#100	61.4		
#200	45.7		
0.0628 mm.	36.9		
0.0447 mm.	35.0		
0.0318 mm.	33.2		
0.0262 mm.	31.3		
0.0203 mm.	30.4		
0.0144 mm.	29.5		
0.0119 mm.	27.6		
0.0084 mm.	26.8		
0.0060 mm.	23.0		
0.0043 mm.	21.3		
0.0030 mm.	19.6		
0.0021 mm.	18.8		
0.0012 mm.	17.5		
0.0009 mm.	14.7		

* (no specification provided)

Material Description

clayey sand

Atterberg Limits (ASTM D 4318)

PL= 16 LL= 32 PI= 16

Classification

USCS (D 2487)= SC AASHTO (M 145)= A-6(4)

Coefficients

D_{90}= 0.5994 D_{85}= 0.4447 D_{60}= 0.1341
D_{50}= 0.0826 D_{30}= 0.0157 D_{15}= 0.0009
D_{10}= C_u= C_c=

Remarks

Date Received: 12/22/2016 **Date Tested:** 1/4/2017

Tested By: M. PONTONI

Checked By: S. HEIN

Title:

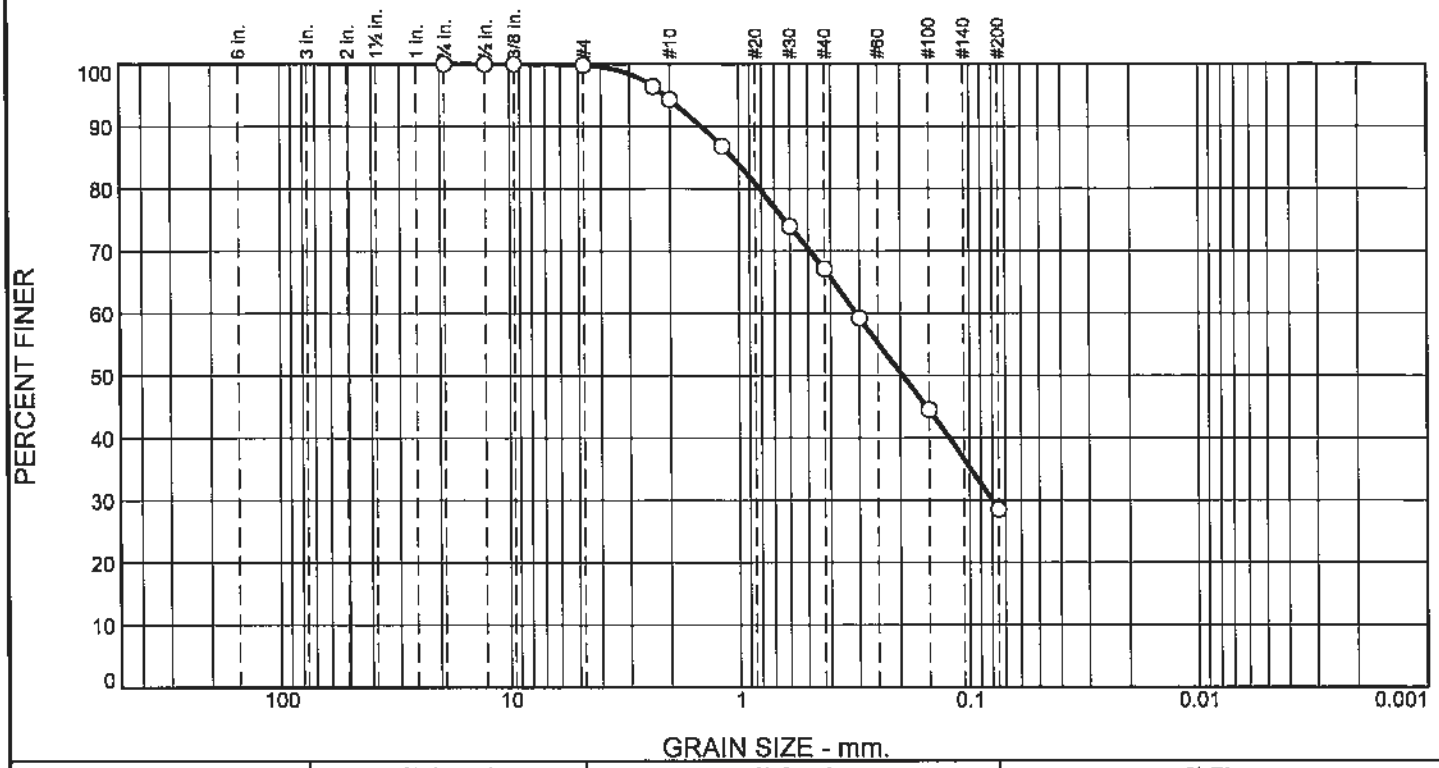
Location: B-1
Sample Number: 1A **Depth:** 2.0'-3.0'

Date Sampled: 12/20/2016

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Client: G&E INVESTMENTS
Project: NORTH EDMUNDS MULTI UNIT RESIDENTIAL DEVELOPMENT
Project No: 1946 **Figure** B-1A

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	5.5	27.2	38.6	28.5	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	99.8		
#8	96.4		
#10	94.3		
#16	86.8		
#30	73.9		
#40	67.1		
#50	59.2		
#100	44.5		
#200	28.5		

* (no specification provided)

Material Description

SILTY, CLAYEY SAND

Atterberg Limits (ASTM D 4318)

PL= 20 LL= 26 PI= 6

Classification

USCS (D 2487)= SC-SM AASHTO (M 145)= A-2-4(0)

Coefficients

D_{90}= 1.4525 D_{85}= 1.0604 D_{60}= 0.3103
D_{50}= 0.1946 D_{30}= 0.0799 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/22/2016 **Date Tested:** 01/04/2017

Tested By: M. PONTONI

Checked By: S.HEIN

Title:

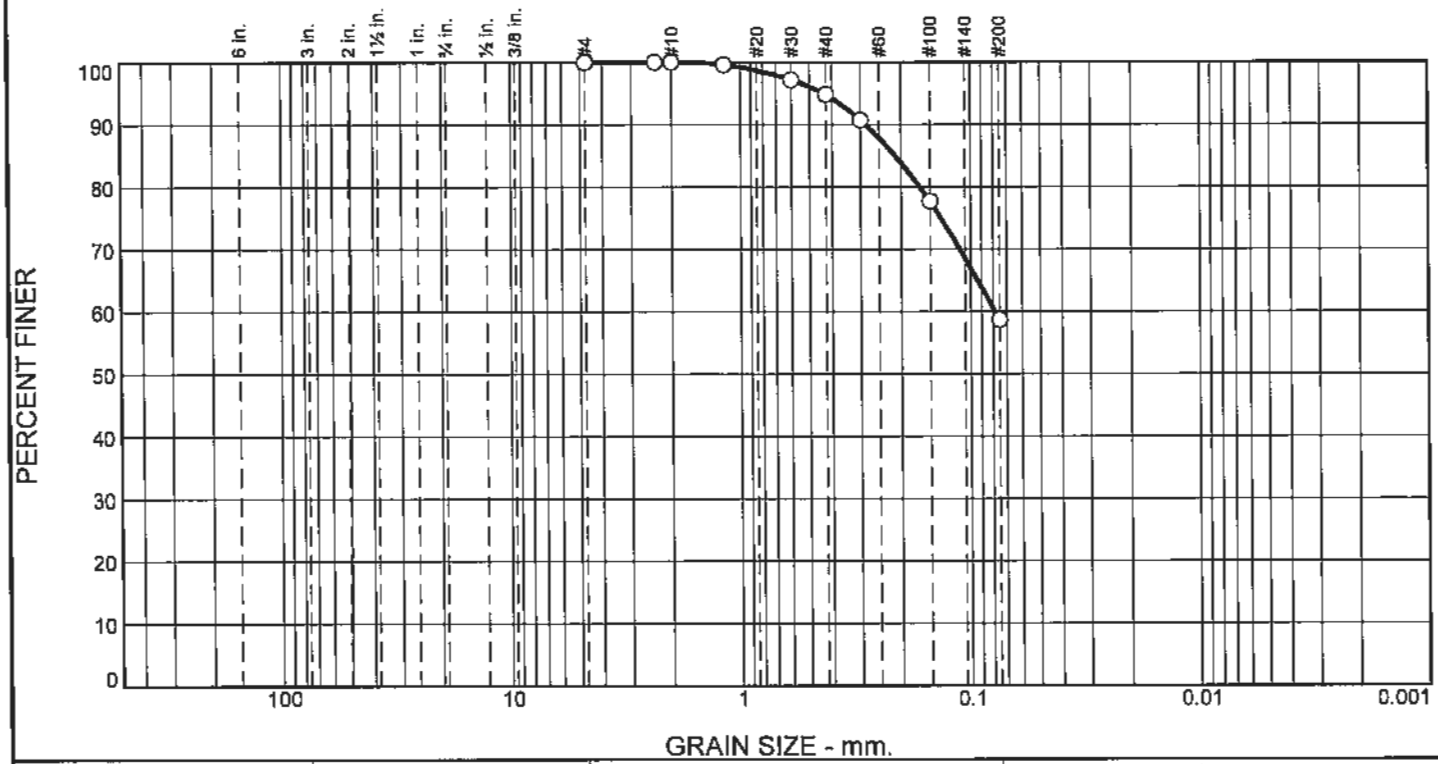
Location: B-2
Sample Number: 2A **Depth:** 2.0'-3.0'

Date Sampled: 12/20/2016

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Client: G&E INVESTMENTS
Project: NORTH EDMUNDS MULTI UNIT RESIDENTIAL DEVELOPMENT
Project No: 1946 **Figure** B-1B

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	5.1	36.2	58.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.6		
#30	97.2		
#40	94.9		
#50	90.7		
#100	77.7		
#200	58.7		

* (no specification provided)

Material Description

SANDY LEAN CLAY

Atterberg Limits (ASTM D 4318)

PL= 27 LL= 49 PI= 22

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-7-6(11)

Coefficients

D_{90}= 0.2856 D_{85}= 0.2120 D_{60}= 0.0785
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/22/2016 **Date Tested:** 1/4/2017

Tested By: MP/GM

Checked By: S. VINES

Title:

Location: B-2 **Date Sampled:** 12/20/2016

Sample Number: 2B **Depth:** 5.0'-5.5'

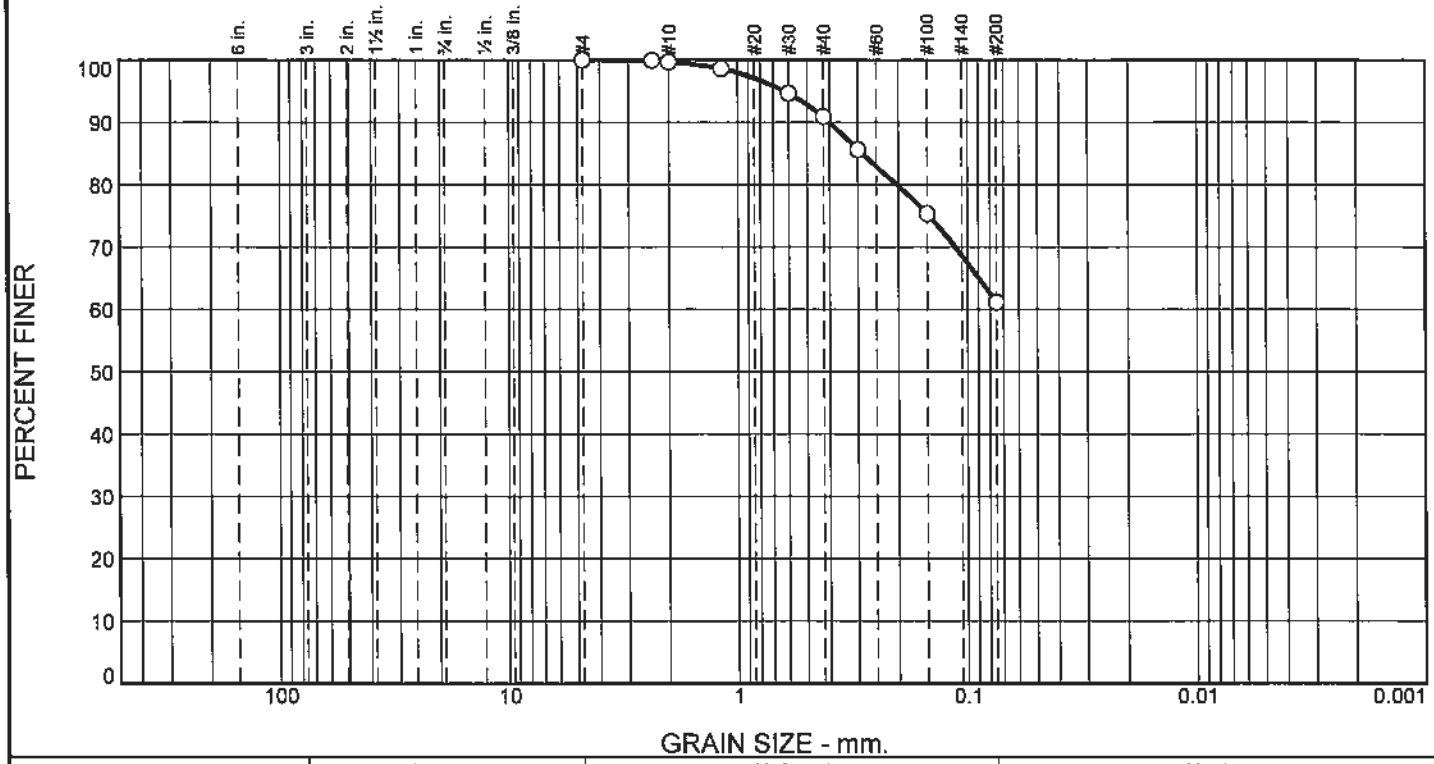
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Client: G&E INVESTMENTS

Project: NORTH EDMUNDS MULTI UNIT RESIDENTIAL DEVELOPMENT

Project No: 1946 **Figure** B-1C

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	8.8	29.8	61.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#8	100.0		
#10	99.7		
#16	98.6		
#30	94.6		
#40	90.9		
#50	85.6		
#100	75.4		
#200	61.1		

* (no specification provided)

Material Description

SANDY LEAN CLAY

Atterberg Limits (ASTM D 4318)

PL= 19 LL= 41 PI= 22

Classification

USCS (D 2487)= CL AASHTO (M 145)= A-7-6(11)

Coefficients

D_{90}= 0.3982 D_{85}= 0.2878 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 12/22/2016 **Date Tested:** 01/04/2017

Tested By: MP/AH

Checked By: S.VINES

Title:

Location: B-1
Sample Number: 1E **Depth:** 12.5'-14'

Date Sampled: 12/20/2016

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

Client: G&E INVESTMENTS
Project: NORTH EDMUNDS MULTI UNIT RESIDENTIAL DEVELOPMENT
Project No: 1946 **Figure** B-1D

SilverState Analytical Laboratories

Sierra Environmental Monitoring | EnviroTech

Laboratory Report

Report ID: 152176

CME-Construction Materials Engineers, Inc		**Date:**	12/28/2016
Attn: Stella Montalvo		**Client:**	CON-160418
69800 Sierra Center Parkway, Suite 90		**Taken by:**	Client
Reno, Nevada 89511		**PO #:**	1946

Analysis Report

Laboratory Accreditation Number: NV-00015

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201612-0950	B-2 @ depth 5.0-6.5'	12/20/2016		12/22/2016

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
pH - Saturated Paste	SW-846 9045D	8.50	pH Units		Bergstrom	12/23/2016	
pH - Temperature	SW-846 9045D	22.0	°C		Bergstrom	12/23/2016	
Resistivity ASTM	ASTM G57	270	ohm cm		Bergstrom	12/27/2016	
Sulfate ASTM 1580C	ASTM 1580C	0.12	%	0.02	Bergstrom	12/27/2016	

Data Flag Legend:

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

G & E INVESTMENTS, LLC
N. EDMONDS MULTIUNIT RESIDENTIAL DEVELOPMENT
CORROSION TEST RESULT
CARSON CITY, NEVADA

PROJECT NO.:1946 DATE: 01/10/2017

PLATE
B-2

Appendix C

CME
CONSTRUCTION MATERIALS ENGINEERS, INC.

USGS Design Maps Summary Report

User–Specified Input

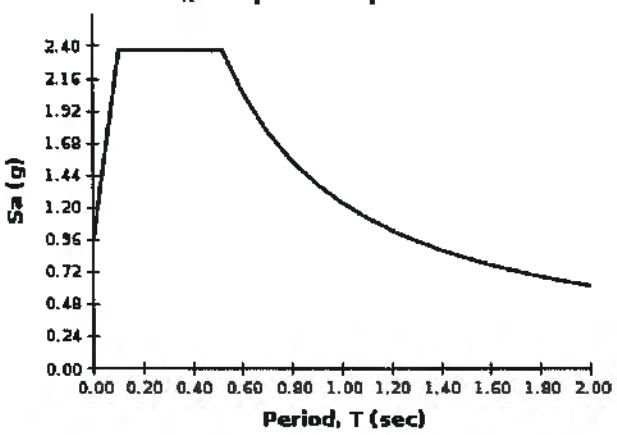
Report Title	N. EDMONDS MULTIUNIT RESIDENTIAL DEV Wed January 4, 2017 18:08:21 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	39.1772°N, 119.72419°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

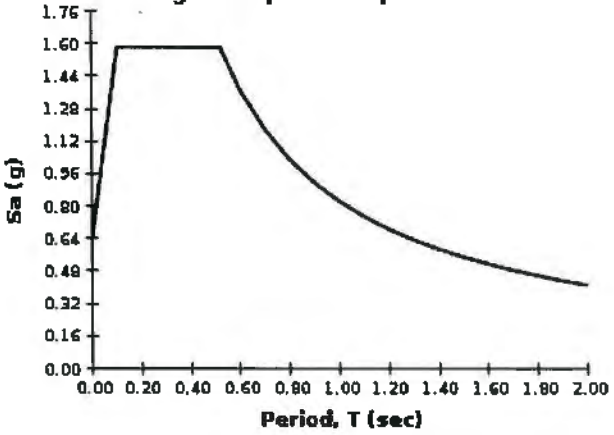
S_S =	2.371 g	S_{MS} =	2.371 g	S_{DS} =	1.581 g
S_1 =	0.824 g	S_{M1} =	1.235 g	S_{D1} =	0.824 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



USGS Design Maps Detailed Report

2012/2015 International Building Code (39.1772°N, 119.72419°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 1613.3.1 — Mapped acceleration parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2012/2015 International Building Code are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 1613.3.3.

From Figure 1613.3.1(1) [1]	S_s = 2.371 g
From Figure 1613.3.1(2) [2]	S_1 = 0.824 g

Section 1613.3.2 — Site class definitions

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Section 1613.

2010 ASCE-7 Standard – Table 20.3-1
SITE CLASS DEFINITIONS

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 1613.3.3 — Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters

TABLE 1613.3.3(1)
VALUES OF SITE COEFFICIENT F_a

Site Class	Mapped Spectral Response Acceleration at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.371 g, F_a = 1.000

TABLE 1613.3.3(2)
VALUES OF SITE COEFFICIENT F_v

Site Class	Mapped Spectral Response Acceleration at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.824 g, F_v = 1.500

Equation (16-37): $S_{MS} = F_a S_S = 1.000 \times 2.371 = 2.371$ g

Equation (16-38): $S_{M1} = F_v S_1 = 1.500 \times 0.824 = 1.235$ g

Section 1613.3.4 — Design spectral response acceleration parameters

Equation (16-39): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.371 = 1.581$ g

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.235 = 0.824$ g

Section 1613.3.5 — Determination of seismic design category

TABLE 1613.3.5(1)
SEISMIC DESIGN CATEGORY BASED ON SHORT-PERIOD (0.2 second) RESPONSE ACCELERATION

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.581 g, Seismic Design Category = D

TABLE 1613.3.5(2)
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.824 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 1613.3.5(1) or 1613.3.5(2)" = E

Note: See Section 1613.3.5.1 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 1613.3.1(1)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(1).pdf
2. *Figure 1613.3.1(2)*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/IBC-2012-Fig1613p3p1(2).pdf

USGS Design Maps Summary Report

User–Specified Input

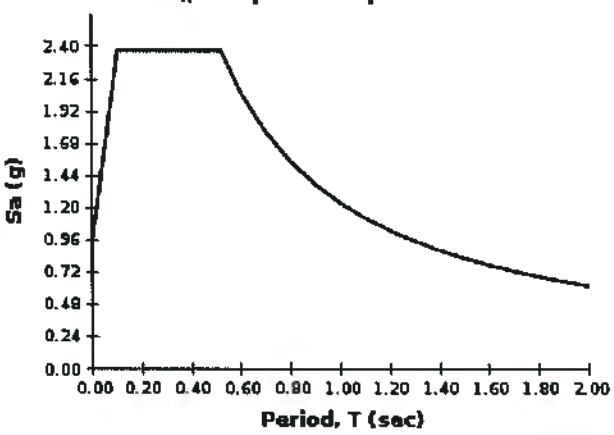
Report Title	N. EDMONDS MULTIUNIT RESIDENTIAL DEV Wed January 4, 2017 18:08:56 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	39.1772°N, 119.72419°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

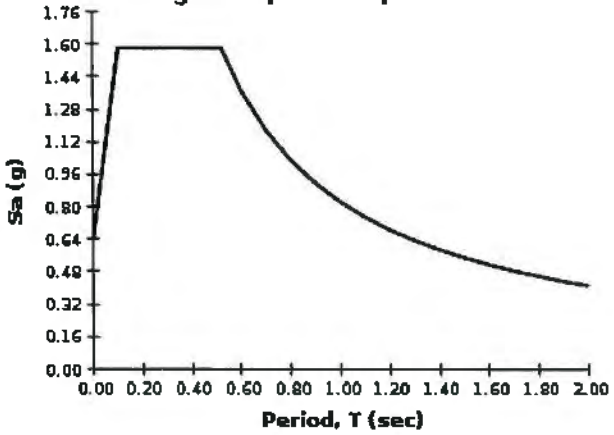
S_S =	2.371 g	S_{MS} =	2.371 g	S_{DS} =	1.581 g
S_1 =	0.824 g	S_{M1} =	1.235 g	S_{D1} =	0.824 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.1772°N, 119.72419°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_s = 2.371 g
From Figure 22-2 [2]	S_1 = 0.824 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.371 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.824 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 2.371 = 2.371$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.824 = 1.235$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

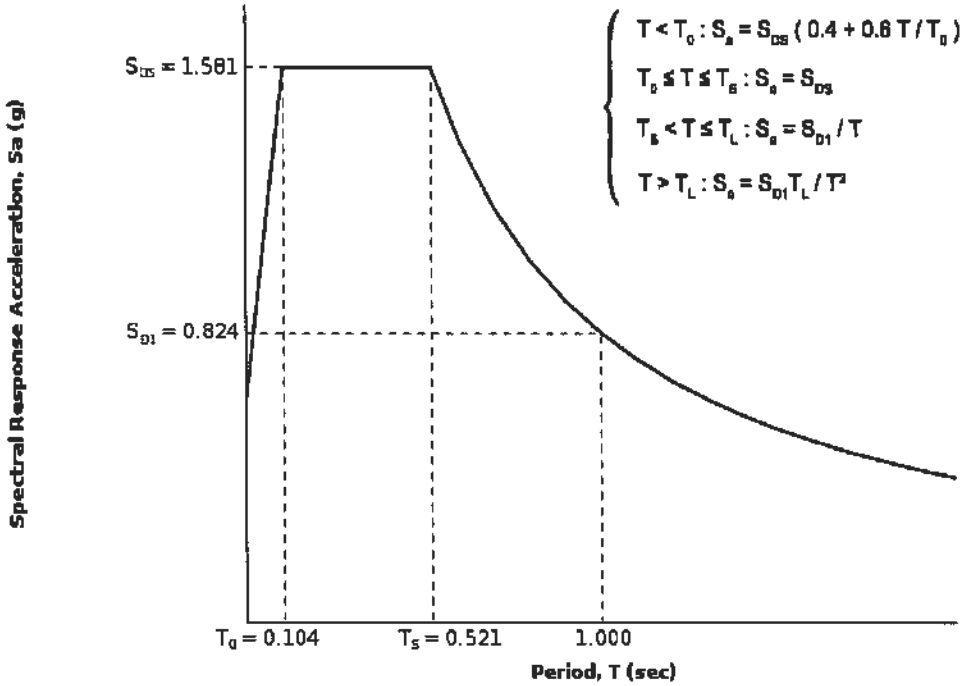
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.371 = 1.581$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.235 = 0.824$ g

Section 11.4.5 — Design Response Spectrum

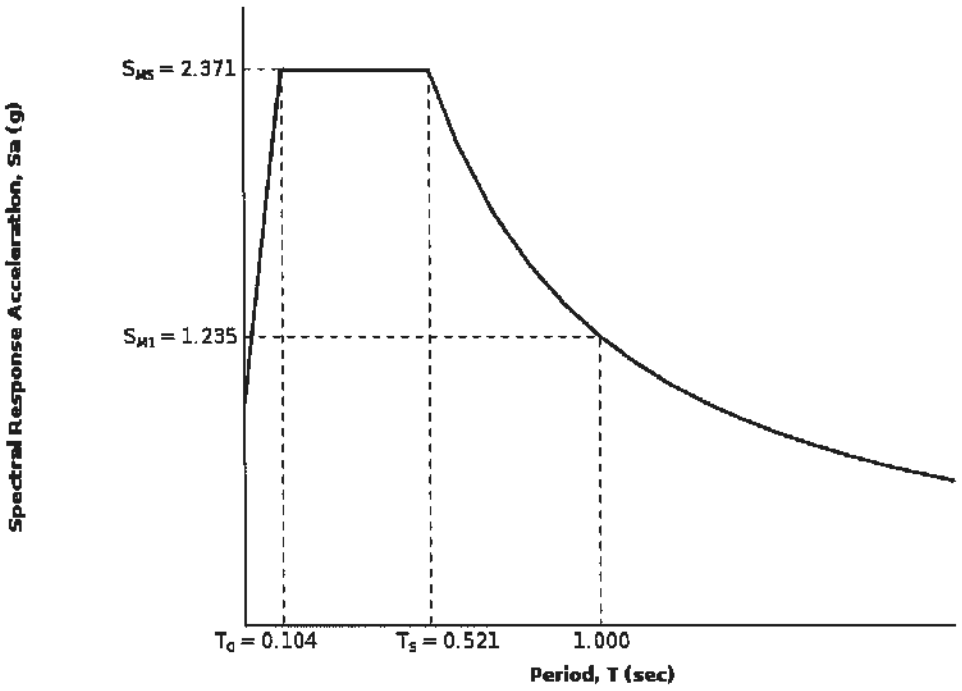
From Figure 22-12[3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.891

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.891 = 0.891$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.891 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.899

From Figure 22-18 [6] C_{R1} = 0.881

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.581 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.824 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = E

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

Appendix D

CME
CONSTRUCTION
MATERIALS
ENGINEERS, INC.

PIEDMONT GEOSCIENCES, Inc.

10235 Blackhawk Dr.
Reno, Nevada 89508
775-972-3234

January 3, 2017

C.E.M. Consulting
P.O. Box 19104
Reno, NV 89511

Attention: Stella Montalvo

Thomas L. Sawyer
Piedmont GeoSciences, Inc.
10235 Blackhawk Drive
Reno, Nevada 89508

SUBJECT: **PRELIMINARY FAULT INVESTIGATION**
NORTH EDMONDS PROJECT
Carson City, Nevada

Stella:

At your request, we have completed our Preliminary Fault Investigation of the North Edmonds multiunit residential project site in Carson City, Nevada (herein the "project site"). The investigation was prompted by a potentially active fault mapped near the western boundary of the project site. This report was prepared by Thomas L. Sawyer, Principal Geologist, Piedmont GeoSciences, Inc. (PGS), Reno, Nevada and submitted to Construction Engineering and Materials, Inc. (CEM) in support of the North Edmonds project.

PRELIMINARY FAULT INVESTIGATION
NORTH EDMONDS PROJECT
CARSON CITY, NEVADA

SECTION 1: INTRODUCTION

This report presents the results of our preliminary fault investigation of the proposed North Edmonds residential project site, located between N. Edmonds Drive and Fairview Drive, south of Gordon Street, Carson City, Nevada. The purpose of the investigation is to evaluate the presence of a potentially active fault mapped near the project site. The location of the project site is shown in relation to Quaternary faults of the project region in Figure 1, and relative to Quaternary faults in the project-site area in Figure 2.

Geologic information reviewed for the investigation included:

- *Earthquake Hazards Map* of the New Empire 7.5' Quadrangle by Bell and Trexler (1979);
- *Geologic Map* of the New Empire 7.5' Quadrangle by Bingler (1977);
- *National Quaternary fault and fold database*, online resource provided by the U.S. Geological Survey, particularly the map and database compilation of the New Empire fault zone and the "Eastern Prison Hill fault zone" (dePolo, 2002a; 2002b);
- *Geotechnical and Geologic Investigation, Stanton Park Subdivision, Carson City, Nevada* by Kleinfelder & Associates (1985); and
- *Fault Investigation, 2006 Paiute Expansion Project South Tahoe And Carson City Pipeline Alignments* by Piedmont GeoSciences (2006).

In addition, the preliminary or surficial fault investigation included the following scope of services:

1. Stereoscopic examination and interpretation of various scales and dates of black-and-white aerial photography covering the project-site area (listed in Table 1) to identify and map Quaternary faults and suspected fault traces. Other remotely

sensed imagery also was examined through various Internet resources (e.g., Google Earth).

2. Compile a Quaternary fault map, based on previous fault mapping and interpretation of aerial photographs (herein) showing the location and activity of Quaternary faults of the project-site area;
3. Conduct field reconnaissance of the project site and project-site area to further evaluate the location and activity of Quaternary fault traces and suspected fault traces; and
4. Analyze and report relevant findings of the preliminary fault investigation.

This Quaternary fault investigation generally follows guidelines provided by the Association of Engineering Geologists in conjunction with the Nevada Bureau of Mines and Geology, "*Guidelines for Evaluation of Potential Surface Fault Rupture/Land Subsidence Hazards in Nevada*" (AEG and NBMG, 1998). The guidelines have been adopted by the Nevada Seismic Safety Council and have been endorsed by the Governor of the State of Nevada (Assembly Bill AB57). According to the guidelines, "if a Quaternary-active fault is mapped or otherwise interpreted to be present on the site" its activity during the Holocene (i.e., past 10,000 years) shall be further investigated.

SECTION 2: TECTONIC AND GEOLOGIC SETTING

Nevada is the third most seismically active state in the nation, exceeded in seismic energy released only by Alaska, followed by California. Many of the most significant Quaternary faults (i.e., seismic sources) are in the western part of the state, within a broadly distributed system of fault known as the Walker Lane shear zone. In total, the shear zone accounts for up to a forth of the relative movement between the Pacific and North American lithospheric plates. The western margin of the right-lateral (dextral) shear zone is delineated by the Sierra Nevada Frontal fault system that, in the project region, is prominently expressed by the Carson Range fault zone (Figure 1).

The Carson Range fault zone is the most significant seismic source in the region extending from Woodfords, California northward to the Truckee River at Reno, Nevada (e.g., Ramelli et al., 1994; USGS National Quaternary fault and fold database, 2016). Bordering the opposite side of Carson and Eagle valleys (tectonically depressed basins or graben) are the distributed East Carson Valley fault zone and, to the north, the Eastern Prison Hill and overlapping New Empire fault zones. The North Edmonds

project site lies within the more than 2 km-wide New Empire fault zone. The closest Quaternary fault trace is mapped near and generally parallel to the western boundary of the project site (Figure 2).

SECTION 3: PROJECT FINDINGS

This preliminary fault investigation of the North Edmonds project site involved three principal tasks: 1) Review of existing maps and published technical literature; 2) Interpretation of aerial photographs and other imagery to identify and evaluate fault-related features; and 3) Surficial geologic investigation involving field reconnaissance and mapping of Quaternary faults and suspected fault-related features in the project-site area. Relevant findings from each of these tasks are discussed in the following subsections.

3.1 Geologic Literature and Map Review

The project site lies within the highly distributed New Empire fault zone that to the south overlaps or merges with the Eastern Prison Hill fault zone, based on review of published Quaternary fault and geologic maps of the larger project-site area (Bell and Trexler, 1979; Bingler, 1977; dePolo, 2002a, 2002b). The most detailed Quaternary fault map of the project-site area is the *Earthquake Hazards Map* of the New Empire 7.5' Quadrangle by Bell and Trexler (1979) and the most detailed Quaternary geologic map is the *Geologic Map* of the New Empire 7.5' Quadrangle by Bingler (1977). In the project-site area the New Empire fault zone consists of a half dozen pre-late Pleistocene (last movement prior to approximately 100,000 years) fault traces in a more than 2 km-wide zone crossing Highway 50 (Figure 2).

Less than 1 km east of the project site, two of these early- to mid-Pleistocene fault traces were shown in exploratory trench exposures not to have been active during the Holocene by Piedmont GeoSciences (2006) (Figure 2). The trench exposures revealed evidence for distributed faulting and possible liquefaction-related features in older subsurface alluvial deposits. However the fault-related features had been erosionally truncated prior to being buried by unbroken older alluvial deposits (pre-late Pleistocene unit Qoa of Bingler, 1977). Thus the trench exposures are generally consistent with the early to mid-Pleistocene fault activity assignment by Bell and Trexler (1979), and provide structural and stratigraphic evidence for an absence of Holocene surface faulting (Piedmont GeoSciences, 2006).

Less than 1 km west of the North Edmonds project site, Bell and Trexler (1979) mapped a younger (mid- to late-Pleistocene) fault trace that similarly was shown in exploratory trenches not to be a Holocene-active fault (Kleinfelder & Associates, 1985). The trench exposures revealed evidence consistent with mid- to late-Pleistocene faulting "extending to within at least 3 feet of the ground surface" and associated tilting of near-surface alluvial deposits. However, none of these fault-related features extended into the overlying older alluvial deposits (unit Qoa of Bingler, 1977).

The closest Quaternary fault to the project site was mapped by Bell and Trexler (1979) as a dashed or approximately located, north-striking fault trace that extends near and parallel to the western boundary of the project site (Figure 2). The arcuate fault trace is mapped as extending northward across Highway 50 and curving to the east-northeast, for total length of about 2 km. The curvilinear fault cuts older alluvial-plain deposits (Qoa) and late Pleistocene older pediment deposits (Qop) (Bingler, 1977).

3.2 Aerial Photography Interpretation

Detailed stereoscopic examination and interpretation of various scales and dates of black-and-white aerial photographs (see Table 1) was conducted to further locate the suspected Quaternary fault trace near the project site based on identification of geomorphic features and vegetation changes or lineaments, as well as, to identify or verify other faults in the project-site area.

Quaternary faults in the area were found to be expressed by generally rounded and dissected fault scarps on Quaternary alluvial deposits, by linear drainage channels aligned (i.e., deflected) along the projection of mappable fault scarps, and by distinct vegetation or tonal lineaments. In all cases the geomorphic expression of these faults is most distinct north of Highway 50, with the exception of the mid- to late-Pleistocene fault trace located west of the project site.

For example, the closest Quaternary fault to the project site was found to be expressed by rounded, dissected fault scarps and distinct vegetation and tonal lineaments north of Highway 50. The expression of the fault decreases southward and becomes unrecognizable near the highway alignment (Figure 2), including on relatively large-scale (1:15,000) aerial photographs (see Table 1) collected under low sun-angle conditions to improve the identification of fault-related geomorphic features. South of the

highway no fault scarps or obvious fault-related features were identified from the analysis of air photos. However ground disturbances resulting from residential development and highway grading predate the oldest aerial photographs (July, 9, 1967) of the project-site area available at the Nevada Bureau of Mines and Geology, Reno, Nevada.

Thus the previous Quaternary fault mapping and relative fault activity assignments of Bell and Trexler (1979) were generally confirmed by the present analysis if aerial photographs. However, the southernmost extent of the closest Quaternary fault to the project site was not verified from analysis of aerial photographs, including from interpretation of low sun-angle air photos.

3.3 Field Mapping

Field mapping was conducted 20 December 2016 to more accurately map the closest Quaternary fault trace to the North Edmonds project site, particularly the southernmost trace of the fault south of Highway 50 (Figure 2).

The Quaternary fault trace was found to be relatively distinct north of Highway 50 where it is characterized by rounded, dissected fault scarps on older alluvial deposits. The fault scarps are highest where the fault trace curves from north- to northeast-striking, and noticeably decrease in height southward to the point of 'dying out' or becoming unrecognizable near the highway alignment. No fault scarps or overall down-to-the-east step or slope of the ground surface was found south of the highway at or near the project site. However, ground disturbances in the area related to residential and roadway construction make the identification of subtle geomorphic features and tonal or vegetation lineaments problematic.

SECTION 4: CONCLUSIONS AND RECOMMENDATIONS

The North Edmonds project site lies within the Walker Lane shear zone and near the Carson Range fault zone, where large-magnitude earthquakes have occurred historically and in recent geologic past (respectively). Therefore, the project site is in a seismically active region where strong to severe ground motion is expected to occur during future large-magnitude earthquakes.

The closest potentially active fault to the project site is expressed and was mapped

north of Highway 50 generally consistent with the mapping by Bell and Trexler (1979). However, no evidence was found at or near the project site to verify nor to suspect that the previously mapped fault trace continues south of the highway. Thus the Quaternary fault trace appears to die out north of the project site.

The results of this preliminary fault investigation indicate that there is no surficial evidence for the existence of a Holocene-active fault trace at or near the project site. This is consistent with existing Quaternary fault maps, as well as, with local trenching studies showing an absence of Holocene faulting on the nearby fault trace to the west nor on either of the two nearby fault traces to the east. Thus there is no evidence for a surface-fault rupture hazard at the project site, nor are such hazards expect in the future.

Additional confidence that the project site is clear of fault rupture hazards would require a subsurface investigation involving extensive exploratory trenches, although such an investigation is not recommended based on the findings presented herein and the residential nature of the project. For critical engineering structures (e.g., hospitals or schools) a subsurface investigation might be considered.

This preliminary fault investigation was limited to surficial geologic studies and did not include subsurface excavations, nor does the scope of the investigation include secondary site effects related to strong earthquake ground motion (e.g., liquefaction, ground settlement).

We appreciate having this opportunity to provide our seismic hazard services in support of CME's North Edmonds project. If you have any questions, or require additional information, please do not hesitate to contact us.

Sincerely,

Piedmont GeoSciences, Inc.

Thomas L. Sawyer
Principal Geologist
Piedmont GeoSciences, Inc.

REFERENCES

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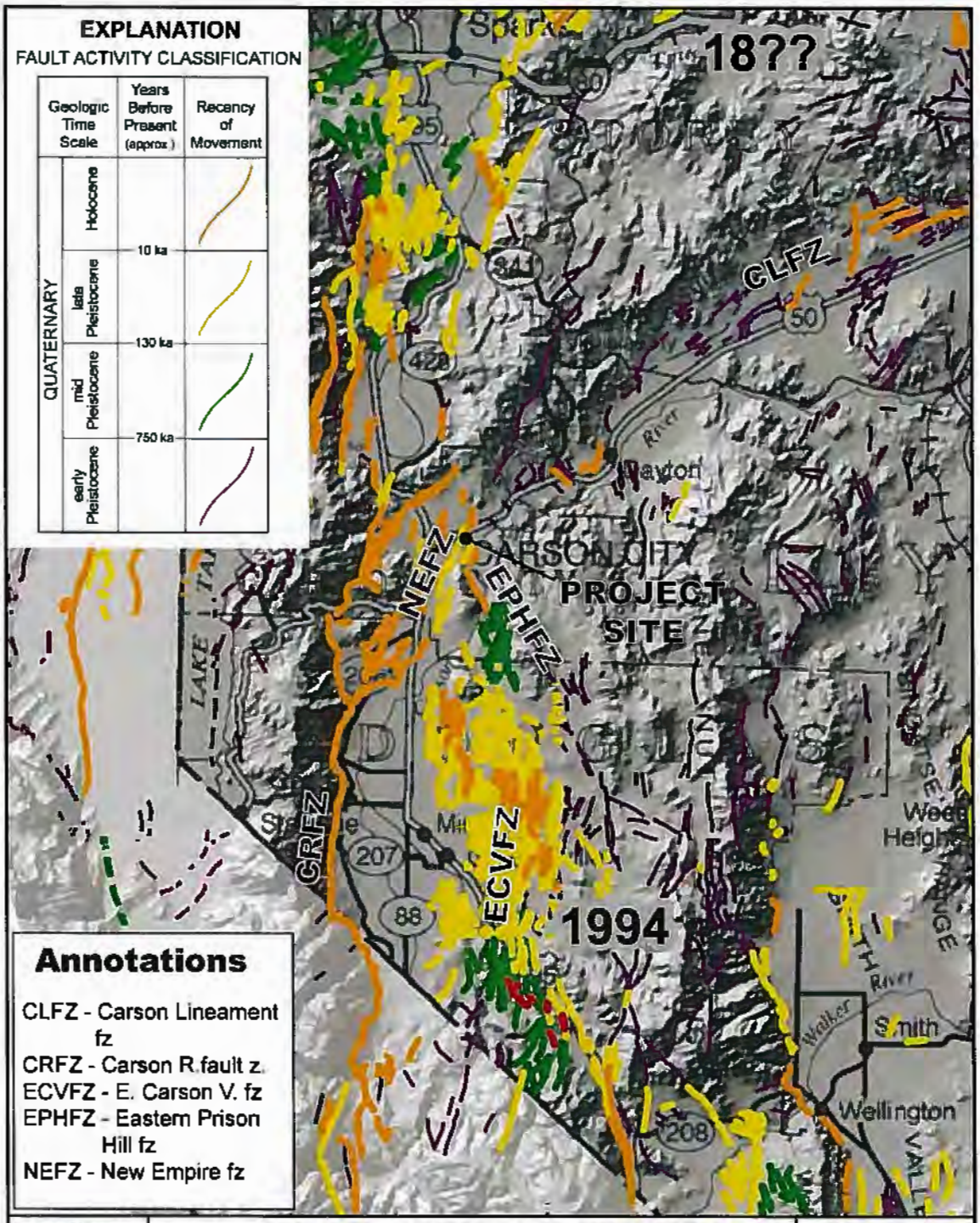
TABLE 1: AERIAL PHOTOGRAPHS

Date	Type	Nominal Scale	Identification	Source
June 1992	B&W	1:15,000	Frames 488-494; 552-554	Slemmons low-sun angle photos at NBMG, Reno, NV
7-12-77	B&W	1:33,000	1179, frames 32-8, 33-8, 34-8 and 35-8	NV Air National Guard at NBMG, Reno, NV
7-9-67	B&W	1:40,000	7-9-67, GS-VBTC, frames 1-96 and 1-97	U.S. Geological Survey at NBMG, Reno, NV

FIGURES

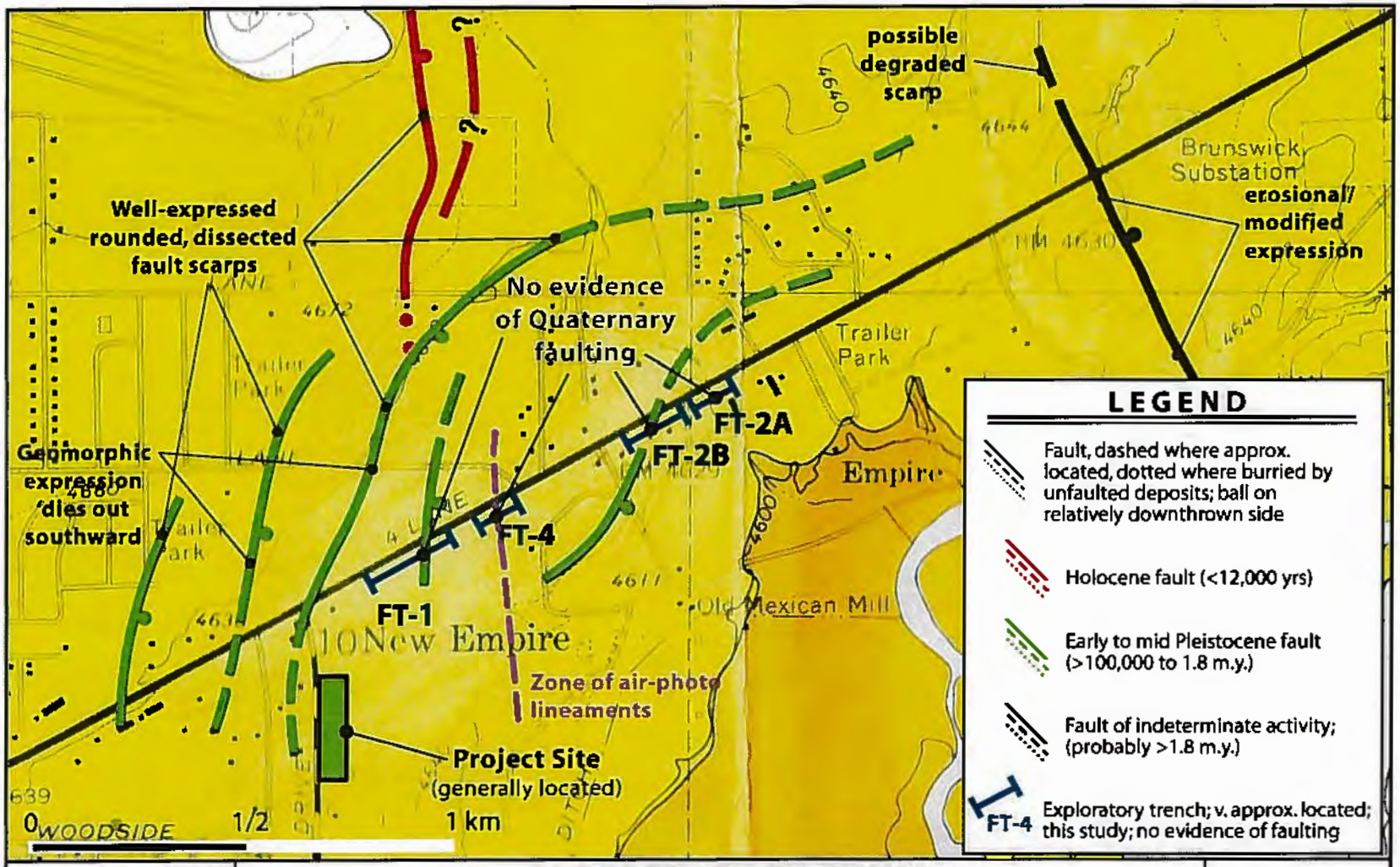


REGIONAL QUATERNARY FAULT MAP

North Edmonds Project
(source: dePolo, 2008)

Figure 1

2021



PGS	**QUATERNARY FAULT MAP** North Edmonds Project				FIGURE 2
	MODIFIED BY TS	SOURCE Bell and Trexler, 1979	PROJECT NO. 2021	SCALE As Reported	Date 12/22/2016