



STAFF REPORT

Report To: Board of Supervisors **Meeting Date:** August 19, 2021

Staff Contact: Heather Ferris, Planning Manager

Agenda Title: For Possible Action: Discussion and possible action regarding an appeal of the Planning Commission's decision to not approve a request for a variance to reduce the setback along the south-eastern property line, adjacent to John Mankins Park, on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W. College Parkway, APNs 007-462-16 and 007-462-17. (Heather Ferris, hferris@carson.org)

Staff Summary: Title 18 Appendix of the Carson City Municipal Code ("CCMC") (Carson City Development Standards ("CCDS")), Division 1.18, subsection 4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district with an additional 10 feet for each story above 1 story. The applicant is proposing two-story, attached single-family homes and is requesting a variance to allow for a 10-foot setback along the south-eastern property line, adjacent to John Mankins Park. The Planning Commission is authorized to approve a variance. At its meeting of July 28, 2021, the Planning Commission did not approve the variance request when a motion for approval failed by a vote of 3 to 3. Per CCMC 18.02.060, a decision of the Planning Commission may be appealed by the applicant or any aggrieved party to the Board of Supervisors ("Board"). The Board may affirm, modify, or reverse the decision of the Planning Commission.

Agenda Action: Formal Action / Motion **Time Requested:** 15 minutes

Proposed Motion

I move to deny the appeal.

Board's Strategic Goal

Quality of Life

Previous Action

July 28, 2021: The Planning Commission considered the request for the major variance. A motion to approve the variance did not pass as a result of a 3-3 (1 absent) vote. The Commissioners who voted no indicated that they felt the setback could be met with the elimination of 4 units, that 10 feet was simply too close, that the overall project is not in keeping with the community and that the request did not meet the criteria for a variance.

Background/Issues & Analysis

Staff had recommended approval of the variance to the Planning Commission, noting that the intent of the required setback (CCDS 1.18.4.a) is to protect adjacent residential uses; however, the actual adjacent use is a park. The proposed setback of 10 feet is consistent with the setbacks of other single-family residences constructed adjacent to the park. Additional information is contained in the July 28, 2021 staff report to the Planning Commission (attached).

Applicable Statute, Code, Policy, Rule or Regulation

CCMC 18.02.060 (Appeals) and CCMC 18.02.085 (Variances); CCDS 1.18 (Residential Development Standards).

Financial Information

Is there a fiscal impact? No

If yes, account name/number:

Is it currently budgeted? No

Explanation of Fiscal Impact:

Alternatives

The Board of Supervisors may modify or reverse the decision of the Planning Commission.

Attachments:

[Appeal Letter-VAR-2021-0232.pdf](#)

[PC staff report Silver Oak at College Pkwy \(7-28-21\).pdf](#)

Board Action Taken:

Motion: _____	1) _____	Aye/Nay
	2) _____	_____

(Vote Recorded By)

August 2, 2021

Ms. Hope Sullivan
Planning Division
108 E. Proctor Street
Carson City, NV 89701

Re: Appeal of VAR-2021-0232

Dear Ms. Sullivan,

On behalf of Lanturn Investments, Manhard Consulting is appealing the Planning Commission's decision of VAR-2021-0232. The basis for the appeal is as follows.

- Unfortunately, the Planning Commission did not have a full panel present at this hearing, resulting in a 3-3 tie vote.
- Based on discussion that took place during the hearing, members of the Commission voted against staff's recommendation for approval and the findings of fact although they (commissioners) clearly had not personally examined the site and were unfamiliar with the area of the Mankins Park in question or in their opinion the request was not, "eligible for the application requested". It is our experience that the Planning Department does not make recommendations for approval of variances where applications are legally or technically ineligible for the consideration that the applicant has requested. It is also our belief that voting against staff recommendations without an argument substantiated by facts is arbitrary and capricious.
- If members of the Commission had taken the time to visit the site, they would have noticed that existing residential development in Silver Oak Phase 21 has been located adjacent to the park with similar 10' setbacks for a number of years. Furthermore, the area where the existing residences are located is immediately adjacent to the active playground area whereas the proposed development is to be located adjacent to an area of the park that includes a designed buffer due to the anticipation of future planned commercial land uses.
- Lastly, if the underlying zoning designations were consistent with the proposed and existing uses, a community park and proposed residential, the variance would not even be required.

In conclusion, based on the reasons outlined above, we agree with staff's recommendation for approval and request the Board of Supervisors consider our appeal.

Sincerely,
Manhard Consulting



Christopher Baker
Planning Manager

STAFF REPORT FOR THE PLANNING COMMISSION MEETING OF JULY 28, 2021

FILE NO: LU-2021-0218;
VAR-2021-0232;
SUB-2021-0215

AGENDA ITEM: 13.D, 13.E, 13.F

STAFF CONTACT: Heather Ferris, Associate Planner

AGENDA TITLE: For Possible Action: Discussion and possible action regarding a request for a Special Use Permit to allow for a 52-unit attached single family residential development on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17. (Heather Ferris, hferris@carson.org)

Summary: Carson City Municipal Code (CCMC) 18.04.120 allows a residential use in the Neighborhood Business zoning district as a conditional use. As it is a conditional use, it may only be established upon approval of a Special Use Permit by the Planning Commission. This application is made in conjunction with SUB-2021-0215 and VAR-2021-0232, the next two items on this agenda. The Planning Commission is authorized to approve a Special Use Permit.

For Possible Action: Discussion and possible action regarding a request for a variance to reduce the setback along the south-eastern property line, adjacent to John Mankins Park, on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17. (Heather Ferris, hferris@carson.org)

Summary: Carson City Development Standards (CCDS) Division 1.18, subsection 4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district with an additional 10 feet for each story above 1 story. The applicant is proposing two-story, attached single-family homes and is requesting a variance to allow for a 10-foot setback along the south-eastern property line, adjacent to John Mankins Park. This application is made in conjunction with SUB-2021-0215 and LU-2021-0219. The Planning Commission is authorized to approve a variance.

For Possible Action: Discussion and possible action regarding a request for a Tentative Subdivision Map for a development known as Silver Oak at College Parkway to create 52 lots for attached single family residences on two parcels totaling 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17.

Summary: The applicant is proposing to subdivide 3.45 acres into 52 lots for attached single family residential development, with a lot size of 1,237 square feet. Common open space will be provided throughout the development and each unit will have a private patio and deck area. This application is made in conjunction with LU-2021-0218 and VAR-2021-0232. The Board of Supervisors is authorized to approve a Tentative Subdivision Map. The Planning Commission makes a recommendation to the Board.

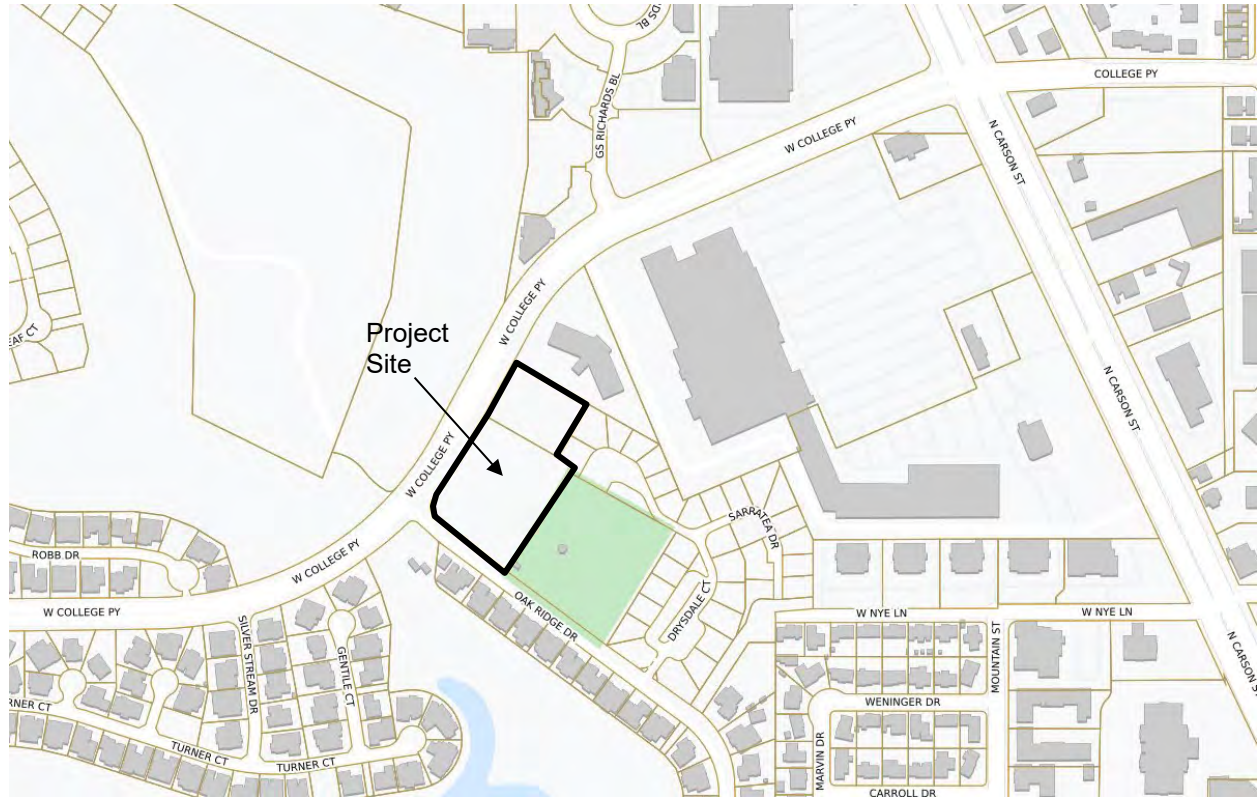
RECOMMENDED MOTIONS:

“I move to approve Special Use Permit LU-2021-0218 based on the ability to make the required findings and subject to the conditions of approval as outlined in the staff report.”

I move to approve a Major Variance VAR-2021-0232 based on the ability to make the required findings and subject to the conditions of approval included in the staff report.”

“I move to recommend approval of Tentative Subdivision Map SUB-2021-0215 to the Board of Supervisors based on the ability to make the required findings and subject to the conditions of approval included in the staff report.”

VICINITY MAP:



RECOMMENDED CONDITIONS OF APPROVAL: Tentative Map

The following are conditions of approval required per CCMC 18.02.105.5:

1. All final maps shall be in substantial accord with the approved tentative map.
2. Prior to submittal of any final map, the development engineering department shall approve all on-site and off-site improvements. The applicant shall provide construction plans to the development engineering department for all required on-site and off-site improvements, prior to any submittals for approval of a final map. The plan must adhere to the recommendations contained in the project soils and geotechnical report.
3. 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.
4. 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 preferably final map.

5. With the submittal of any parcel map or preferably final maps, the applicant shall provide evidence to the planning and community development department from the health and fire departments indicating the agencies' concerns or requirements have been satisfied. Said correspondence shall be included in the submittal package for any final maps and shall include approval by the fire department of all hydrant locations.
6. The following note shall be placed on all final maps stating:

"These parcels are subject to Carson City's growth management ordinance and all property owners shall comply with provisions of said ordinance."
7. Placement of all utilities, including AT&T Cablevision, shall be underground within the subdivision. Any existing overhead facilities shall be relocated prior to the submittal of final maps.
8. The applicant must sign and return the notice of decision for conditions for approval within 10 days of receipt of notification after the board of supervisors meeting. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further consideration.
9. 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 department 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.
10. The applicant shall adhere to all city standards and requirements for water and sewer systems, grading and drainage, and street improvements.
11. The applicant shall obtain a dust control permit from the Nevada Division of Environmental Protection. The site grading must incorporate proper dust control and erosion control measures.
12. A detailed storm drainage analysis, water system analysis, and sewer system analysis shall be submitted to the development engineering department prior to approval of a final map.
13. Prior to the recordation of the final map for any phase of the project, the improvements associated with the project must either be constructed and approved by Carson City, or the specific performance of said work secured, by providing the city with a proper surety in the amount of 150 percent 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 appear in the work within 1 year of acceptance by the city.
14. A "will serve" letter from the water and wastewater utilities shall be provided to the Nevada Health Division prior to approval of a final map.
15. The district attorney shall approve any CC&R's prior to recordation of the first final map.

Other Conditions of Approval:

16. The internal street shall be privately owned and maintained.
17. The water main must be private, and the line shall be master metered with appropriate backflow preventers.
18. The developer shall install a curb ramp, meeting current ADA standards, at the intersection of College Parkway and Oak Ridge Drive.
19. The developer shall enter into an agreement to pay it's pro-rata share of the cost to improve approximately 1,135 feet of 12 inch sewer main which is currently at capacity in College Parkway between Imperial Way and Granite Way. The pro-rate share for this development is 1.6 percent and is not to exceed \$9,600.
20. As part of the site improvement permit, the applicant must provide a landscape plan demonstrating compliance with the Development Standards in Division 3.
21. Carson City is a nationally recognized Bee City USA. As a result, the applicant shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. A recommended tree and shrub species list has been provided. Any remaining landscape plant material selection must be consistent with the City's approved tree species list or other tree species, as approved by the City.
22. An exhibit demonstrating compliance with the open space requirements (Carson City Development Standards 1.18.6) shall be included in the application for site improvement permit.
23. The applicant is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The Parks, Recreation & Open Space Department is willing to assist the applicant with this aspect of their project as needed.
24. The applicant shall provide the Community Development Department with a deed restriction for recordation at the time the final map is submitted for recordation. The document shall state the following:
 - Variance (VAR-2021-0232) has been approved placing the homes along the south-eastern boundary of the project site within 20 feet closer to the existing park on APN 007-462-13, than is required by Carson City Development Standards 1.18. There may be inconvenience or discomfort, including but not limited to noise, glare, or physical activity, associated with the proximity to such a use.
25. At the time of recordation of the final map, a private Homeowner's Association (HOA) or similar entity must be formed to provide maintenance for all common areas, including the private road, in perpetuity.
26. The Tentative Subdivision Map is only approved if the applicant obtains approval from the Planning Commission for the following concurrent applications:
 - a. LU-2021-0218- A Special Use Permit for a residential use in a non-residential zoning district.

- b. VAR-2021-0232- A Variance from Division 1.18.4(b) requiring a minimum of a 20-foot setback plus 10 feet for each story above one-story if adjacent to a single-family zoning district.

RECOMMENDED CONDITIONS OF APPROVAL: Special Use Permits (LU-2021-0218)

1. All development shall be substantially in accordance with the plans presented to the Planning Commission.
2. All on and off-site improvements shall conform to city standards and requirements.
3. The use for which this permit is approved shall expire with the Tentative Subdivision Map (SUB-2021-0215).
4. The applicant must sign and return the notice of decision for conditions of approval within 10 days of receipt of notification. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further considerations.

RECOMMENDED CONDITIONS OF APPROVAL: Variance (VAR-2021-0232)

1. All development shall be substantially in accordance with the plans presented to the Planning Commission.
2. All on and off-site improvements shall conform to city standards and requirements.
3. The use for which this permit is approved shall expire with the Tentative Subdivision Map (SUB-2021-0215).
4. The applicant must sign and return the notice of decision within 10 days of receipt of notification. If the notice of decision is not signed and returned within 10 days, then the item will be rescheduled for the next planning commission meeting for further consideration.

LEGAL REQUIREMENTS: CCMC 17.05 (Tentative Maps); CCMC 17.07 (Findings); CCMC 18.02.080 (Special Use Permit); 18.04.120.3 (Neighborhood Business); (Development Standards 1.18 (Residential development standards in non-residential districts); NRS 278.330

SITE DEVELOPMENT INFORMATION:

SUBJECT SITE AREA: 3.45 acres
EXISTING LAND USE: Vacant

MASTER PLAN DESIGNATION: High Density Residential (HDR)

ZONING: Neighborhood Business Planned Unit Development (NB-P)

KEY ISSUES: Will the Special Use Permit meet the required findings and will the proposed residential use be compatible with the surrounding neighborhood and in keeping with the standards of CCMC? Is the Tentative Map consistent with the required findings? Does the proposal meet the Tentative Map requirements and other applicable requirements? Can the proposed reduced setbacks be supported by the required findings?

SURROUNDING ZONING AND LAND USE INFORMATION

NORTH: Neighborhood Business Planned Unit Development / Senior Living Facility
SOUTH: Single Family 12,000 Planned Unit Development / Single family residences & golf course
EAST: Single Family 12,000 Planned Unit Development / Single family residences & park
WEST: Single Family 12,000 Planned Unit Development / golf course

ENVIRONMENTAL INFORMATION:

FLOOD ZONE: Zone X shaded
SEISMIC ZONE: Zone I (Greatest Severity)
FAULT: Beyond 500 feet

DISCUSSION:

The project site consists of two parcels totaling 3.45 acres in size and is zoned Neighborhood Business Planned Unit Development. The applicant is seeking approval of a Tentative Subdivision Map to subdivide the 3.45 acres into 52 lots for an attached single family development with 25,266 square feet of common area open space. Two points of access are proposed to connect to Oak Ridge Drive and West College Parkway with the interior roads proposed to be privately owned and maintained.

The project site is located within the Silver Oak Planned Unit Development. Commercially zoned parcels within the PUD are limited to those uses outlined in the zoning code. Per Carson City Municipal Code (CCMC) 18.04.120.3, a residential use is a conditional use in the Neighborhood Business zoning district and therefore requires a Special Use Permit, subject to the supplemental standards outlined in Division 1.18 of the Development Standards (Residential Development Standards in Non-Residential Districts). Carson City Development Standards (CCDS) Division 1.18.4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district, with an additional 10 feet for each story above 1 story. This would result in a required 30-foot setback along the south-eastern property line adjacent to John Mankins Park; however, the applicant is requesting a variance to allow for a 10-foot setback adjacent to the park.

There is no maximum density within non-residential zoning districts subject to meeting the height, setback, parking, and open space requirements. The overall design concept is single family attached with a lot size 1,237 square feet. The lots include all aspects of the building including patios and porches. The applicant proposes three floor plans. Each unit will be two-story, and will range in size from 1,529 to 1,627 square feet. Private open space will be provided in the form of patios and porches for each unit with 25,266 square feet of common open space throughout the project site. Proposed setbacks are as follows:

Periphery Setbacks:

Front Yard-	10 feet
Street Side Yard-	10 feet
Side Yard	15 feet
Rear Yard-	10 feet

Internal setbacks are 0 feet between lots

Parking is proposed to be provided via standard two car garages for each unit. Consistent with Division 2 of the Development Standards, on-site guest parking will be provided at a ratio of 1 space for every two units for a total of 35 spaces.

The Planning Commission is authorized to approve a Special Use Permit and Variance upon making the seven required findings of fact. The Planning Commission conducts a public hearing and advises the Board if the proposed tentative map is consistent with the provisions of the Municipal Code and NRS 278.320.

PUBLIC COMMENTS: Public notices were mailed to 60 property owners within 600 feet of the subject site pursuant to the provisions of NRS and CCMC for the Tentative Subdivision Map application. As of the completion of this staff report no public comments have been received. Any written comments that are received after this report is completed will be submitted prior to or at the Planning Commission meeting on July 28, 2021 depending upon their submittal date to the Planning Division.

OTHER CITY DEPARTMENT OR OUTSIDE AGENCY COMMENTS: The following comments were received from City departments. Recommendations have been incorporated into the recommended conditions of approval, where applicable.

Engineering Division

The Engineering Division has no preference or objection to the tentative map and special use permit request and offers the following conditions of approval:

- The new street must be private as proposed.
- Due to the use of the special street section, the water main must be private. This will necessitate that the line be master metered with appropriate backflow preventers.
- A curb ramp, meeting current ADA standards, must be installed at the intersection of College Parkway and Oak Ridge Drive (see CCMC 11.12.081).
- The project must enter into an agreement to pay it's pro rata share of the cost to improve approximately 1,135 feet of 12" sewer main which is currently at capacity in College Parkway between Imperial Way and Granite Way. The pro rata share for this development is 1.6%, and is not to exceed \$9,600.00
- The project must meet all Carson City Development Standards and Standard Details.

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 and CCMC 18.02.080. 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.*

Water: The existing water main is 12-inch PVC on the west side of the property and 10-inch PVC on the southwest side of the property. The new domestic water system must be private with a master meter and backflow prevention per the above conditions of approval.

Sewer: The existing sewer main is 15-inch PVC on the west side of the property and 8-inch PVC on the southwest side of the property. The 15" main is approximately 30% full and the 8" main is approximately 5% full (d/D). The downstream main in College Parkway is at capacity and the development is required to enter into a pro-rata share agreement per the above recommended conditions of approval.

- 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 system capacity and water rights to meet the required water allocation for the subdivision.

- 3. The availability and accessibility of utilities.*

Water, sanitary sewer, and stormwater 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.*

There is a public park adjacent to this project. These lands are accessible via Oak Ridge Drive.

- 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.*

Local intersections: The site is at the corner of Oak Ridge Dr and W College Pkwy. Oak Ridge Dr is a local street while W College Pkwy is a minor collector.

Parking and internal circulation: There will be on-site parking offered via 2 car garages and on-site parking lots. There is no on street parking on Oak Ridge Dr or W College Pkwy. It was determined by the City's Transportation Department that no further analysis was needed on the existing intersections in the area.

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

Earthquake faults: The closest fault is over 500 feet with a slip rate of less than 0.2 mm/yr.

FEMA flood zones: The FEMA flood zone is Zone X (shaded).

Site slope: The site's slope is between 0% to 2%.

Soils and Groundwater: The soil on site is coarse sandy loam with the groundwater table about 11 feet deep according to the geotechnical report provided.

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.

Special Use Permit Findings-

C.C.M.C. 18.02.080 (5a) - Master Plan

The request is not in conflict with any Engineering Master Plans.

C.C.M.C. 18.02.080 (5b) – Use, Peaceful Enjoyment, Economic Value, Compatibility

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5c) - Traffic/Pedestrians

See finding #8 above.

C.C.M.C. 18.02.080 (5d) - Public Services

See findings #1 & #3 above.

C.C.M.C. 18.02.080 (5e) – Title 18 Standards

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5f) – Public health, Safety, Convenience, and Welfare

The project will meet engineering standards for health and safety if conditions are met.

C.C.M.C. 18.02.080 (5g) – Material Damage or Prejudice to Other Property

Development Engineering has no comment on this finding.

C.C.M.C. 18.02.080 (5h) – Adequate Information

The plans and reports provided were adequate for this analysis.

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.

Fire Department

Project must comply with the International Fire Code and northern Nevada fire code amendments as adopted by Carson City.

SPECIAL USE PERMIT FINDINGS: Staff recommends approval of the Special Use Permit based on the findings below and in the information contained in the attached reports and documents, pursuant to CCMC 18.02.080.5 (Findings), subject to the recommended conditions of approval, and further substantiated by the applicant's written justification. In making findings for approval, the Planning Commission must consider:

1. Will be consistent with the objectives of the Master Plan elements;

The project is consistent with the Master Plan. The project site is designated as High Density Residential which is designed to create opportunities for higher-density neighborhoods in an urban and suburban setting with densities ranging from 8 to 36 units per acre. The proposed density of the project is 15 units per acre.

The requested development is consistent with the concept of a Compact and Efficient Pattern of Growth (Guiding Principle 1). Carson City is committed to a compact pattern that makes efficient use of land area and water resources available for urban growth, and that fosters the provisions of infrastructure and services in a cost effective manner. The subject property can be served by water and sewer.

Guiding Principle 7 discusses compact, mixed use activity centers, stating “Carson City will encourage the creation of compact, mixed-use activity centers in easily accessible and highly visible locations of the community. The activity centers will promote the efficient use of available commercial lands and concentrate retail services in pedestrian and transit-oriented development nodes that may be easily accessed from and serve surrounding neighborhoods. Activity centers will vary in size and composition depending upon their location, context, and level of priority.

Staff finds that the proposed development is consistent with the concepts of compact development, placing people near economic centers to encourage mixed use activity centers.

2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity;

The subject property is surrounded by single family residences, John Mankins Park, a senior living facility, and the golf course to the south. The project proposes a single family attached product, providing a transitional use between the commercial use (senior living facility) and the residential uses. The proposed use is consistent with the existing neighborhood and will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood. While the applicant is also seeking a variance from the 30-foot setback along the common property line with John Mankins Park, the proposed single family residential use is compatible the Park. Moreover, the proposed setback of 10 feet will be in keeping with the setbacks from the park for other homes in the area.

3. Will have little or no detrimental effect on vehicular or pedestrian traffic;

As proposed and conditioned, the project will have little or no detrimental effect on vehicular or pedestrian traffic. The applicant has provided a traffic memo outlining the estimated trips, based on the ITE Trip Generation Manual. The project is anticipated to generate approximately 305 daily trips with an AM peak of 23 trips and a PM peak of 28 trips. This is below the threshold for a full traffic analysis. The project will be required to install a curb ramp, meeting current ADA standards, must be installed at the intersection of College Parkway and Oak Ridge Drive.

4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage and other public improvements;

The project is located adjacent to existing single family and commercial developments which are served by the existing public services including schools, sheriff, transportation facilities, and parks. Staff has consulted with the School District. The District has indicated they do not have any additional comments beyond the information provided for previous projects and have indicated that the School District will be re-districting which should help. For previous projects the School District indicated that they remain concerned about capacity and advised that for every 100 new homes it expects about 30 new students. With most of the schools now at capacity, the limited capital funding for new facilities, it is concerned, as it cannot “rezone” its way out of the problem. The school district has advised that it is doing its utmost to prepare for growth, within its means. Development Engineering has reviewed the development for impacts to water, sewer, storm drainage, and roadway systems. The existing water, storm drain, and roadway infrastructure is sufficient to serve the project. The downstream sewer main in College Parkway is at capacity and staff has recommended a condition of approval requiring the developer enter into a pro-rata share agreement for the future upgrading of the downstream sewer. The Fire Department has also reviewed the development. As proposed, sufficient access is provided. As noted in the Fire Department comments, the project must comply with the currently adopted edition of the International Fire Code and the Northern Nevada Fire Code Amendments as adopted by Carson City.

5. Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district;

The project meets the definition and specific standards set forth in Title 18. The subject property is zoned Neighborhood Business Planned Unit Development. A residential use is a conditional use in this zoning district. Development Standards 1.18 provides standards for residential development in non-residential zoning districts, as well as supplemental findings. Compliance with the provisions of 1.18- Residential Development Standards in non-residential districts is outlined below:

The following standards are intended to establish minimum standards and Special Use Permit review criteria for residential development within the Neighborhood Business (NB), Retail Commercial (RC), General Commercial (GC), Residential Office (RO) and General Office (GO) zoning districts.

Permitted uses. Residential uses are only allowed as permitted by Chapter 18.04, Use Districts, as a primary or conditional use in the applicable zoning districts.

The subject property is located in the Neighborhood Business Planned Unit Development zoning district and therefore residential uses are allowed subject to first obtaining approval of a Special Use Permit.

Maximum permitted density. There is no maximum residential density within non-residential zoning districts subject to meeting the height, setback, parking and open space requirements of this chapter.

The density for the project is 15 units per acre. The proposed development will comply with the height, parking, and open space requirements. Additional discussion regarding setbacks is below.

Maximum building height shall be the maximum height established by the zoning district in which the project is located.

The Neighborhood Business zoning allows for a maximum height of 26 feet. The applicant proposes two-story single family attached units with a maximum height of 26 feet measured to the peak.

Setbacks. *Minimum setbacks shall be those established by the zoning district in which the project is located, subject to the following:*

a. *In the NB, RC, GC and GO zoning districts, a minimum setback of twenty (20) feet is required adjacent to a residential zoning district, with an additional ten (10) feet for each story above one (1) story if adjacent to a single-family zoning district.*

The Neighborhood Business zoning district calls for a setback of 0 feet but additional setbacks are required when a residential development is proposed in a non-residential district adjacent to a single-family zoning district. As noted above, the applicant proposes two-story units; therefore, a 30-foot setback would be required along the south-eastern property line. As proposed, this setback is not met. The applicant is requesting a variance to allow for a 10-foot setback along this property line (variance findings addressed separately). Therefore, this Special Use Permit is conditioned on the applicant obtaining approval of the variance.

b. *A minimum setback of ten (10) feet is required from the right-of-way of an arterial street as identified in the adopted Transportation Master Plan, excluding the Downtown Mixed-Use area.*

As proposed, the units will be a minimum of 10 feet from the right-of-way.

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

Two parking spaces are required for each unit and an additional 1 space per 2 units for guest spaces for a total of 130 required on-site spaces. The applicant is proposing a standard 2 car garage to accommodate parking for each unit with an additional 35 on-site guest spaces. As proposed, sufficient parking will be provided that the Special Use Permit for tandem parking is approved.

Open Space.

a. *For Multi-Family Residential development, 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 dimension less than 15 feet, and a minimum of 100 square feet per unit of the 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.*

This requirement does not apply. The proposed use is for a 37 lot single family residential development.

b. *For Multi-Family Residential development, 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.*

This requirement does not apply. The proposed use is for a 37 lot single family residential development.

c. *For Single-Family Residential development or Two-Family Residential development, a minimum of 250 square feet of open space must be provided for each unit either as private open space or common open space.*

The project would require a minimum of 13,000 square feet of open space. The application demonstrates a 25,266 square feet of common open space. Additionally, each unit will be provided with private patio and porch areas for additional outdoor space.

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

In order to ensure compliance with this requirement, staff is recommending a condition of approval requiring the applicant provide an open space exhibit demonstrating (both quantitatively and qualitatively) compliance with the open space requirements prior to recording the final subdivision map.

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

The applicant has identified areas for landscaping, but not a detailed landscape plan. A detailed landscape plan that demonstrates compliance with Development Standards Division 3 is required to be submitted with construction plans. Staff has included this as a condition of approval.

Special Use Permit review standards. *Where a residential use is a conditional use within a given zoning district, the Planning Commission shall make two (2) of the following findings in the affirmative in the review of the Special Use Permit in addition to the required findings of Section 18.02.080 of the Carson City Municipal Code.*

a. *The development is not situated on a primary commercial arterial street frontage.*

This finding is met. The project is not located on a commercial arterial frontage. The proposed development is located at the intersection of West College Parkway and Oak Ridge Drive, a minor collector and local street.

b. *The development is integrated into a mixed-use development that includes commercial development.*

Although the subject property is intended to develop as solely residential, it is adjacent to and in proximity to commercial and residential uses alike, thus creating a mixed use area.

6. Will not be detrimental to the public health, safety, convenience and welfare; and

Staff finds that the proposed single family residential development will not be detrimental to the public health, safety, convenience, and welfare. The use is an allowed use, consistent with the Master Plan, and will meet all City standards.

7. Will not result in material damage or prejudice to other property in the vicinity, as a result of proposed mitigation measures.

Staff finds the attached single family residential development will not result in material damage or prejudice to other property in the vicinity. The subject property is surrounded by single family residences, John Mankins Park, a senior living facility, and the golf course to the south. The

project proposes a single family attached product, providing a transitional use between the commercial use (senior living facility) and the residential uses. While the applicant is also seeking a variance from the 30-foot setback along the common property line with John Mankins Park, the proposed single family residential use is compatible with the Park. Moreover, the proposed setback of 10 feet will be in keeping with the setbacks from the park for other homes in the area.

VARIANCE FINDINGS: Staff recommends approval of the Variance based on the findings below pursuant to CCMC 18.02.085.5 (Findings), subject to the recommended conditions of approval, and further substantiated by the applicant's written justification. In making findings for approval, the Planning Commission must consider:

- a. *That because of special circumstances applicable to the subject property, including shape, size, topography or location of surroundings, the strict application of the zoning ordinance would deprive the subject property of privileges enjoyed by other properties in the vicinity or under identical zone classification;***

Carson City Development Standards (CCDS) Division 1.18.4(a) requires a minimum setback of 20 feet when adjacent to a residential zoning district, with an additional 10 feet for each story above 1 story. The property to the south-east is zoned Single-Family 12,000 Planned Unit Development but it is developed with a City Park (John Mankins Park). Because the applicant proposes two-story houses, this would result in a required 30-foot setback along the common property line between the project site and the park. The applicant is requesting a variance to allow for a 10-foot setback in this area.

The intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park. The proposed setback of 10 feet is consistent with the setbacks of other single family residences from adjacent to the park. In order to further protect the park, staff has recommended a condition of approval for the Tentative Subdivision Map requiring the applicant to record a deed restriction at the time the final map is submitted for recordation. The deed restriction will disclose the project's proximity to the existing park and the inconvenience or discomfort including but not limited to noise, glare, or physical activity that could result from living in close proximity to such a use.

- b. *That the granting of the application is necessary for the preservation and enjoyment of substantial property rights of the applicant;***

The granting of the Variance can be supported because the intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park. The proposed setback of 10 feet is consistent with the setbacks of other single family residences adjacent to the park. All other setbacks will be consistent with the requirements of Carson City Municipal Code, including 30+ foot setbacks from the single family residences that are adjacent to the project site.

- c. *That the granting of the application will not, under the circumstances of the particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the subject property.***

The granting of the variance will not, under the circumstances of this particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the subject property. The intent of CCDS 1.18.4(a) is to protect adjacent residential uses; however, the actual adjacent use is a park.

The property that would be impacted by this request is the park property immediately south-east of the proposed project. The proposed setback of 10 feet is consistent with the setbacks of other single family residences adjacent to the park.

TENTATIVE MAP FINDINGS: Staff recommends approval of the Tentative Subdivision Map based on the findings below and the information contained in the attached reports and documents, pursuant to CCMC 17.05 (Tentative Maps); 17.07 (Findings) and NRS 278.349, subject to the recommended conditions of approval, and further substantiated by the applicant’s written justification. In making findings for approval, the Planning Commission and Board of Supervisors must consider:

- 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 development is required to comply with all applicable environmental and health laws concerning water and air pollution and disposal of solid waste. A copy of the proposed tentative map was submitted to the Nevada Division of Water Resources and the Nevada Division of Environmental Protection. The Public Works Department has advised of adequate capacity to meet water and sewer demand, subject to the recommended conditions of approval. The utility design will need to meet all applicable development standards related to water and sewer design.

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

Water supplied to the development will meet applicable health standards. The City has sufficient system capacity and water rights to meet the required water allocation for the subdivision.

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

All utilities are available in the area to serve this development.

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

The project is located adjacent to existing single family and commercial developments which are served by the existing public services including schools, sheriff, transportation facilities, and parks. Staff has consulted with the School District. The District has indicated they do not have any additional comments beyond the information provided for previous projects and have indicated that the School District will be re-districting which should help. For previous projects the School District indicated that they remain concerned about capacity and advised that for every 100 new homes it expects about 30 new students. With most of the schools now at capacity, the limited capital funding for new facilities, it is concerned, as it cannot “rezone” its way out of the problem. The school district has advised that it is doing its utmost to prepare for growth, within its means. Development Engineering has reviewed the development for impacts to water, sewer, storm drainage, and roadway systems. The existing water, storm drain, and roadway infrastructure is sufficient to serve the project. The downstream sewer main in College Parkway is at capacity and staff has recommended a condition of approval requiring the developer enter into a pro-rata share agreement for the future upgrading of the downstream sewer. The Fire Department has also reviewed the development. As proposed, sufficient access is provided. As noted in the Fire Department comments, the project must comply with the currently adopted edition of the International Fire Code and the Northern Nevada Fire Code Amendments as adopted by Carson City.

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 proposed subdivision is adjacent to a public park. Residents will be able to access park via existing sidewalks along W. College Parkway and Oak Ridge Drive.

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

The project is consistent with the Master Plan. The project site is designated as High Density Residential which is designed to create opportunities for higher-density neighborhoods in an urban and suburban setting with densities ranging from 8 to 36 units per acre. The proposed density of the project is 15 units per acre. The requested development is consistent with the concept of a Compact and Efficient Pattern of Growth (Guiding Principle 1). Carson City is committed to a compact pattern that makes efficient use of the limited land area and water resources it has available for urban growth, and that fosters the provision of infrastructure and services in a cost effective manner.

Guiding Principal 7 discusses compact, mixed use activity centers, stating “Carson City will encourage the creation of compact, mixed-use activity centers in easily accessible and highly visible locations of the community. The activity centers will promote the efficient use of available commercial lands and concentrate retail services in pedestrian and transit-oriented development nodes that may be easily accessed from and serve surrounding neighborhoods. Activity centers will vary in size and composition depending upon their location, context and level of priority.”

Given the existing surrounding neighborhood context, staff finds this proposal to be consistent with the master plan.

The zoning designation is Neighborhood Business. Residential uses are permitted in this zoning district subject to first obtaining approval of a Special Use Permit for residential uses in a commercial zoning district. The applicant has concurrently applied for a Special Use Permit (LU-2021-0218) and the Tentative Subdivision Map is reliant upon approval of the SUP. The Tentative Subdivision Map is also dependent upon the approval of the concurrent application for a Variance from the required 30 foot setback along the southern-most property line (VAR-2021-0232). Staff finds the proposed subdivision is consistent with the Master Plan land use designation, and as conditioned is consistent with the zoning ordinance.

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

The proposed subdivision is in conformance with the City's master plan for streets and highways. The project will be required to install a curb ramp meeting current ADA standards.

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

As proposed and conditioned, the project will have little or no detrimental effect on vehicular or pedestrian traffic. The applicant has provided a traffic memo outlining the estimated trips, based on the ITE Trip Generation Manual. The project is anticipated to generate approximately 305 daily trips with an AM peak of 23 trips and a PM peak of 28 trips. This is below the threshold for a full traffic analysis. The project will be required to install a curb ramp, meeting current ADA standards, at the intersection of College Parkway and Oak Ridge Drive.

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

Staff has reviewed the site for any impacts from physical characteristics. The site is relatively flat and located in the FEMA flood zone X (shaded) and therefore does not require special flood damage prevention considerations.

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

The proposed tentative map has been routed to the Nevada Department of Environmental Protection (NDEP) and the Nevada Division of Water Resources. Public Works has indicated sufficient water and sewer capacity to meet the demands of this project, subject to the condition of approval requiring the developer to enter into a pro-rata share agreement for the sewer main.

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 Public Works Department has reviewed the project in conjunction with the Fire Department. There is sufficient access and sufficient fire flows to serve the project. The Fire Department will review the site improvement permit for compliance with the International Fire Code and northern Nevada fire code amendments as adopted by Carson City.

12. Recreation and trail easements.

The project is adjacent to John Mankins Park. Access to the park will be provided via sidewalks along the project frontage.

Attachments

Application- SUB-2021-0215, LU-2021-0218, and VAR-2021-0232

RECEIVED

JUL 01 2021

SILVER OAK AT COLLEGE PARKWAY

TENTATIVE SUBDIVISION MAP
SPECIAL USE PERMIT
MAJOR VARIANCE

JUNE 17, 2021

REVISED JUNE 30, 2021



Prepared For:

**Lanturn
Investments, LLC**

Prepared By:



241 Ridge Street, Suite 400
Reno, NV 89501

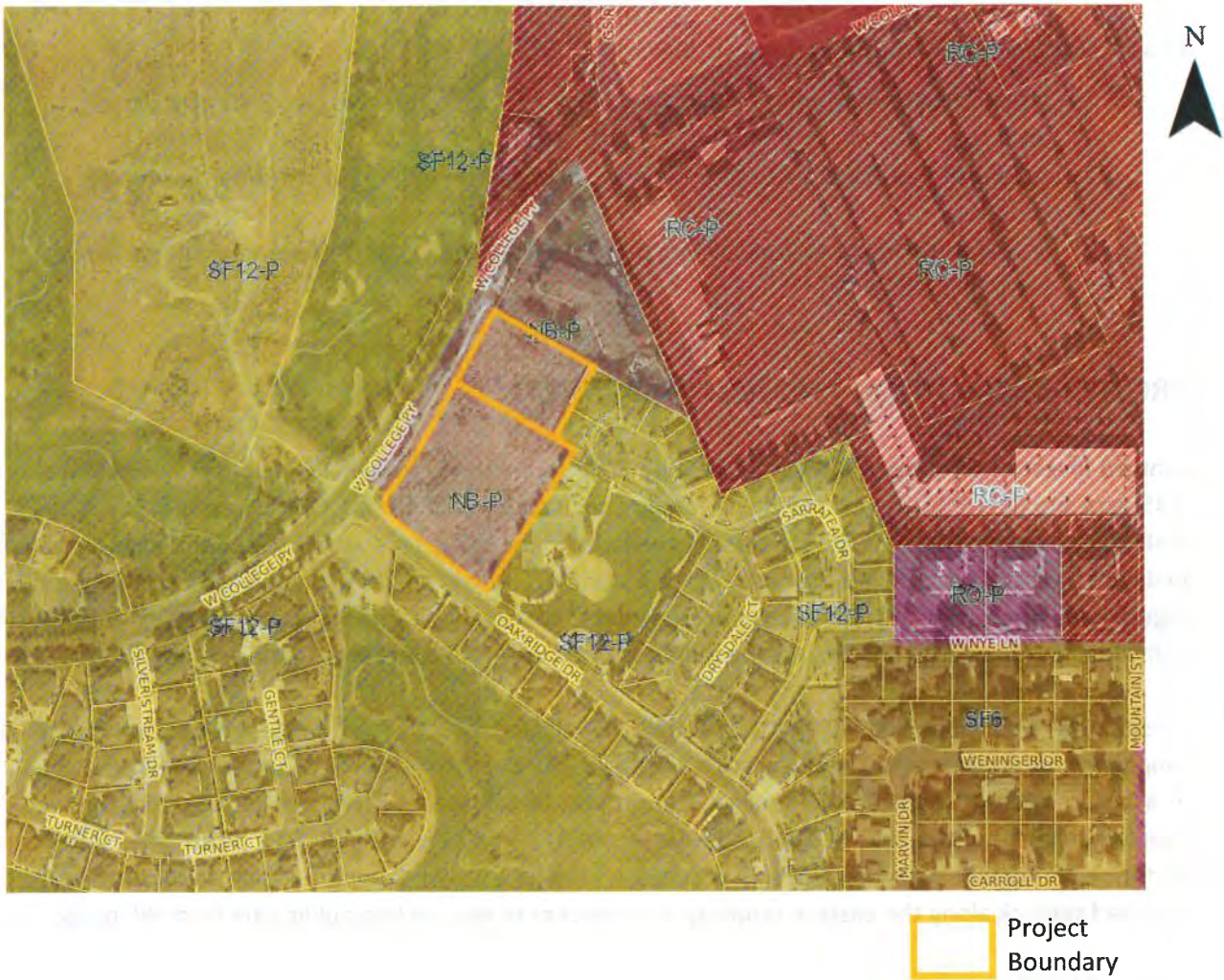
PROJECT LOCATION

The project site is located within the Silver Oak Planned Unit Development at the northeast corner of Oakridge Drive and West College Parkway. The total project area is 3.45 acres and is comprised of two separate parcels, APNs 007-46-217 (1.04 acres) and 007-46-216 (2.41 acres). The subject properties are currently undeveloped and are adjacent to existing residential and open space uses.

Figure 1: Project Location



Figure 3: Existing Zoning Designation: Neighborhood Business with PUD Overlay



The surrounding Master Plan designations, zoning, and current land uses are as depicted in Figure 4.

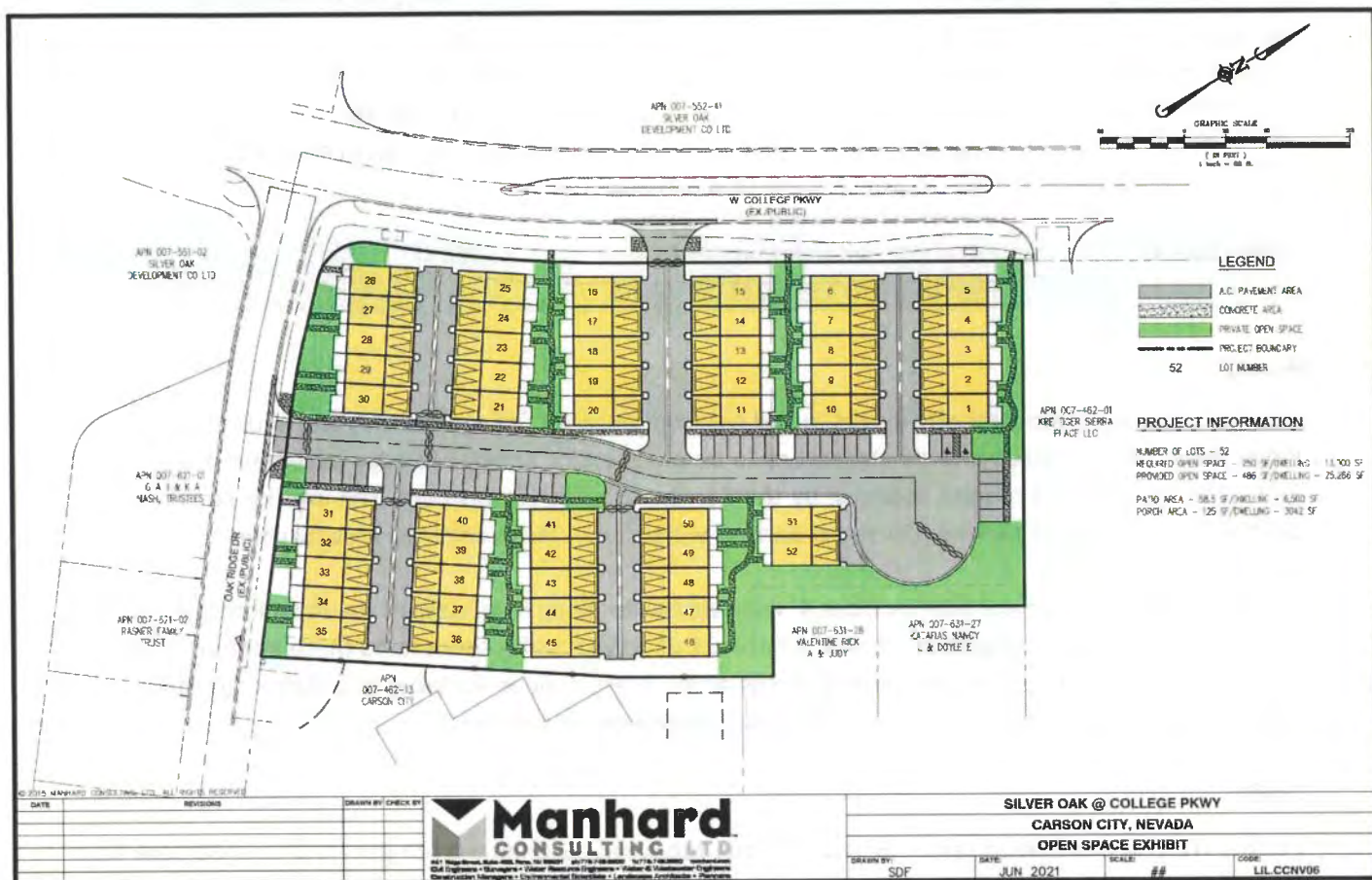
Figure 4: Surrounding Property Designations

Direction	Master Plan	Zoning	Current Land Use
North	High Density Residential	NB-P	Senior Living Facility
South	Medium Density Residential and Open Space	Single Family 12,000 SF PUD (SF12-P)	Single Family Residential and Golf Course
East	Parks and Recreation	SF12-P	Single Family Residential and Park
West	Open Space	SF12-P	Golf Course



In accordance with this provision, 13,000 sf (52 units x 250 sf/unit) of open space is required. The design exceeds the open space requirement by providing 25,266 sf as common open space within the site which will be maintained by a homeowner’s association, or similar entity. Please note that the common open space will be privately-owned (HOA or similar) and is intended for use by the Silver Oak and College Parkway residents. See Figure 5 for the Open Space Exhibit that depicts where the common open space is located. See Figure 6 for details of the provided Open Space.

Figure 5: Open Space Exhibit



Setbacks

The proposed lot configurations meet or exceed the setbacks for NB zoning within the interior and the perimeter of the development. The perimeter setbacks along Oak Ridge Drive and West College Parkway were measured, based on the Municipal Code and staff direction, from the zoning boundary (centerline of each road) and not the property boundary. Accommodating CCDS 1.18.4, the required 20’ setback when adjacent to residential zoning (SF12-P) plus 10’ additional setback for 2 stories is provided in the development where the proposed use is directly adjacent to existing residential structures. The setback for the remainder of the property line adjacent to residential zoning (SF12-P) is proposed to be 10’. A Major Variance is being applied for this reduced setback and the justification for such is addressed in further detail later in this document.



Water/Sewer

The site will be provided water and sewer services from the City. Water will be connected in a loop system to existing 12" main at West College Parkway and existing 10" main at Oak Ridge Drive. The onsite sanitary sewer will connect to an existing 8" main at the northeast corner of the subject property.

Drainage

On-site detention for the project has previously been accounted for in the Master Drainage Study for Silver Oak, which identifies connection to the fairway directly across West College Parkway from the project site. A small water quality basin is proposed on-site at the northeast corner of the property. This basin is intended to provide filtration of sediment before discharge to the golf course infrastructure via an existing 24" storm drainpipe.

Floodplain

The project area is designated as Flood Zone X, which indicates a minimal flood hazard.

Phasing

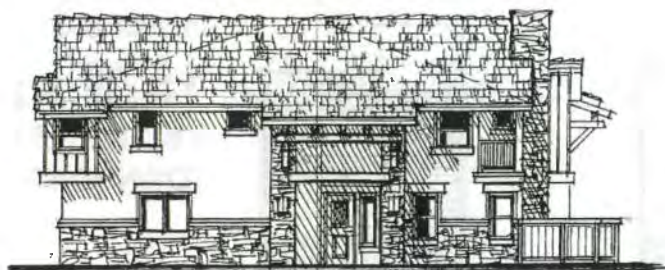
No phasing is proposed with this submittal.

Architecture

Conceptual renderings for the proposal are being prepared and will be submitted at a later date. Preliminary elevations and floor plans for the proposed buildings were provided and can be found in Figure 8.



Figure 8: Proposed Building Elevations and Floor Plans (continued)



P-1

SIDE ELEVATION

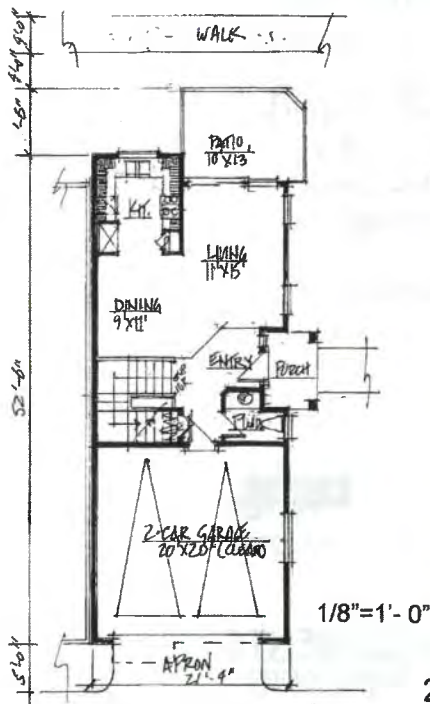
1/8"=1'-0"

BUILDING - 1

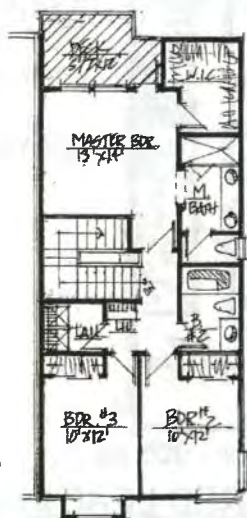
6/23/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



1st. Floor - 612 sq. ft.



2nd. Floor - 917 sq. ft.

PLAN - 1

End Unit (only)

1529 sq. ft.

3 BDR./2.5 B

TOWNHOME



5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



Parking

Two garage stalls are provided with each unit, which meets code requirements. Per code, the required guest parking to be provided for the proposed 52 units is 26 stalls. The proposed site plan includes an excess of guest parking with 35 stalls.

Figure 9: Parking Calculations

CCMC Parking Requirement	# of Residential Units	Required Parking per CCMC	Provided Parking (guest stalls and garages)	Accessible Parking Provided
2 per unit plus 1 guest stall for every 2 units	52	130 (52 x 2.5)	139 (104 garage stalls + 35 guest stalls)	2

MASTER PLAN POLICY CHECKLIST/FINDINGS

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 Tentative Map application. The Checklist is included with this letter. In addition, the following are included:

- **Tentative Map Findings;** and
- **Special Use Permit Findings;** and
- **CCDS 18.1.18 - Residential Development in Non-Residential Districts Comments;** and
- **Major Variance Findings.**

The project complies with the Master Plan and accomplishes the following objectives.

Chapter 3: A Balanced Land Use Pattern

1. Goal 1.1c-Water Conservation: The proposed project is expected to encourage water conservation efforts through low-water landscaping, low-flow fixtures, and/or other water saving devices.
2. Goal 1.1e-Sustainable Construction Techniques: The proposed project is expected to utilize sustainable building materials and construction techniques.
3. Goal 1.5d–Coordination of Services: The site location will allow the development to be adequately served by city services including fire and sheriff services.
4. Goal 3.3d-Floodplain and Hazard Area Development: The proposed development is not within the 100-year floodplain or other hazardous areas.
5. Mixed Use Employment Policy 1.4-Location: The site is located on existing collector and local streets.



TENTATIVE 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, 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.**

Police services are currently provided by the Carson City Sheriff's Office. Fire protection will be provided by the Carson City Fire Department. The project meets the requirements of the Fire Department. The Regional Transportation Commission is responsible for transportation in and around the project area. Carson City Parks Department provides recreational and parks services, although this project is not expected to impact recreational services. Educational services are provided by Carson City School District.

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 incorporates public access to the public park south east of the subject property via connection to an existing path network.

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 High Density Residential. The current zoning designation of Neighborhood Business (with a PUD overlay) permits attached single-family residences, but only with a special use permit (requested with this submittal package). The proposed residential development will complement the existing adjacent uses by providing a transition use between the less intense single-family detached homes to the south and more intense commercial uses to the north.

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



intense commercial uses to the north. The Master Plan Policy Checklist is included in this application package with additional information.

- 2. Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties of the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare, or physical activity.**

The surrounding neighborhood is comprised of public park space, single-family detached residential, and commercial uses. The project proposes attached single-family residential units, which provides an ideal transition between commercial use to the north and single-family residential units to the south and east. Landscaping and open space will be in accordance with Carson City requirements, providing appropriate buffering of the development. Landscape/open space areas are shown on the Site Plan. Dust control during construction will be managed in accordance with Carson City requirements and the intended residential use should have no significant impact on surrounding development regarding noise, fumes, odors, or glare.

- 3. Will have little or no detrimental effect on vehicular or pedestrian traffic.**

Figure 7 includes the calculated vehicular trip generation in Average Daily Trips (ADT) as well as peak AM and PM hours per the ITE Trip Generation manual. The figures (305 ADT, 23 AM peak trips, 28 PM peak trips) represent a modest impact on traffic in the area and do not trigger a traffic impact study per Carson City Code.

- 4. Will not overburden existing public services and facilities, including schools, police and fire protection, water, sanitary sewer, public roads, storm drainage, and other public improvements.**

The site is located along a minor collector and a local street within the NB zoning district and is served by public services including schools, police and fire protection, water, and sanitary sewer. The addition of 52 residential units within a business zoning district will not overburden public services or facilities.

- 5. Meets the definition and specific standards set forth elsewhere in this Title for such particular use and meets the purpose statement of that district.**

Single-family attached dwellings are permitted in the NB zoning district subject to approval of a Special Use Permit (CCMC Section 18.04.120(3)). The proposed project meets the specific standards set forth in CCMC Section 18.04.120 and Title 18 Appendix 1.18, residential development standards in non-residential districts.

- 6. Will not be detrimental to the public health, safety, convenience and welfare.**

Providing new single-family dwellings with modern construction methods will not be detrimental to the public health, safety, and welfare because the area is intended for low intensity and residential uses.



The proposed setbacks within the interior and the perimeter of the development meet or exceed the setbacks for the NB district. The perimeter setbacks along Oak Ridge Drive and West College Parkway are 30', accommodating CCDS 1.18.4, which requires 20' setbacks adjacent to residential districts (SF12-P) plus an additional 10' for each story above one. The interior setbacks meet or exceed those required in the NB zoning district.

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

The site design does not include on-street parking, so CCMC requires one stall per two units for guest parking in addition to the base requirement of two stalls per unit. As demonstrated in Figure 9: Parking Calculations, the design provides two garage stalls with each unit, which meets code requirements. Per code, the required guest parking to be provided for the proposed 52 units is 26 stalls. The proposed site plan includes an excess of guest parking with 35 stalls.

6. Open Space.

- a. **A minimum of one hundred fifty (150) square feet per dwelling unit of common open space must be provided. For projects of ten (10) or more units, areas of common open space may only include contiguous landscaped areas with no dimension less than fifteen (15) feet, and a minimum of one hundred (100) square feet per unit of the 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 twenty-five (25) feet.**
- b. **A minimum of one hundred (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.**

Please reference *Figure 6: Development Standards (for residential development in non-residential zoning districts)* for demonstration of meeting and exceeding compliance with these standards. Each residential lot includes a minimum 250 sf of common open space provided within the development.

7. Landscaping. Landscaping shall comply with the Carson City Development Standards Division 3, Landscaping.

The proposed landscaping plan was designed in accordance with CCMC.

8. Special Use Permit review standards. Where a residential use is a conditional use within a given zoning district, the Planning Commission shall make two (2) of the following findings in the affirmative in the review of the Special Use Permit in addition to the required findings of Section 18.02.080 of the Carson City Municipal Code.

- a. **The development is not situated on a primary commercial arterial street frontage.**



3. **That granting of the application will not, under the circumstances of the particular case, adversely affect to a material degree the health or safety of persons residing or working in the neighborhood of the subject property and will not be materially detrimental to the public welfare or materially injurious to property or improvements in the neighborhood of the su**

The granting of this application will not negatively affect the health or safety of people living or working in the neighborhood as the variance only affects the proximity of some of the proposed buildings in relation to existing public open space. The public open space will still be able to be utilized and enjoyed by area residents, with no negative affects to their health, safety and general welfare. Such a variance will not set any precedents that will reduce or hinder adjacent property rights and values in the future as there are not any neighboring properties that are zoned in a manner that would create the same unique situation that exists with subject project.



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

FOR OFFICE USE ONLY:

CCMC 18.02.085

MAJOR VARIANCE

FILE #

FEE*: \$2,150.00 + noticing fee
 *Due after application is deemed complete by staff

APPLICANT PHONE #
 Mark Turner/Lanturn Investments 775-745-0881

- SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies)
 - Application Form
 - Detailed Written Project Description
 - Site Plan
 - Building Elevation Drawings and Floor Plans
 - Variance Findings
 - Applicant's Acknowledgment Statement
 - Documentation of Taxes Paid-to-Date

MAILING ADDRESS, CITY, STATE, ZIP
 1075 College Drive, Carson City, NV 89703

EMAIL ADDRESS
 silveroakmark@me.com

- CD or USB DRIVE with complete application in PDF

PROPERTY OWNER PHONE #
 James and Sandra Foley Trust

Application Reviewed and Received By:

MAILING ADDRESS, CITY, STATE, ZIP
 455 Combs Canyon Road, Carson City, NV 89703

APPLICANT AGENT/REPRESENTATIVE PHONE #
 Chris Baker/Manhard Consulting 775-321-6539
 MAILING ADDRESS, CITY, STATE, ZIP
 141 Ridge Street, Suite 400, Reno, NV 89501
 EMAIL ADDRESS
 cbaker@manhard.com

Submission Deadline: Planning Commission application
 submittal schedule.

Note: Submittals must be of sufficient clarity and detail such that all departments are able to determine if they can support the request. Additional information may be required.

Project's Assessor Parcel Number(s):
 007-462-16, 007-462-17

Street Address
 1147 W. College Parkway

Project's Master Plan Designation
 High Density Residential

Project's Current Zoning
 Neighborhood Business - PUD Overlay

Nearest Major Cross Street(s)
 W. College Parkway and Oak Ridge Drive

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

The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan designation of high density residential, is zoned neighborhood business with a PUD overlay and a special use permit will be needed for proposed use.

PROPERTY OWNER'S AFFIDAVIT

JAMES B. FOLEY, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

James B Foley
 Signature

1147 W. College Parkway
 Address

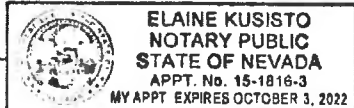
7/1/2021
 Date

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

STATE OF NEVADA)
 COUNTY CARSON CITY)

On JULY 1, 2021, JAMES B. FOLEY, personally appeared before me, a notary public, personally known (or proved) to me to be the person whose name is subscribed to the foregoing document and who acknowledged to me that ~~she~~ executed the foregoing document.

Elaine Kusisto
 Notary Public



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.

there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.



Applicant's Signature

JAMES B FOLEY

Print Name

7/1/2021

Date

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

FILE #

APPLICANT **PHONE #**
 Mark Turner/Lanturn Investments 775-745-0881

MAILING ADDRESS, CITY, STATE, ZIP
 3075 College Drive, Carson City, NV 89703

EMAIL ADDRESS
 silveroakmark@me.com

PROPERTY OWNER **PHONE #**
 James and Sandra Foley Trust

MAILING ADDRESS, CITY, STATE, ZIP
 1455 Combs Canyon Road, Carson City, NV 89703

EMAIL ADDRESS

APPLICANT AGENT/REPRESENTATIVE **PHONE #**
 Chris Baker/Manhard Consulting 775-321-6539

MAILING ADDRESS, CITY STATE, ZIP
 241 Ridge Street, Suite 400, Reno, NV 89501

EMAIL ADDRESS
 cbaker@manhard.com

FOR OFFICE USE ONLY:
 CCMC 18.02.080

SPECIAL USE PERMIT

FEE*: \$2,450.00 MAJOR
 \$2,200.00 MINOR (Residential zoning districts)
 + noticing fee
 *Due after application is deemed complete by staff

SUBMITTAL PACKET – 4 Complete Packets (1 Unbound Original and 3 Copies) including:

- Application Form
- Detailed Written Project Description
- Site Plan
- Building Elevation Drawings and Floor Plans
- Special Use Permit Findings
- Master Plan Policy Checklist
- Applicant's Acknowledgment Statement
- Documentation of Taxes Paid-to-Date
- Project Impact Reports (Engineering)

CD or USB DRIVE with complete application in PDF

Application Received and Reviewed By:

Submission Deadline: Planning Commission application submittal

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

Project's Assessor Parcel Number(s): 007-462-16, 007-462-17	Street Address 1147 W. College Parkway	
Project's Master Plan Designation High Density Residential	Project's Current Zoning Neighborhood Business - FW	Nearest Major Cross Street(s) College Parkway and Oak Ridge Drive

Please provide a brief description of your proposed project and/or proposed use below. Provide additional pages to describe your request in more detail. The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan with a PUD overlay and a special use permit will be needed for proposed use.

PROPERTY OWNER'S AFFIDAVIT

James Foley, being duly deposed, do hereby affirm that I am the record owner of the subject property, and that I have knowledge of, and I agree to, the filing of this application.

James B. Foley 1147 W. College Parkway 6/15/2021

Signature Address Date

Use additional page(s) if necessary for additional owners.

STATE OF NEVADA
 COUNTY)
 in June 15, 2021, James B. Foley, personally appeared before me, a notary public, 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.

Kristin L. Hordzwick
 Notary Public
 STATE OF NEVADA
 My Appt. Exp. Oct. 17, 2022

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.

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

FILE #

APPLICANT **PHONE #**
 Mark Turner/Lanturn Investments 775-745-0881

MAILING ADDRESS, CITY, STATE, ZIP
 3075 College Drive, Carson City, NV 89703

EMAIL
 silveroakmark@me.com

PROPERTY OWNER **PHONE #**
 James and Sandra Foley Trust

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EMAIL

APPLICANT AGENT/REPRESENTATIVE **PHONE #**
 Chris Baker/Manhard Consulting 775-321-6539

MAILING ADDRESS, CITY, STATE, ZIP
 241 Ridge Street, Suite 400, Reno, NV 89501

EMAIL
 cbaker@manhard.com

Project's Assessor Parcel Number(s)
 007-462-16, 007-462-17

Project's Street Address
 1147 W. College Parkway

Nearest Major Cross Street(s)
 W. College Parkway and Oak Ridge Drive

Project's Master Plan Designation
 High Density Residential

Project's Current Zoning
 Neighborhood Business - PUD Overlay

Project Name
 Silver Oak at College Parkway

Total Project Area	Number of Lots	Smallest Parcel Size
3.45 AC	52	1.04

Please provide a brief description of your proposed project below. Provide additional pages to describe your request in more detail.
The applicant is proposing 52 attached single family residences on 3.45 acres. The site has a master plan designation of high density residential, is zoned neighborhood business with a PUD overlay and a special use permit will be needed for proposed use.

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.

 Applicant's Signature

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 – 5 Complete Packets (1 Unbound Original and 4 Copies) including:**
 - Application Form including Applicant's Acknowledgment
 - Property Owner Affidavit
 - Copy of Conceptual Subdivision Map Letter
 - Detailed Written Project Description
 - Proposed Street Names
 - Master Plan Policy Checklist
 - Wet Stamped Tentative 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:

Submission Deadline: 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.

6/15/2021


 Date

If there is any additional information that would provide a clearer picture of your proposal that you would like to add for presentation to the Planning Commission, please be sure to include it in your detailed description.

Please type and sign the statement on the following page at the end of your findings response.

ACKNOWLEDGMENT OF APPLICANT

I certify that the forgoing statements are true and correct to the best of my knowledge and belief. I agree to fully comply with all conditions as established by the Planning Commission. I am aware that this permit becomes null and void if the use is not initiated within one-year of the date of the Planning Commission's approval; and I understand that this permit may be revoked for violation of any of the conditions of approval. I further understand that approval of this application does not exempt me from all City code requirements.



Applicant's Signature

MARK B TURNER

Print Name

6/15/2021

Date

PROPERTY OWNER'S AFFIDAVIT

James Foley

(Print Name)

, being duly deposed, do hereby affirm that I am the record owner of the

1147 W. College Parkway (007-462

subject property located at

(Property Address and APN)

, and that I have knowledge of, and I agree to, the

filling of this Tentative Subdivision Map application.

James B Foley
Signature

4455 COMBS CANYON RD
Address CARSON CITY, NV.

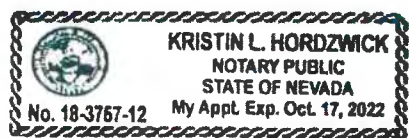
6/15/2021
Date

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

STATE OF NEVADA)
COUNTY)

On June 15, 2021, personally appeared before me, a notary public,
James B. Foley, 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.

Kristin L. Hordzwick
Notary Public





Carson City Planning Division

108 E. Proctor Street

Carson City, Nevada 89701

(775) 887-2180-Hearing Impaired:711

www.carson.org

www.carson.org/planning

March 18, 2021

Louis Cariola
 Manhard Consulting
 241 Ridge Street, Suite 400
 Reno, NV 89501

Major Project Review: MPR-2021-0048

Project Description: Request for a residential use in a non-residential zoning district to allow for 52 attached single-family residences.

Review Date: March 2, 2021

Major Project Review Comments

The Major Project Review Committee has reviewed the proposed plans for a residential use in a non-residential zoning district to allow for 52 attached single family residences. The following requirements and comments are provided for your use in preparing final plans and submittals for the project. Please be advised that the comments presented in this letter are based on the plans submitted with the Major Project Review application and may not include all the requirements or conditions which may be placed on the project at the time of submittal of planning applications for approval (if applicable) or final plans for building permits. It is hoped, however, that this review will expedite the completion of your project.

Some of the requirements noted below may have already been shown or otherwise indicated in the plans and need only be submitted in the final improvement plan form. Final on- and off-site improvement plans shall be submitted to the Permit Center, (108 E. Proctor Street). These plans must contain all appropriate requirements of Development Engineering, Health, Utilities, Fire, and Planning Divisions/Departments.

Planning applications (if applicable), such as Master Plan Amendments, Zoning Changes, Special Use Permits, Variances, Lot Line Adjustments, Parcel Maps, etc. shall be submitted to the Planning Division (108 E. Proctor Street) for review and approval.

SITE INFORMATION:

Address: 1147 West College Parkway

APN: 007-462-16 and -17

Parcel Size: 3.45 acres

Master Plan Designation: High Density Residential (HDR)

oning: Neighborhood Business – Planned Unit Development (NB-P)

LANNING DIVISION

Contact Hope Sullivan, Planning Manager

Permitted Use - CCMC 18.04.120

multifamily dwellings are a conditional use in the Neighborhood Business zoning district. Therefore, the use may only establish upon issuance of a Special Use Permit.

The applicant indicated subdivision of land. The subdivision of land will require a tentative map approval, followed by a final map approval.

Setbacks CCMC 18.04.195 (Non-Residential) and Development Standards 1.18 (Residential Development Standards in a non-residential district)

A minimum setback of twenty feet is required adjacent to a residential zoning district, with an additional ten feet for each story above one (1) story. Property to the west, south and east of the property has a residential zoning district.

Staff will support a variance request relative to the setback from the park.

Please refer to the definition of adjacent in CCMC 18.03 to determine the point of measurement when the adjacent property is across the street.

Height - CCMC 18.04.195 (Non-Residential)

The maximum building height for the General Commercial zoning district is 26 feet. Additional height may be permitted subject to a Special Use Permit.

Signs - Carson City Development Standards, Division 4.7.2 Multi-family Residential Uses

All signs must be consistent with Division 4.7.2 of the Development Standards.

Landscaping - Carson City Development Standards, Division 3

Landscaping must be consistent with Division 3 of the Development Standards.

Parking and Loading – Carson City Development Standards, Division 2

The parking standard is 2 spaces per unit. All provisions of Division 2 of the Development Standards must be met.

Architectural Design - Carson City Development Standards, Division 1

Proposed structures must meet the architectural standards outlined in the Development Standards, Division 1.1.

Lighting - Carson City Development Standards, Division 1

Lighting must meet the standards outlined in Development Standards 1.3.

Roof-Mounted Equipment - Carson City Development Standards, Division 1

Roof mounted equipment must meet the standards outlined in Carson City Development Standards 1.1.7.

10. Trash Storage - Carson City Development Standards, Division 1

Trash storage must meet the standards outlined in Carson City Development Standards 1.2.6.

11. Residential Development in a Non-Residential Zoning District: - CCMC Development Standards Division 1.18

The project must meet the standards outlined in Carson City Development Standards 1.18. Staff will not support a reduction to the open space requirement based on existing open space at Silver Oak. Staff is open to other suggestions relative to a reduction in open space, including potential construction of additional parking for the neighboring park.

12. Growth Management - CCMC 18.12

Growth Management applies to all residential, commercial and industrial property that is required to be served by city water and/or sewer service within the consolidated municipality of Carson City.

Conclusion

Due to changing conditions of business and requirements for zoning, master plan and development codes of Carson City, this MPR information will expire and will need to be updated with a new MPR if the developer has not applied for a building permit within one year of the date of the MPR meeting.

When applying for a special use permit in relation to the proposed project in addition to the required plans, please submit the following:

- Copy of this MPR letter packet.
- Exterior light fixture details must be submitted with a building permit application for review and approval by the Planning Division prior to installation.
- Color palette for all proposed exterior colors of the buildings.
- Open space details.

ENGINEERING AND UTILITIES

Contact Stephen Pottley, Development Engineering

Project Specific Comments:

Transportation:

1. Please submit the overall traffic analysis for Silver Oak, with the next application. Please also provide a sealed trip generation memo which speaks to the change in estimated trips resulting from this development with respect to the overall Silver Oak traffic analysis. If changes from this project result in an increase to traffic at the intersections of College Parkway and Oak Ridge Drive or College Parkway and GS Richards Boulevard, the applicant must review those intersections. If either of these intersections are shown to have a failing level of service, a stop warrant and a signal warrant analysis

must also be provided for the failing intersections. Please contact Chris Martinovich for further scoping questions at 775-283-7367.

2. The subdivision must have two points of access. The access onto College Parkway may be limited to right-in and right-out only. The minimum spacing between driveways is 150 feet.
3. The drive isle widths shown are acceptable, however where the driving lanes are narrower than 26' wide, they must be signed as 15 mph speed limit.
4. The internal access ways must be private, as is proposed.
5. The parking and drive isles must meet Carson City Standard Details for parking lots.
6. A curb ramp meeting current ADA standards must be installed at intersection of College Parkway and Oak Ridge Drive.
7. All driveway aprons must meet Carson City Standard Details.

Water:

8. Due to minimal water information provided in the MPR application, additional requirements may apply.
9. Project shall comply with all City and State codes and standards.
10. The existing water main on the Oak Ridge Dr frontage is 10" PVC; the main in the W. College Parkway 12" PVC.
11. A wet stamped water main analysis must be submitted in accordance with CCDS 15.3.1(a) to show that adequate pressure will be delivered to the meter and fire flows meet the minimum requirements of the Carson City Fire Department.
12. No fire flow information is available for the subject parcel, the cost is \$79.80 per test, and results can take up to two weeks. Please contact the Water Operations Supervisor at (775) 283-7081 to schedule a fire hydrant flow test.
13. The subject project is located at the upper end of the 4960 zone. The applicant may wish to consider installing booster pumps to provide adequate pressures at the upper stories of the development. Booster pumps would be installed and maintained at the property owners expense.
14. The project shall be master metered for the water service. A looped water system is recommended due to the number of units in the development. Every water service shall be equipped with a reduced pressure principle backflow prevention assembly. Please refer to NRS 704.940 in regards to metering, charging and billing for water supplied to individual units.
15. A reduced pressure principle assembly backflow preventer will be required for the domestic water line. Fire sprinkler lines, if required, must have a double check valve backflow preventer if it is Class 1-3, or a reduced pressure principle assembly if it is Class 4-6. These backflow preventers must be above ground in a hot box, and must be located as close to the property line as possible. The irrigation service will need a reduced pressure backflow preventer if a vacuum breaker system cannot be designed to operate properly.
16. A separate fire loop may be required to meet fire flow requirements. This loop may be isolated from the City system with a single check valve as long as it only serves fire hydrants and does not serve any fire sprinklers.
17. Please show sufficient utility information to ensure that minimum spacing is met between water meters and dry utilities.

Sewer:

18. The sewer main on the west side of the property is 15 in PVC, and is approximately 30% full (d/D). The sewer main on the south side of the property is 8 in PVC and is approximately 5% full (d/D).
19. A wet stamped sewer main analysis must be submitted that includes addressing the effect of flows on the existing City system. See section 15.3.2 of CCDS.
20. There is 1,135 feet of 12" sewer at capacity in College Parkway between Granite and Imperial that will need to be replaced due to the project. The estimated increase in flows at this location is 1.6%. The estimated cost to replace the sewer main is \$600,000. The project will be required to enter into an agreement to pay it's pro rata share of the cost of this improvement.

Storm Drainage and Flooding:

21. The storm drain development standards have been revised and moved to a Carson City Drainage Manual which will be effective on July 1, 2021. These changes include a change in the detention design storm to a 10-year 24 hour event, and the inclusion of Low Impact Design requirements. A link to the drainage manual will be sent by email. If the project plans are submitted for a permit before July 1, 2021, the current drainage standards will apply.
22. With the next application map please provide the master drainage study. Please confirm that drainage for the proposed project will function as the drainage study originally contemplated, or provide an addendum to the study if necessary.
23. The existing drainage system location will need to be verified in the field. Storm water flow is flowing from College Parkway south toward Nye Lane.

City Lands:

24. There is a 10 ft public use easement on the north side of APN 00746217 which is approximately 10 ft to 30 ft into the property per Map 2904. There is an existing 24 inch RCP storm pipe in the easement. The storm drain must be relocated as shown, and the easement must be abandoned and relocated with the final map. The drainage easement is recorded as document #472814 and the Public Utility Easement Deed is recorded as document #472815.

General Comments:

25. Water and sewer connection fees must be paid. Please see CCMC 12.01.030 for the water connection fee schedule and 12.03.020 for the sewer connection fee schedule.
26. 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.
27. Please reach out to Waste Management before applying for a building permit for approval of the parking and access layout.
28. All construction work must be to Carson City Development Standards (CCDS) and meet the requirements of the Carson City Standard Details.
29. Addresses for units will be provided during the building permit review process.
30. Fresh water must be used for Dust control. Contact the Water Operations Supervisor Public Works at 283-7382 for more information.
31. 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.

32. An erosion control plan meeting section 13 of CCDS will be required in the plan set.
33. New electrical service must be underground.
34. 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.
35. Please show any easements on the construction drawings.
36. A Construction Stormwater Permit from the Nevada Division of Environmental Protection (NDEP) will be required for the construction of projects 1 acre or greater.

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.

FIRE DEPARTMENT

Contact Dave Ruben, Fire Marshall

1. Project must comply with the International Fire Code (IFC) and northern Nevada fire code amendments as adopted by Carson City.
2. Provide details on College Parkway gate. Electric gate must provide a Knox key switch.

PARKS DEPARTMENT

Contact Nick Wentworth, Project Manager

1. The City will not be responsible for any landscape or irrigation system maintenance on the project. All landscaping and landscape maintenance in the right of way will be the sole responsibility of the owner. The developer is required to maintain all common landscape and open space areas within the development including any landscaping in the street(s) right of ways on in perpetuity.
2. Carson City is a Bee City, USA. As a result, the developer shall use approximately 50% pollinator friendly plant material for any required landscaping on the project site. Also, any remaining landscape plant material selection needs to be consistent with the City's approved tree species list or other tree species, as approved by the City. The Carson City Pollinator Plant list and other plant selection resources can be found at www.carson.org/beecityusa

The City's approved tree species list for commercial projects can be found at <https://www.carson.org/Home/ShowDocument?id=15225>

3. Hoary Cress has been identified in abundance on the subject parcel and Russian Knapweed has a very strong presence in the Silver Oak area. The developer is required to incorporate "best management practices" into their construction documents and specifications to reduce the spread of noxious weeds. The spread of invasive and noxious weeds is a significant issue in construction projects that involve land disturbance. Earth moving activities contribute to the spread of weeds, as does the use of contaminated construction fill, seed, or erosion-control products. Experience has demonstrated that prevention is the least expensive and most effective way to halt the spread of noxious and invasive weeds. Preventing the establishment or spread of weeds relies upon:

- Educating workers about the importance of managing weeds on an ongoing basis;
- Properly identifying weed species to determine most appropriate treatment strategies;
- Avoiding or treating existing weed populations; and
- Incorporating measures into projects that prevent weed seeds or other plant parts from establishing new or bigger populations such as certification of weed-free products.
 - *All spoils from the site will be taken to the Carson City Landfill and will not be disposed of or utilized in any other fashion or in any other location(s).*

For more information on “best management practices” please contact The Carson City Parks, Rec. and Open Space Dept. by phone or email through the contacts listed at the top of this document.

4. Deciduous trees must be planted a minimum of 5’ from any city/public street, sidewalk or pathway. Evergreen trees must be planted a minimum of 10’ from any city/public street, sidewalk or pathway. Fruit bearing, “non-fruiting” flowering or any other trees that drop debris such as seed pods will not be permitted near or placed where they will eventually hang over city/public sidewalks or pathways.
5. Carson City Municipal Code: Title 18, Division 3 should be reviewed by any/all parties involved in the proposed landscape design prior to landscape plans being submitted to the city for final approval of a building permit. Note: Special care and consideration should be taken in the protection of existing trees on-site.
https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=TIT18_APP_ENDIXCADEST_DIV3LA
6. Carson City may allow additional public parking spaces adjacent to John Mankins Park on Oak Ridge Drive to be constructed in exchange for acceptance of a smaller percentage of required open space within the development.
7. The project is subject to the collection of Residential Construction Tax (RCT), compliant with NRS Chapter 278 and Carson City Municipal Code (CCMC 15.60).

The aforementioned comments are based on the Major Project Review Committee’s review. If you have any questions, please feel free to contact the following members of staff, Monday through Friday 8:00 AM to 4:00 PM.

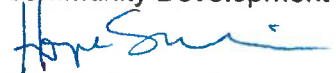
Planning Division –
 Hope Sullivan, Planning Manager
 (775) 283-7922
 Email: hsullivan@carson.org

Engineering Division –
 Stephen Pottey, Development Engineering
 (775) 283-7079
 Email: spottey@carson.org

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

Parks Department
Nick Wentworth, Project Manager
(775)283-7733
Email: nwentworth@carson.org

Sincerely,
Community Development Department, Planning Division



Hope Sullivan, AICP
Planning Manager

cc: MPR-2021-0048

Master Plan Policy Checklist

Special Use Permits & Major Project Reviews & Administrative Permits

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 non-residential and multi-family residential development. This checklist is designed for developers, staff, and decision-makers and is intended to be used as a guide only.

Development Name: Silver Oak at College Parkway

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:

- Meet the provisions of the Growth Management Ordinance (1.1d, Municipal Code 18.12)?
- Use sustainable building materials and construction techniques to promote water and energy conservation (1.1e, f)?
- N/A 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)?

2

Special Use Permit, Major Project Review, & Administrative Permit Development Checklist

- N/A Protect existing site features, as appropriate, including mature trees or other character-defining features (1.4c)?
- N/A At adjacent county boundaries or adjacent to public lands, coordinated with the applicable agency with regards to compatibility, access and amenities (1.5a, b)?
- N/A 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)?
- Meet adopted standards (e.g. setbacks) for transitions between non-residential and residential zoning districts (2.1d)?
- N/A Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- Sited outside the primary floodplain and away from geologic hazard areas or follows 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)?
- N/A 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)?
- 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:

- Encourage a citywide housing mix consistent with the labor force and non-labor force populations (5.1j)
- N/A Encourage the development of regional retail centers (5.2a)
- N/A Encourage reuse or redevelopment of underused retail spaces (5.2b)?
- N/A Support heritage tourism activities, particularly those associated with historic resources, cultural institutions and the State Capitol (5.4a)?
- N/A Promote revitalization of the Downtown core (5.6a)?
- N/A 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:

- Use durable, long-lasting building materials (6.1a)?
- N/A Promote variety and visual interest through the incorporation of varied 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)?
- N/A 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)?
- N/A 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)?
- Incorporate a mix of housing models and densities appropriate for the project location and size (9.1a)?

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

4

Special Use Permit, Major Project Review, & Administrative Permit Development Checklist

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)?



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: Silver Oak at College Parkway

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)?
- N/A 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)?
- N/A 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)?
- N/A 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)?
- N/A Protect environmentally sensitive areas through proper setbacks, dedication, or other mechanisms (3.1b)?
- N/A 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)?
- N/A 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)?
- N/A Promote revitalization of the Downtown core (5.6a)?
- N/A 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:

- N/A 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)?
- N/A 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)?
- N/A 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:

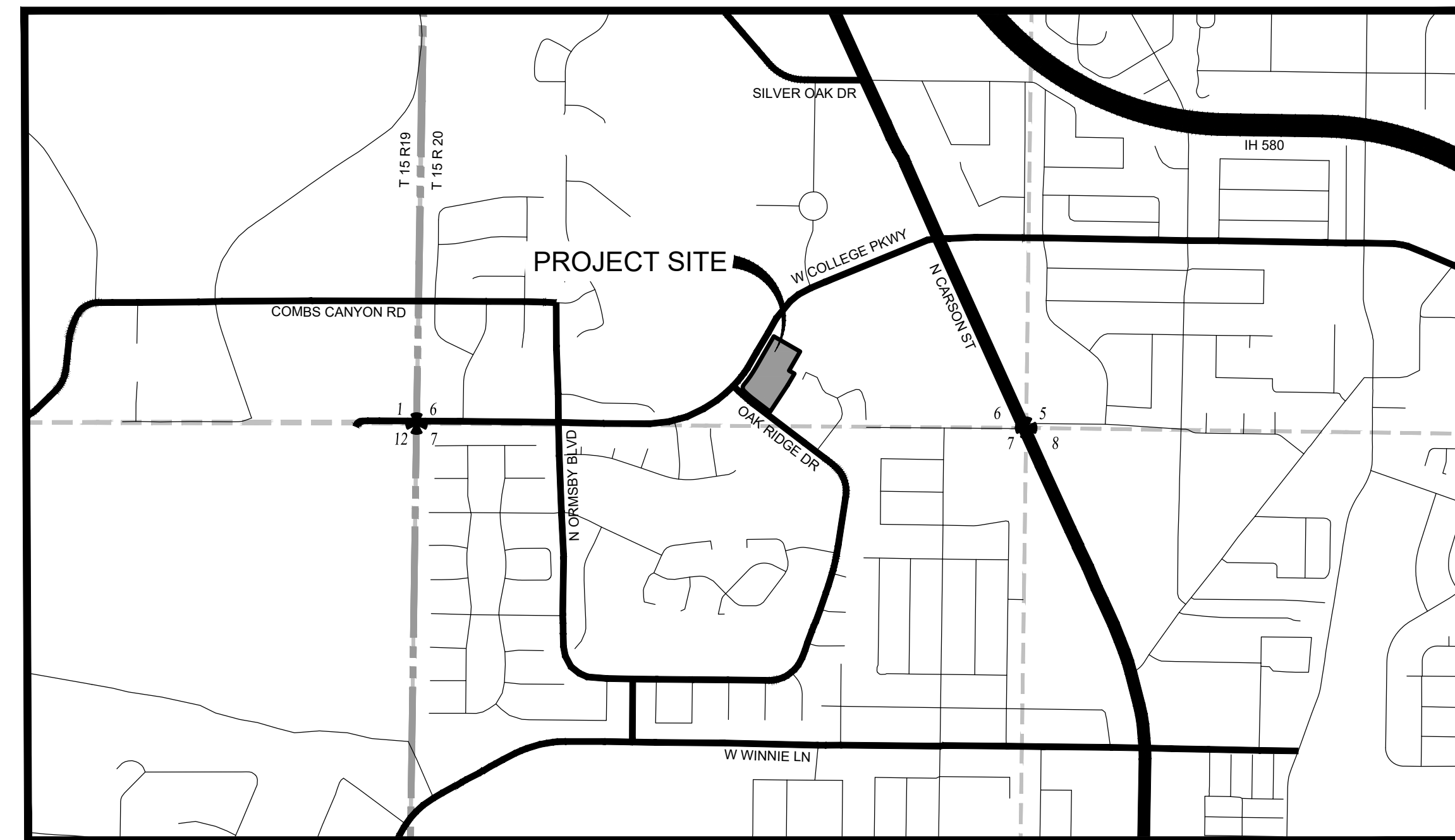
- Promote transit-supportive development patterns (e.g. mixed-use, pedestrian-oriented, higher density) along major travel corridors to facilitate future transit (11.2b)?
- Maintain and enhance roadway connections and networks consistent with the Transportation Master Plan (11.2c)?
- Provide appropriate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

SPECIAL USE PERMIT FOR SILVER OAK @ COLLEGE PKWY

APN: 007-462-16 & 007-462-17
CARSON CITY, NEVADA

STANDARD SYMBOLS

EXISTING		PROPOSED
	STORM SEWER	
	SANITARY SEWER	
	WATER MAIN	
	GAS	
	ELECTRIC	
	TELEPHONE	
	SANITARY MANHOLE	
	SANITARY CLEANOUT	
	STORM MANHOLE	
	CATCH BASIN	
SWPPP FEATURES		
	RIP RAP	
	FLARED END SECTION HEADWALL	
	STREET LIGHT	
	DITCH OR SWALE	
	DIRECTION OF FLOW	
	2 FOOT CONTOURS	
	ROADWAY GRADE BREAK	
	CURB AND GUTTER	
	CONCRETE WALK	
ACCESSIBLE CURB RAMP		
PROPERTY LINE		
	SIGN	
	POWER POLE	
	GUY WIRE	
	GAS VALVE	
	ELECTRICAL BOX	
	TELEPHONE PEDISTAL	
	CHAIN-LINK FENCE	
	TOP OF CURB ELEVATION	
	EDGE OF PAVEMENT ELEVATION	
	TOP OF WALL ELEVATION	
	FINISH GRADE ELEVATION	
	GRADE BREAK ELEVATION	
	FLOWLINE ELEVATION	
ROCKERY WALL		
RETAINING WALL		
LANDSCAPE WALL		
CLASS "A" MONUMENT		



VICINITY MAP
NTS

SHEET INDEX

SHEET NO	SHEET NAME
1	TITLE SHEET
2	PRELIMINARY SITE PLAN
3	PRELIMINARY GRADING PLAN
4	PRELIMINARY UTILITY PLAN
5	PRELIMINARY EROSION CONTROL PLAN

PROJECT DATA

ASSESSOR'S PARCEL NUMBER	007-462-16 & 007-462-17
TOTAL PROJECT AREA	3.46 AC
LOT AREA	1.48 AC
RIGHT-OF-WAY AREA	0.00 AC
PRIVATE STREET AREA	0.00 AC
COMMON AREA	1.98 AC
TOTAL LOTS	52
LOT SIZE	1,237 SF
GUEST PARKING	35
EXISTING ZONING	NB-P
EXISTING MASTER PLAN DESIGNATION	HDR
PROPOSED DENSITY	15.03 UNITS/AC

UTILITIES

CABLE	CHARTER COMMUNICATIONS
PHONE	AT&T
ELECTRICAL	NV ENERGY
GAS	SOUTHWEST GAS CORPORATION
SEWER	CARSON CITY PUBLIC WORKS
STORM DRAIN	CARSON CITY PUBLIC WORKS
SOLID WASTE	CAPITOL SANITATION
WATER	CARSON CITY PUBLIC WORKS

BASIS OF BEARINGS

GRID NORTH, 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 CC075 AND CC029. 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 CITY OF CARSON CITY CONTROL MONUMENT CC029, HAVING A PUBLISHED ELEVATION OF 4732.41 U.S. FEET. CC020 IS DESCRIBED AS 2" BRASS DISK STAMPED "CC029" LOCATED AT THE NORTHWEST CORNER OF THE INTERSECTION OF WEST NYE LANE AND MOUNTAIN STREET.

LEGAL DESCRIPTION

ADJUSTED PARCELS 1 AND 2 AS DESCRIBED IN DOCUMENT NO. 472816 AND AS SHOWN ON THE RECORD OF SURVEY MAP LLA-16-169 ENTITLED "RECORD OF SURVEY IN SUPPORT OF A BOUNDARY LINE ADJUSTMENT FOR JAMES B. AND SANDY M. FOLEY AND SILVER OAK DEVELOPMENT, FILED IN BOOK 10, PAGE 2904 AS FILE NO. 472817, BOTH DOCUMENTS FILED ON MARCH 2, 2017 IN THE OFFICIAL RECORDS OF CARSON CITY, NEVADA.

ABBREVIATIONS

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

Manhard CONSULTING LTD

241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3500 manhard.com
Civil Engineers • Surveyors • Water Resources Engineers • Water & Wastewater Engineers
Construction Managers • Environmental Scientists • Landscape Architects • Planners

OWNER
JAMES B. & SANDRA M. FOLEY TRUST
4455 COMBS CANYON RD
CARSON CITY, NEVADA 89703

DEVELOPER
LANTURN INVESTMENTS
3075 COLLEGE DR
CARSON CITY, NEVADA 89703
775-745-0881

CIVIL
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

PLANNER
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

SURVEYOR
MANHARD CONSULTING, LTD
241 RIDGE STREET, SUITE 400
RENO, NEVADA 89501
(775) 746-3500

GEOTECH ENGINEER
PEZONELLA ASSOCIATES, INC.
520 EDISON WAY
RENO, NEVADA 89502
(775) 856-5566

LANDSCAPE ARCHITECT
SANDRA WENDEL, RLA
880 MARION WAY
GARDNERVILLE, NV 89460
(775) 721-6630

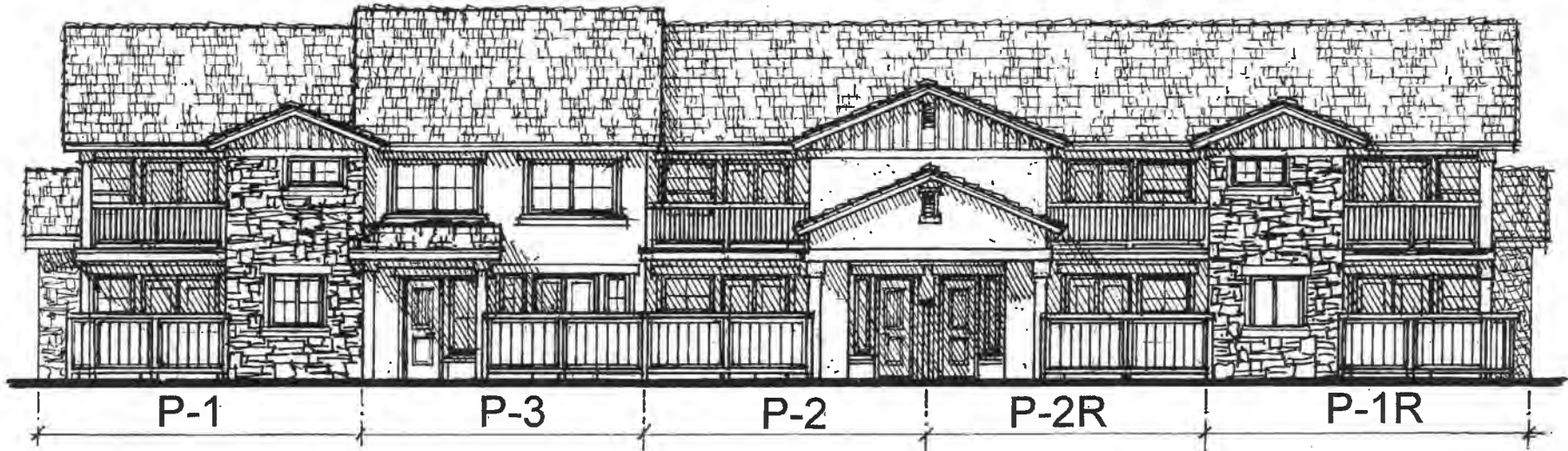
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SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
TITLE SHEET

REGISTERED CIVIL ENGINEER - STATE OF NEVADA
SPENCER O'FELLOWS
Exp. 06-30-23
No. 027892

PROJ. MGR.: SDF
PROJ. ASSOC.: SDF
DRAWN BY: SDF
DATE: JUN 2021
SCALE: AS SHOWN
SHEET
1 OF 5
LIL.CCNV06



FRONT ELEVATION

1/8"=1'-0"

BUILDING - 1

FIVE UNITS

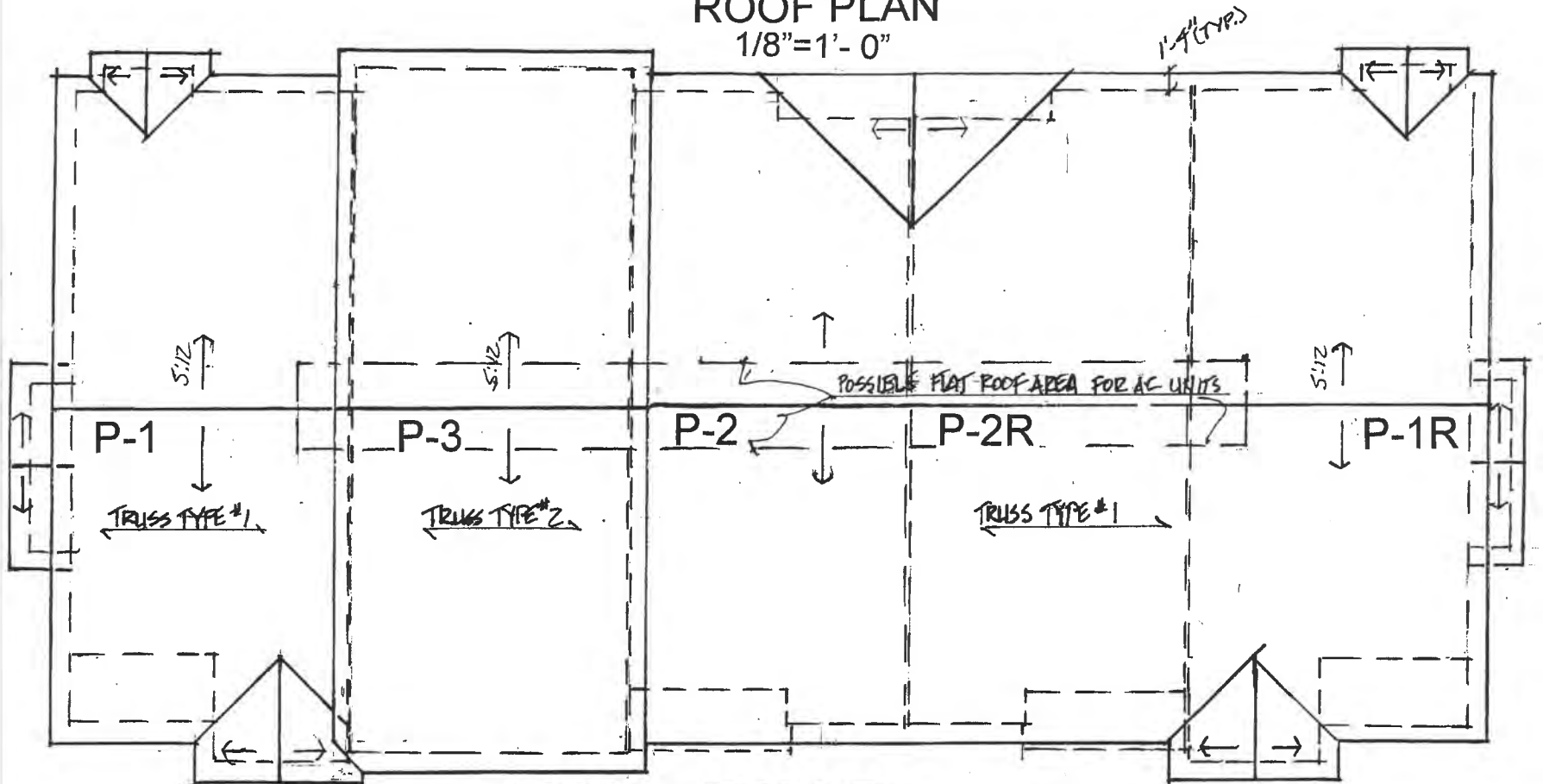
RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/16/21

ROOF PLAN

1/8" = 1'-0"



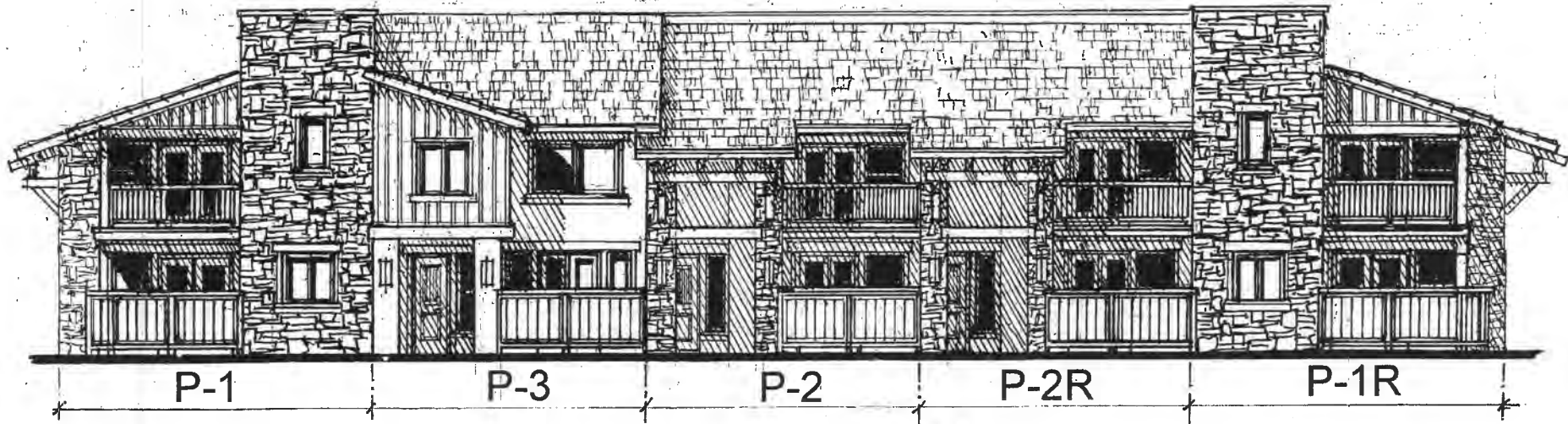
BUILDING - 1

FIVE UNITS

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/16/21



FRONT ELEVATION

1/8"=1'-0"

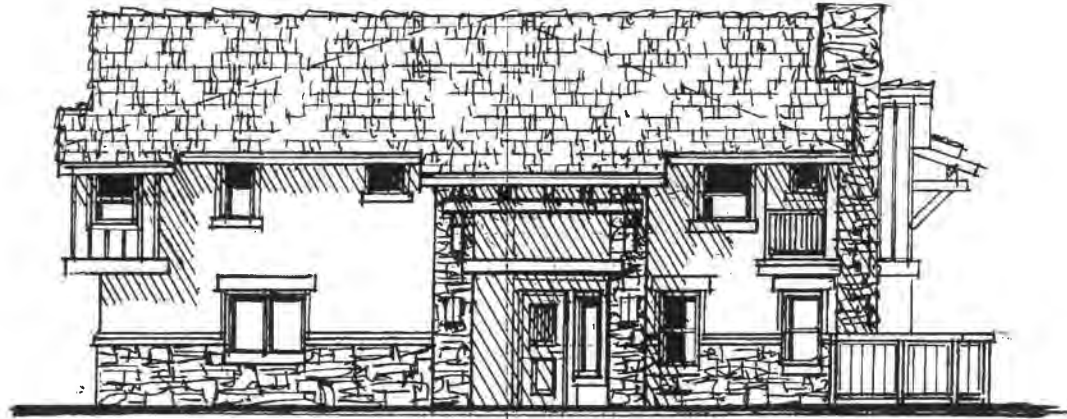
BUILDING - 1

FIVE UNITS

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES

6/23/21



P-1

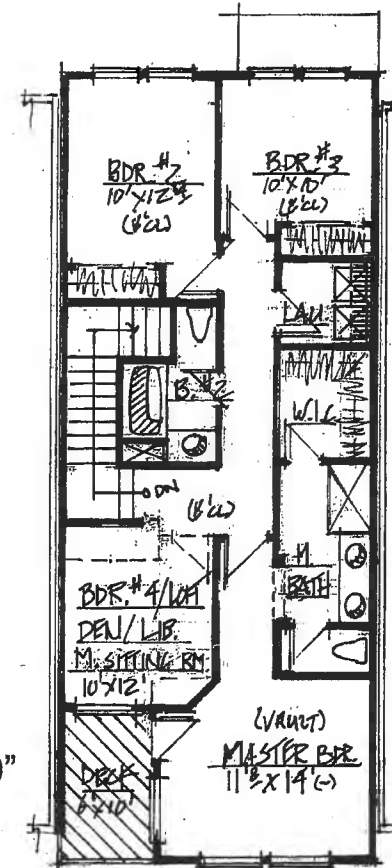
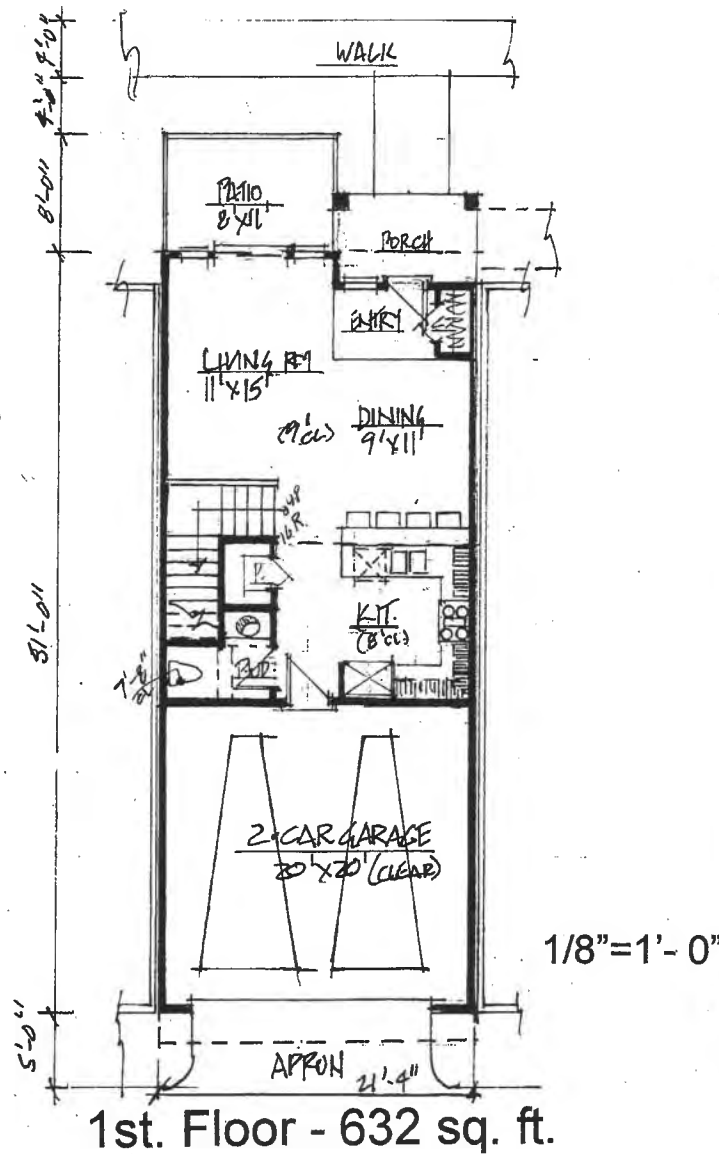
SIDE ELEVATION

1/8"=1'-0"

BUILDING - 1

RED LEAF INVESTMENTS
COLLEGE PARKWAY TOWNHOMES

6/23/21



PLAN - 3

End Unit/Interior Unit

1627 sq. ft.

3 BDR./2.5 B +
BDR. # 4/Den
MBR. Sitting Rm.

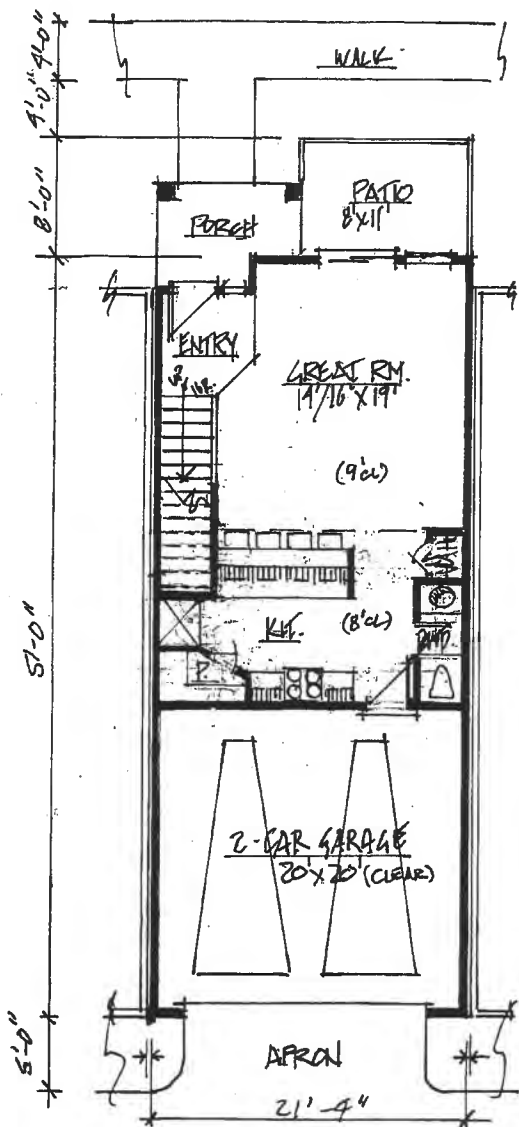
TOWNHOME



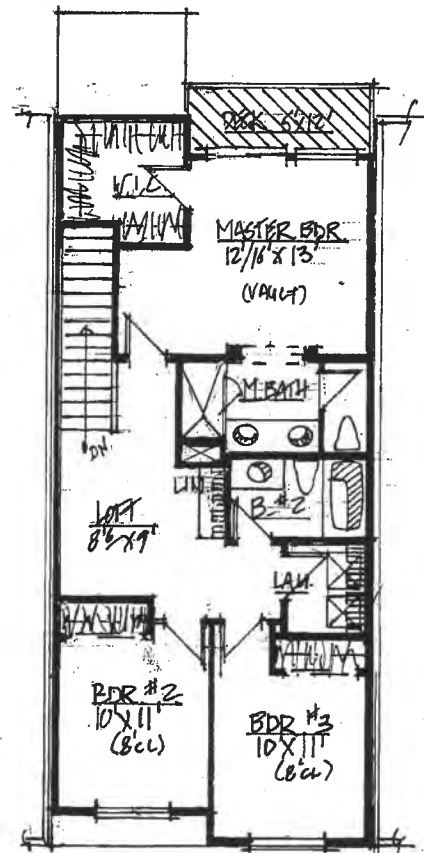
5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



1st. Floor - 629 sq. ft.



2nd. Floor - 950 sq. ft.

RED LEAF INVESTMENTS
COLLEGE PARKWAY TOWNHOMES

PLAN - 2

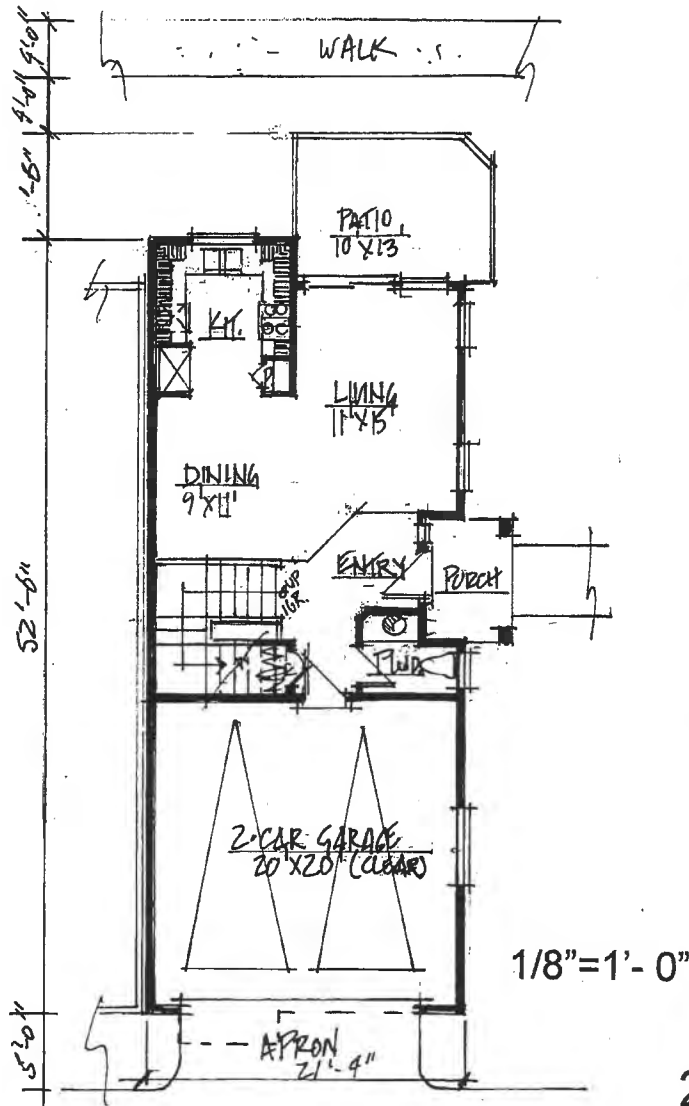
Interior Unit

1579 sq. ft.

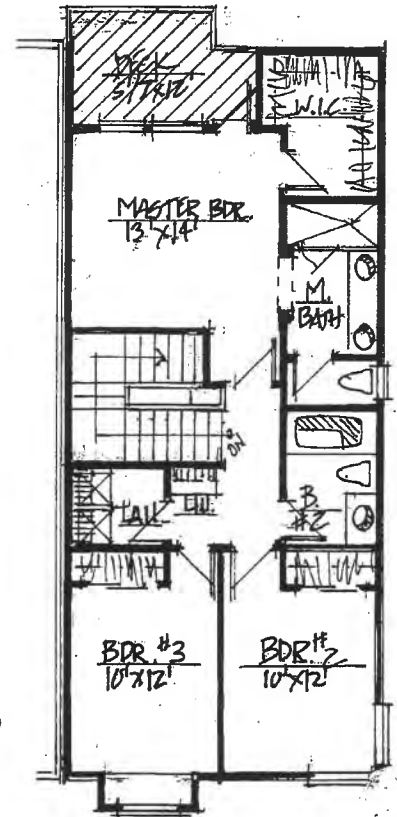
3 BDR./2.5 B/Loft
TOWNHOME



5/14/21



1st. Floor - 612 sq. ft.



2nd. Floor - 917 sq. ft.

PLAN - 1

End Unit (only)

1529 sq. ft.

3 BDR./2.5 B

TOWNHOME



5/14/21

RED LEAF INVESTMENTS

COLLEGE PARKWAY TOWNHOMES



CARSON CITY

Capital of Nevada

[Treasurer Home](#) [Assessor Data Inquiry](#) [Back to Last Page](#)

Secured Tax Inquiry Detail for Parcel # 007-462-16

Property Location: W COLLEGE PKWY
 Billed to: FOLEY, JAMES B & SANDRA M TRUST
 % JAMES B & SANDRA M FOLEY, TT
 4455 COMBS CANYON RD
 CARSON CITY, NV 89703-0000

Tax Year: 2019-20
 Roll #: 006046
 District: 2.4
 Tax Service:
 Land Use Code: 140

[Code Table](#)

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
Current Year					
08/19/19	1,969.70		1,969.70	1,969.70	.00
10/07/19	1,967.00		1,967.00	1,967.00	.00
01/06/20	1,967.00		1,967.00	1,967.00	.00
03/02/20	1,967.00		1,967.00	1,967.00	.00
Totals:	7,870.70	.00	7,870.70	7,870.70	

No Taxes Owning

[History](#)

Additional Information

	2019-20	2018-19	2017-18	2016-17	2015-16
Tax Rate	3.5700	3.5700	3.5700	3.5200	3.5200
Tax Cap Percent	4.8	4.2	2.6	2	3.2



CARSON CITY

Capital of Nevada

[Treasurer Home](#)
[Assessor Data Inquiry](#)
[Back to Last Page](#)

Secured Tax Inquiry Detail for Parcel # 007-462-17

Property Location: 1147 W COLLEGE PKWY
 Billed to: FOLEY, JAMES B & SANDRA M TRUST
 % JAMES & SANDRA FOLEY, TTEES
 4455 COMBS CANYON RD
 CARSON CITY, NV 89703-0000

Tax Year: 2019-20
 Roll #: 006047
 District: 2.4
 Tax Service:
 Land Use Code: 140

[Code Table](#)

Outstanding Taxes:

Prior Year	Tax	Penalty/Interest	Total	Amount Paid	Total Due
Current Year					
08/19/19	849.63		849.63	849.63	.00
10/07/19	849.00		849.00	849.00	.00
01/06/20	849.00		849.00	849.00	.00
03/02/20	849.00		849.00	849.00	.00
Totals:	3,396.63	.00	3,396.63	3,396.63	

No Taxes Owing

[History](#)

Additional Information

	2019-20	2018-19	2017-18	2016-17	2015-16
Tax Rate	3.5700	3.5700	3.5700	3.5200	3.5200
Tax Cap Percent	4.8	4.2	2.6	.2	3.2



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PRELIMINARY SEWER REPORT

FOR

SILVER OAK @ COLLEGE PKWY

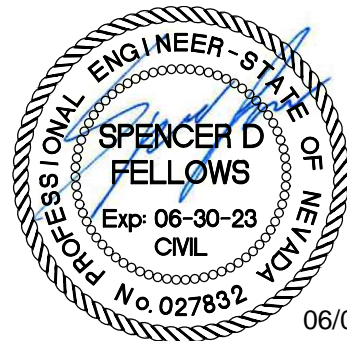
CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge St.
Suite 400
Reno, Nevada 89501



06/08/21

Project: LILCCNV06

Date: June 8, 2021

Table of Contents

1	INTRODUCTION	1
2	PROPOSED ALIGNMENT AND QUANTITY OF SERVICE	1
3	CONCLUSION	3

Appendices

APPENDIX A - FLOWMASTER FLOW DATA

Figures

FIGURE 1 – VICINITY MAP
FIGURE 2 – SEWER MAIN LAYOUT

1 INTRODUCTION

1.1 Purpose of Analysis

This report represents a preliminary analysis of the proposed sanitary sewer system for Silver Oak @ College Pkwy. The purpose of this analysis is to establish peak flow rates and evaluate proposed sanitary sewer sizes for the subject property.

1.2 Project Location and Description

The proposed Silver Oak @ College Pkwy development is approximately 3.46 acres in size and located in the northwestern portion of Carson City and is west of North Carson Street, south of West College Parkway, and east of Oak Ridge Drive. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Vicinity Map). The project site is within the existing parcels 007-462-16 and 007-462-17.

Figure 2, the Sewer Main Layout, illustrates the location and orientation of the project and its proposed lots and access locations.

1.3 Project Description

The Silver Oak @ College Pkwy development is a proposed subdivision which consists of 52 single-family residential units. The project site is currently zoned NB-P.

2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE

2.1 Project Wastewater Collection System

Sewage flow from Silver Oak @ College Pkwy will be conveyed via public 8" diameter PVC SDR-35 sewer mains to the collection point (manhole) located near the east corner of the development. The sanitary sewer main within the development flows east to the connection of the existing 8-inch sanitary sewer located on west edge of Silver Oak Phase 21. All of the mains within the proposed subdivision are located within the common area which will have a blanket public utility easement. The proposed sizes and locations of the sanitary sewers can be found on the *Sanitary Sewer Plan*, which is included in this report.

The minimum and maximum proposed slopes used within this development are 0.50% and 2.00%. The slope has been checked to ensure that it is within the Carson City required velocity of 2 fps and 10 fps during the peak flow condition.

2.2 Estimated Peak Sewage Flows

Calculations for the design of the sewer system were performed in accordance with Chapter 10, Section 11.243 of the Recommended Standards for Wastewater Facilities (10-State Standards), 2014 Edition and Division 15, Section 15.3.2 of the Carson City Development Standards and Carson City's Sewer System Master Plan Update, July 2017, by Atkins. According to analysis, the actual per capita flow was 148 gal/cap/day with a peaking factor ranging from 1.5 – 6.0 in wet weather conditions. Table 1 in the 10-State Standards suggests using a peaking factor of 2.5 based on the population of Carson City, Nevada. For this

analysis, the flow factors used in the calculations are 2.5 capita per dwelling unit for a single-family residential lot and 150 gal/cap/day to calculate average daily flow. A peaking factor of 2.5 is then applied to the daily average flow to compute the peak flow used in the design of the sanitary sewer. Complete peak flow calculations for Silver Oak @ College Pkwy are included within this report. The following table summarizes the results of the calculations of the peak daily flows for the residential subdivision:

Units	Capita/DU	GPD/ Capita	Peaking Factor	Peak Flow (gpd)	Peak Flow (cfs)
52	2.5	150	2.5	48,750	0.08
			Total	48,750	0.08

2.3 Proposed Sewer Mains

Basic normal depth calculations for the proposed 8-inch sewer mains were done using open-channel pipe flow theory, the Manning’s Formula, and *Bentley FlowMaster® V8i® (FlowMaster)* software. A Manning’s Coefficient of 0.013 (assuming PVC pipe material) was used in all of these calculations. The *FlowMaster* worksheets that demonstrate these calculations are included within this report (Appendix A).

Per Carson City Development Standards, sewer mains are considered at capacity when peak flow is at $d/D=0.50$ for sewer mains that are 15” or less in diameter (Div. 15, Section 15.3.2.a.). In addition, the minimum velocity of 2 fps and the maximum velocity of 10 fps are required design conditions (Div 15, Section 15.3.2.e.). The *FlowMaster* calculations included within this report demonstrate that the various velocities of PVC sewer pipe at a d/D of 50% at the minimum and maximum slopes mentioned above are within the requirements for Carson City. The velocity of an 8-inch sewer main is 2.45 fps for a minimum pipe slope of 0.50%. All of the calculated velocities described above are within the Carson City required ranged of 2 fps to 10 fps. These velocity calculations can be found in the *FlowMaster* calculations included within this report.

In addition to evaluating the sewer velocities within this development, this report also analyzes maximum capacity within the proposed sewer pipes. As described above, the peak flow within the sewer main must remain at or below a normal depth of 50%. As shown in the *FlowMaster* calculations included within this report, an 8-inch PVC sewer at 0.50% can convey 276,116 gpd (0.43 cfs) at a maximum depth of 50%. Therefore, the contribution by the proposed Silver Oak @ College Pkwy will be less than the 50% full capacity requirement, and the contribution will be 48,750 gpd (0.08 cfs), which is less than the maximum allowed capacity of an 8-inch sewer. The size and locations of the proposed sanitary sewers mentioned above can be found on the *Sanitary Sewer Plan*, which is included in this report.

Carson City provided the estimated flow the existing sewer mains adjacent to the property which consists of a 8-inch sewer main to the south of the property flowing from west to east is at 0.05 (d/D) and a 15-inch sewer main to the west of the property flow south to north is at 0.30 (d/D). Connecting to the 8-inch sewer main, increases this flow to 0.22. Since connecting to either sewer pipe will contribute flow to the 12-inch pipe in between North Carson Street and Northgate Lane, which is at capacity, the project will need to contribute a pro-rated amount of 1.6% of the estimate improvement cost per Carson City’s MPR meeting comments.

3 CONCLUSION

The 8-inch sanitary sewer mains proposed herein will adequately serve the project as planned. The attached *FlowMaster* worksheet calculates the maximum capacity of the proposed 8-inch sewer mains at a minimum slope of 0.50% in accordance with the requirements of Carson City. The 8-inch sewer main at 0.50% have a capacity of 276,116 gpd (0.43 cfs) at a maximum depth of 50%, which will be able to adequately serve Silver Oak @ College Pkwy.

The proposed sanitary sewerage system within this report for the Silver Oak @ College Pkwy development has adequate capacity to carry the subject property's peak sewage flow in conformance with the guidelines outlined in the Carson City Development Standards and the Recommended Standards for Wastewater Facilities (10-State Standards), 2014, and the Sewer System Master Plan Update, July 2017, by Atkins.

SANITARY SEWER CALCULATIONS FOR SILVER OAK @ COLLEGE PKWY

The following calculations were performed in accordance with Chapter 10, Section 11.243 of the Recommended Standards for Wastewater Facilities, 2014 ed. (Ten-States Standards), Carson City Development Standards, and the Sewer System Master Plan Update, July 2017, by Atkins:

2.5 capita/dwelling unit
150 gal/capita/day

The site will consist of 149 dwelling units; therefore, the following equations are used:

Average flow = num. of dwellings * capita/dwelling * GPCD

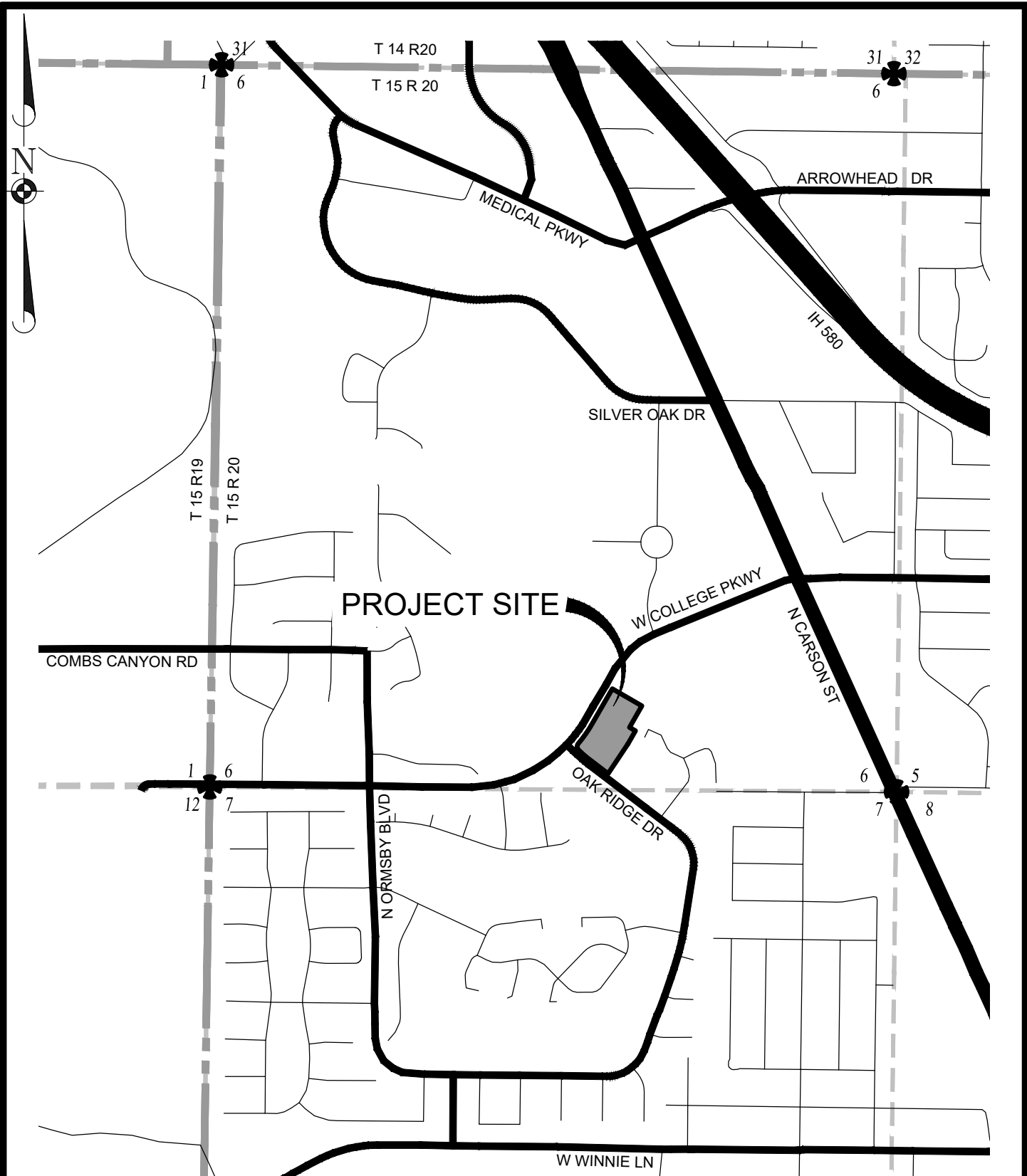
Average flow = 52 * 2.5 * 150 = 19,500 gpd = 0.03 cfs

Peak flow = Average flow * peaking factor

Peaking Factor = $(18 + P^{1/2}) / (4 + P^{1/2})$ where P = population in thousands (or use value off Table 1 based on population). The maximum peaking factor is 4.2 according to Table 1 in the 10-State Standards. Based on the population of Carson City, Nevada, a peaking factor of 2.5 is acceptable.

Peak flow = 19,500 * 2.5 = 48,750 gpd = 0.08 cfs

The design shall be for the peak flow; therefore, the design flow is 0.08 cfs.



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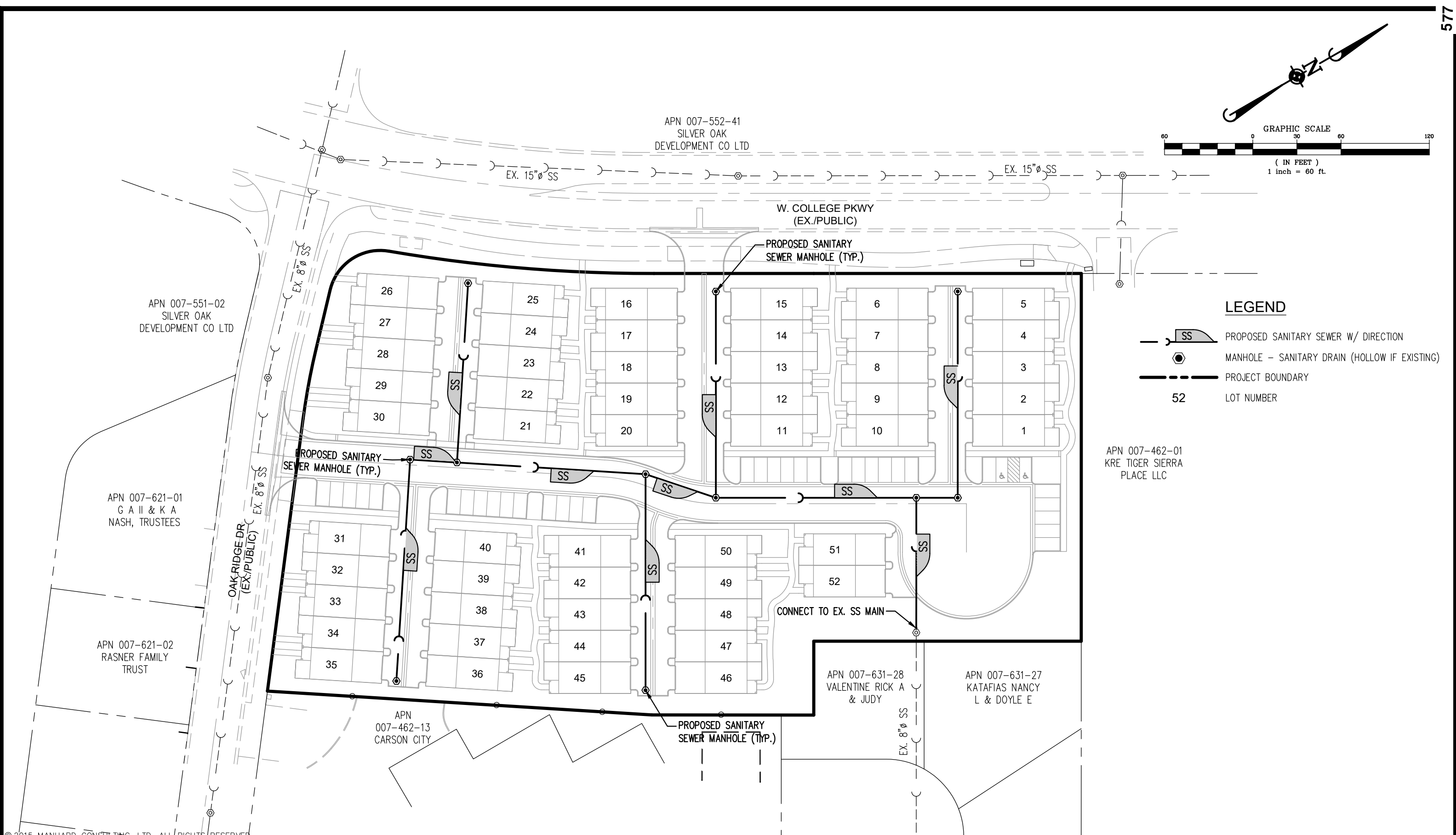
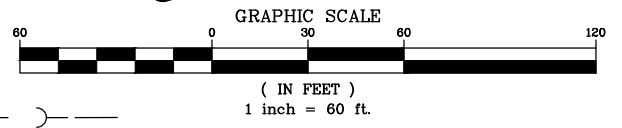
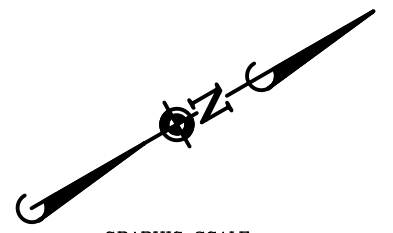
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SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S.

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1 OF **2**
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LEGEND

- PROPOSED SANITARY SEWER W/ DIRECTION
- MANHOLE - SANITARY DRAIN (HOLLOW IF EXISTING)
- PROJECT BOUNDARY
- 52** LOT NUMBER

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DATE	REVISIONS	DRAWN BY	CHECK BY

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SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
FIGURE 2 - SEWER MAIN LAYOUT

DRAWN BY: SDF	DATE: JUN 2021	SCALE: 1"=60'	CODE: LIL.CCNV06
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APPENDIX A

FlowMaster Flow Data

Worksheet for 8" Sewer at 0.50% - Max Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Normal Depth	4.00	in
Diameter	8.00	in

Results

Discharge	276116.36	gal/day
Flow Area	0.17	ft ²
Wetted Perimeter	1.05	ft
Hydraulic Radius	2.00	in
Top Width	0.67	ft
Critical Depth	3.66	in
Percent Full	50.0	%
Critical Slope	0.00680	ft/ft
Velocity	2.45	ft/s
Velocity Head	0.09	ft
Specific Energy	0.43	ft
Froude Number	0.84	
Maximum Discharge	0.92	ft ³ /s
Discharge Full	0.85	ft ³ /s
Slope Full	0.00125	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.00	%
Downstream Velocity	Infinity	ft/s

Worksheet for 8" Sewer at 0.50% - Max Capacity

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	in
Critical Depth	3.66	in
Channel Slope	0.00500	ft/ft
Critical Slope	0.00680	ft/ft

Worksheet for 8" Sewer at 0.50% - 52 Lots

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	8.00	in
Discharge	48750.00	gal/day

Results

Normal Depth	1.61	in
Flow Area	0.05	ft ²
Wetted Perimeter	0.62	ft
Hydraulic Radius	0.97	in
Top Width	0.53	ft
Critical Depth	1.50	in
Percent Full	20.1	%
Critical Slope	0.00664	ft/ft
Velocity	1.51	ft/s
Velocity Head	0.04	ft
Specific Energy	0.17	ft
Froude Number	0.87	
Maximum Discharge	0.92	ft ³ /s
Discharge Full	0.85	ft ³ /s
Slope Full	0.00004	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	20.08	%
Downstream Velocity	Infinity	ft/s

Worksheet for 8" Sewer at 0.50% - 52 Lots

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.61	in
Critical Depth	1.50	in
Channel Slope	0.00500	ft/ft
Critical Slope	0.00664	ft/ft

Worksheet for 8" Sewer at 0.50% - 0.05 d/D plus 52 Lots

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	8.00	in
Discharge	55952.00	gal/day

Results

Normal Depth	1.72	in
Flow Area	0.06	ft ²
Wetted Perimeter	0.64	ft
Hydraulic Radius	1.03	in
Top Width	0.55	ft
Critical Depth	1.61	in
Percent Full	21.5	%
Critical Slope	0.00656	ft/ft
Velocity	1.57	ft/s
Velocity Head	0.04	ft
Specific Energy	0.18	ft
Froude Number	0.87	
Maximum Discharge	0.92	ft ³ /s
Discharge Full	0.85	ft ³ /s
Slope Full	0.00005	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	21.49	%
Downstream Velocity	Infinity	ft/s

Worksheet for 8" Sewer at 0.50% - 0.05 d/D plus 52 Lots

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.72	in
Critical Depth	1.61	in
Channel Slope	0.00500	ft/ft
Critical Slope	0.00656	ft/ft



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PRELIMINARY WATER MAIN ANALYSIS REPORT

FOR

SILVER OAK @ COLLEGE PKWY

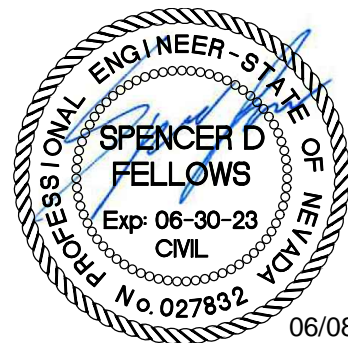
CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge Street, Suite 400
Reno, Nevada 89501



06/08/21

Project: LIL.CCNV06

Date: June 8, 2021

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3	CONCLUSION	3

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APPENDIX B – FIRE FLOW DATA

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FIGURE 2 – WATER MAIN LAYOUT

Tables

TABLE 1 – SILVER OAK @ COLLEGE PKWY PRESSURE SUMMARY

1 INTRODUCTION

1.1 Purpose of Analysis

This report represents a preliminary analysis of the proposed water main system for the Silver Oak @ College Pkwy. The report describes the water system and the criteria used for design. The purpose of this analysis is to establish the adequacy of the proposed water main pipe diameters and layout to meet the needs of the development.

1.2 Project Location and Description

The proposed Silver Oak @ College Pkwy development is approximately 3.46 acres in size and located in the northwestern portion of Carson City and is west of North Carson Street, south of West College Parkway, and east of Oak Ridge Drive. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian (refer to Figure 1, Vicinity Map). The project site is within the existing parcels 007-462-16 and 007-462-17.

Figure 2, the Water Main Layout, illustrates the location and orientation of the project and its proposed lots and roadway locations.

1.3 Project Description

The Silver Oak @ College Pkwy development is a proposed subdivision which consists of 52 single-family residential units. The project site is currently zoned within the NB-P zoning district. For purposes of this water main analysis the average lot size for this development is taken to be approximately 1,237 sf.

1.4 Methodologies

The Silver Oak @ College Pkwy water main analysis was analyzed using WaterGEMS, which employs the Hazen-Williams Method to determine headloss. The Hazen-Williams formula uses a pipe carrying capacity factor (C) based on piping materials. For the Silver Oak @ College Pkwy analysis, a C-value of 135 was used to model the proposed water main system.

2 PROPOSED ALIGNMENT AND QUANTITY OF SERVICE

2.1 Project Water Main System

Two connection points to the existing water system are being utilized for this project. The first connection point occurs on Oak Ridge Drive to the south of the project site and the second connection is to the west of the project on West College Parkway. At these points, a proposed 8" water main will connect to an existing stub or hot-tapped in the existing water main. This will loop the existing 8" water mains that surround the property. The Silver Oak @ College Pkwy development will be served by 8" water main that creates a water system loop for the project (refer to Figure 2, *Water Main Layout*).

2.2 Water Main Analysis

Pressure test data was provided by Carson City with the water main analysis. This hydrant test is located along West College Parkway near the project. See Appendix B for the Fire Flow Data.

Since this development is expanding the existing water system of Carson City with over 500 residential units, the average per lot demand (1.5 gpm/unit) was used in the analysis of the water main system from NAC 445A.66735(d). The average per lot demand of 1.5 gpm/unit was used instead of 1.0 gpm/unit to have a more conservative analysis even though the proposed services will be metered. A maximum day demand factor of 2.0 was applied to the average day demand to obtain the maximum day demand (per *Tentative Addendum*). The peak hour demand was calculated by applying a 1.5 global demand multiplier to the maximum day demands.

Irrigation demands are not known at this time for the park located in the northeast corner of the development. An assumed demand of 2 gpm will be used for the irrigation meter based on Arbor Villas irrigations demands to the west. This is an estimate and will be adjusted in final design.

In a separate analysis, a 1000 gpm fire flow requirement was applied to all the hydrants in the system. This 1000 gpm fire flow requirement was obtained from Section B105 and Table B105.1 of the 2018 International Fire Code. As a conservative analysis, it was assumed that all of the irrigation zones were active at the same time.

The following table provides the high and low pressures that were calculated using WaterGEMS (refer to Appendix A for WaterGEMS output) for each demand condition:

Table 1: Silver Oak @ College Pkwy Pressure Summary

Condition	High Pressure (psi)	Low Pressure (psi)
Max Day	70	67
Peak Hour	70	67
Fire Flow	68	61

The maximum day demand low pressure of 61 psi is above the NAC minimum of 40 psi. The peak hour demand low pressure is above the minimum of 60 psi listed in the *Carson City Development Standards – Title 18*. The pressure for the various scenarios can be found in the WaterGEMS output included in Appendix A of this report. The fire flow low pressures indicated in the table above are well above the NAC minimum requirement of 20 psi. The pressure at the hydrants EH-1 through H-1 can be found in the WaterGEMS output included in Appendix A of this report.

3 CONCLUSION

The analysis of the water system shows that the pipe sizes and layouts within Silver Oak @ College Pkwy are adequately designed to meet the demands of the development. The WaterGEMS analysis shows that the pressures are greater than the minimum requirement and below the maximum requirement for Carson City and the NAC requirements. Silver Oak @ College Pkwy complies and meets the minimum pressures per NAC 445A.6711 during maximum day, peak hour, and fire flow conditions.

WATER DEMAND CALCULATIONS FOR SILVER OAK @ COLLEGE PKWY

Number of units = 52

Average per lot demand = 1.5 gpm/lot

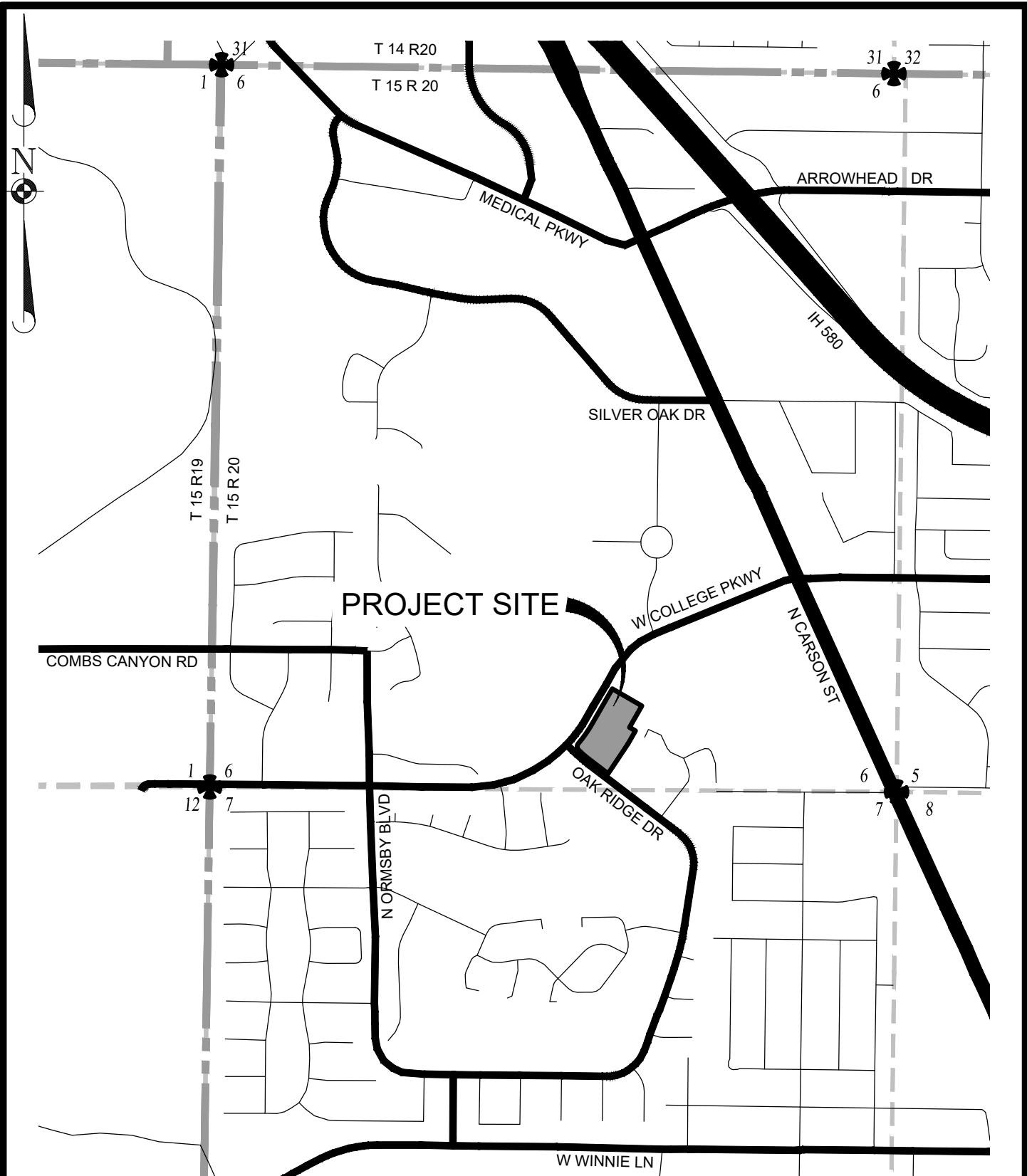
Maximum day demand factor = 2.0

Peak hour global demand multiplier = 1.5

Average demand = $52 * 1.5 = 78$ gpm

Maximum day demand = $78 * 2.0 = 156$ gpm

Peak hour demand = $156 * 1.5 = 234$ gpm



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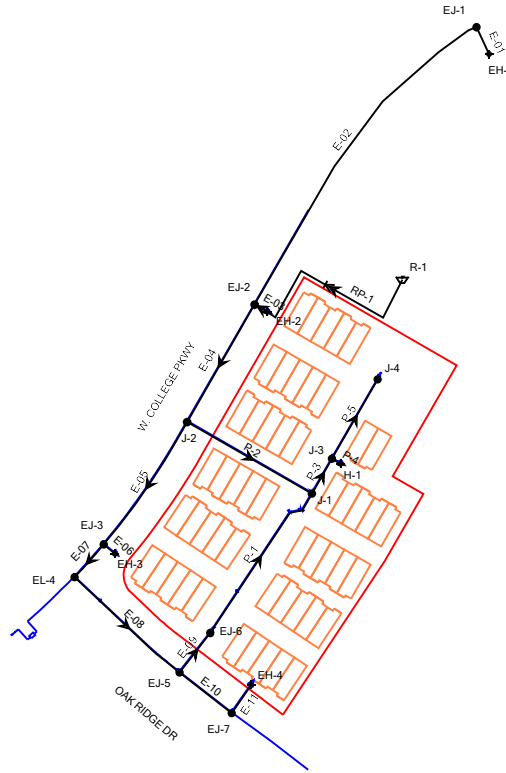
SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S.

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1 OF **2**
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Figure 2 - Watermain Layout



APPENDIX A

WaterGEMS Output

Scenario Summary Report

Scenario: ADD

Scenario Summary	
ID	76
Label	ADD
Notes	
Active Topology	<I> Base Active Topology
Physical	<I> Base Physical
Demand	ADD
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	<I> Base Fire Flow
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	AVERAGE DAY
Transient Solver Calculation Options	<I> 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: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EL-4	4,753.30	0.0	4,899.96	63
EJ-3	4,750.51	0.0	4,899.96	65
EJ-5	4,745.39	0.0	4,899.96	67
EJ-6	4,744.40	0.0	4,899.96	67
J-2	4,744.30	0.0	4,899.96	67
EJ-7	4,742.62	0.0	4,899.96	68
J-1	4,741.40	60.0	4,899.95	69
J-3	4,740.00	0.0	4,899.95	69
EJ-2	4,738.88	0.0	4,899.96	70
J-4	4,736.90	20.0	4,899.94	71
EJ-1	4,731.00	0.0	4,899.96	73

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)
E-01	42	EJ-1	EH-1	135.0	0.0	0.00
E-02	512	EJ-2	EJ-1	135.0	0.0	0.00
E-03	21	EJ-2	EH-2	135.0	80.0	0.91
E-04	192	J-2	EJ-2	135.0	80.0	0.23
E-05	210	EJ-3	J-2	135.0	32.2	0.09
E-06	21	EJ-3	EH-3	135.0	0.0	0.00
E-07	62	EL-4	EJ-3	135.0	32.2	0.09
E-08	201	EL-4	EJ-5	135.0	32.2	0.13
E-09	71	EJ-5	EJ-6	135.0	32.2	0.21
E-10	94	EJ-5	EJ-7	135.0	0.0	0.00
E-11	49	EJ-7	EH-4	135.0	0.0	0.00
P-1	250	EJ-6	J-1	135.0	32.2	0.21
P-2	204	J-1	J-2	135.0	47.8	0.31
P-3	57	J-1	J-3	135.0	20.0	0.13
P-4	14	J-3	H-1	135.0	0.0	0.00
P-5	130	J-3	J-4	135.0	20.0	0.23
RP-1	283	R-1	EH-2	135.0	80.0	0.23

Scenario Summary Report

Scenario: MDD

Scenario Summary			
ID	81		
Label	MDD		
Notes			
Active Topology	<I> Base Active Topology		
Physical	<I> Base Physical		
Demand	ADD		
Initial Settings	<I> Base Initial Settings		
Operational	<I> Base Operational		
Age	<I> Base Age		
Constituent	<I> Base Constituent		
Trace	<I> Base Trace		
Fire Flow	<I> Base Fire Flow		
Energy Cost	<I> Base Energy Cost		
Transient	<I> Base Transient		
Pressure Dependent Demand	<I> Base Pressure Dependent Demand		
Failure History	<I> Base Failure History		
SCADA	<I> Base SCADA		
User Data Extensions	<I> Base User Data Extensions		
Steady State/EPS Solver Calculation Options	MAX DAY		
Transient Solver Calculation Options	<I> 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: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EL-4	4,753.30	0.0	4,899.85	63
EJ-3	4,750.51	0.0	4,899.85	65
EJ-5	4,745.39	0.0	4,899.85	67
EJ-6	4,744.40	0.0	4,899.84	67
J-2	4,744.30	0.0	4,899.86	67
EJ-7	4,742.62	0.0	4,899.85	68
J-1	4,741.40	120.0	4,899.81	69
J-3	4,740.00	0.0	4,899.81	69
EJ-2	4,738.88	0.0	4,899.87	70
J-4	4,736.90	40.0	4,899.79	70
EJ-1	4,731.00	0.0	4,899.87	73

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)
E-01	42	EJ-1	EH-1	135.0	0.0	0.00
E-02	512	EJ-2	EJ-1	135.0	0.0	0.00
E-03	21	EJ-2	EH-2	135.0	160.0	1.82
E-04	192	J-2	EJ-2	135.0	160.0	0.45
E-05	210	EJ-3	J-2	135.0	64.3	0.18
E-06	21	EJ-3	EH-3	135.0	0.0	0.00
E-07	62	EL-4	EJ-3	135.0	64.3	0.18
E-08	201	EL-4	EJ-5	135.0	64.3	0.26
E-09	71	EJ-5	EJ-6	135.0	64.3	0.41
E-10	94	EJ-5	EJ-7	135.0	0.0	0.00
E-11	49	EJ-7	EH-4	135.0	0.0	0.00
P-1	250	EJ-6	J-1	135.0	64.3	0.41
P-2	204	J-1	J-2	135.0	95.7	0.61
P-3	57	J-1	J-3	135.0	40.0	0.26
P-4	14	J-3	H-1	135.0	0.0	0.00
P-5	130	J-3	J-4	135.0	40.0	0.45
RP-1	283	R-1	EH-2	135.0	160.0	0.45

Scenario Summary Report

Scenario: MDD plus FF

Scenario Summary

ID	82
Label	MDD plus FF
Notes	
Active Topology	<I> Base Active Topology
Physical	<I> Base Physical
Demand	ADD
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	Fire Flow
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	MAX DAY PLUS FIRE
Transient Solver Calculation Options	<I> 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	Fire Flow

FlexTable: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EL-4	4,753.30	0.0	4,899.85	63
EJ-3	4,750.51	0.0	4,899.85	65
EJ-5	4,745.39	0.0	4,899.85	67
EJ-6	4,744.40	0.0	4,899.84	67
J-2	4,744.30	0.0	4,899.86	67
EJ-7	4,742.62	0.0	4,899.85	68
J-1	4,741.40	120.0	4,899.81	69
J-3	4,740.00	0.0	4,899.81	69
EJ-2	4,738.88	0.0	4,899.87	70
J-4	4,736.90	40.0	4,899.79	70
EJ-1	4,731.00	0.0	4,899.87	73

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)
E-01	42	EJ-1	EH-1	135.0	0.0	0.00
E-02	512	EJ-2	EJ-1	135.0	0.0	0.00
E-03	21	EJ-2	EH-2	135.0	160.0	1.82
E-04	192	J-2	EJ-2	135.0	160.0	0.45
E-05	210	EJ-3	J-2	135.0	64.3	0.18
E-06	21	EJ-3	EH-3	135.0	0.0	0.00
E-07	62	EL-4	EJ-3	135.0	64.3	0.18
E-08	201	EL-4	EJ-5	135.0	64.3	0.26
E-09	71	EJ-5	EJ-6	135.0	64.3	0.41
E-10	94	EJ-5	EJ-7	135.0	0.0	0.00
E-11	49	EJ-7	EH-4	135.0	0.0	0.00
P-1	250	EJ-6	J-1	135.0	64.3	0.41
P-2	204	J-1	J-2	135.0	95.7	0.61
P-3	57	J-1	J-3	135.0	40.0	0.26
P-4	14	J-3	H-1	135.0	0.0	0.00
P-5	130	J-3	J-4	135.0	40.0	0.45
RP-1	283	R-1	EH-2	135.0	160.0	0.45

Fire Flow Node FlexTable: Fire Flow Report

Label	Fire Flow Iterations	Flow (Total Needed) (gpm)	Pressure (Calculated Residual @ Total Flow Needed) (psi)	Fire Flow (Available) (gpm)	Pressure (Calculated Residual) (psi)
EH-1	4	1,000.0	69	4,316.5	20
EH-2	6	1,000.0	68	7,411.2	26
EH-3	4	1,000.0	61	4,516.8	20
EH-4	4	1,000.0	64	3,780.1	20
H-1	4	1,000.0	65	4,205.3	20

Scenario Summary Report

Scenario: PHD

Scenario Summary	
ID	84
Label	PHD
Notes	
Active Topology	<I> Base Active Topology
Physical	<I> Base Physical
Demand	ADD
Initial Settings	<I> Base Initial Settings
Operational	<I> Base Operational
Age	<I> Base Age
Constituent	<I> Base Constituent
Trace	<I> Base Trace
Fire Flow	<I> Base Fire Flow
Energy Cost	<I> Base Energy Cost
Transient	<I> Base Transient
Pressure Dependent Demand	<I> Base Pressure Dependent Demand
Failure History	<I> Base Failure History
SCADA	<I> Base SCADA
User Data Extensions	<I> Base User Data Extensions
Steady State/EPS Solver Calculation Options	PEAK HOUR
Transient Solver Calculation Options	<I> 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: Junction Table

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
EL-4	4,753.30	0.0	4,899.69	63
EJ-3	4,750.51	0.0	4,899.69	65
EJ-5	4,745.39	0.0	4,899.67	67
EJ-6	4,744.40	0.0	4,899.66	67
J-2	4,744.30	0.0	4,899.70	67
EJ-7	4,742.62	0.0	4,899.67	68
J-1	4,741.40	180.0	4,899.60	68
J-3	4,740.00	0.0	4,899.60	69
EJ-2	4,738.88	0.0	4,899.73	70
J-4	4,736.90	60.0	4,899.55	70
EJ-1	4,731.00	0.0	4,899.73	73

FlexTable: Pipe Table

Label	Length (Scaled) (ft)	Start Node	Stop Node	Hazen-Williams C	Flow (Absolute) (gpm)	Velocity (ft/s)
E-01	42	EJ-1	EH-1	135.0	0.0	0.00
E-02	512	EJ-2	EJ-1	135.0	0.0	0.00
E-03	21	EJ-2	EH-2	135.0	240.0	2.72
E-04	192	J-2	EJ-2	135.0	240.0	0.68
E-05	210	EJ-3	J-2	135.0	96.5	0.27
E-06	21	EJ-3	EH-3	135.0	0.0	0.00
E-07	62	EL-4	EJ-3	135.0	96.5	0.27
E-08	201	EL-4	EJ-5	135.0	96.5	0.39
E-09	71	EJ-5	EJ-6	135.0	96.5	0.62
E-10	94	EJ-5	EJ-7	135.0	0.0	0.00
E-11	49	EJ-7	EH-4	135.0	0.0	0.00
P-1	250	EJ-6	J-1	135.0	96.5	0.62
P-2	204	J-1	J-2	135.0	143.5	0.92
P-3	57	J-1	J-3	135.0	60.0	0.38
P-4	14	J-3	H-1	135.0	0.0	0.00
P-5	130	J-3	J-4	135.0	60.0	0.68
RP-1	283	R-1	EH-2	135.0	240.0	0.68

APPENDIX B

Fire Flow Data

Fire Flow Test Data Sheet



Location of Test (Street and Cross Street): College Parkway and Oak Ridge Drive
 Address Nearest Residual Hydrant: 1147 W College Parkway
 Test Date: 5/19/2021 Test Time: _____
 Testing Personnel: CH, DR, NT
 Pressure Zone: 4960 Main Size: 12"
 Comments: _____

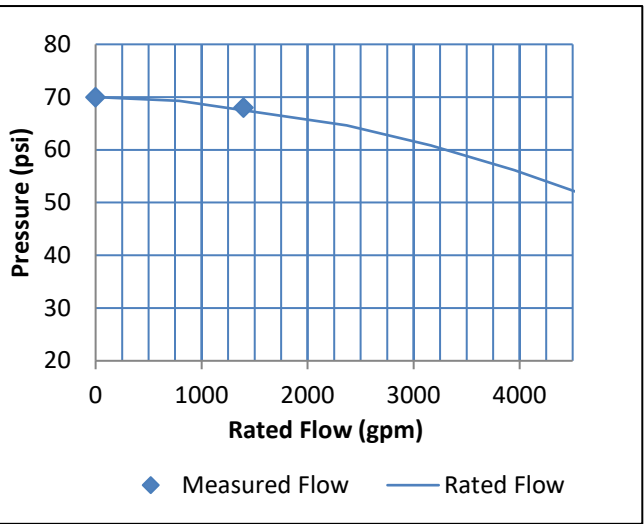
Test Results:

Residual Hydrant		Flow Hydrant(s)					
Static:	70 psi		Testing Apparatus	Pitot Pressure (psi)	Discharge Diameter (in)	Outlet Coeff. (c)	Pitot Flow (gpm)
Residual:	68 psi						
Pressure Drop:	2 psi	Flow 1	HM2	19	2	1.307	680
	3 %	Flow 2	HM1	21	2	1.307	715
		Flow 3					
Total							1395

Area Map



Rated Flow



Rated Pressure (for Rated Capacity Calculation) 20 psi
Rated Capacity at 20 psi residual pressure. 7,900 gpm

Based on NFPA 291 - 2019 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: 721
 Data Sheet File Name: College Pkwy-Oak Ridge1.pdf



Manhard™

CONSULTING LTD

CONCEPTUAL DRAINAGE STUDY

FOR

SILVER OAK @ COLLEGE PKWY

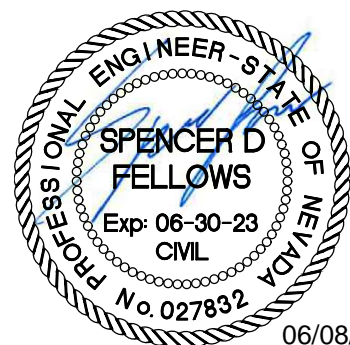
CARSON CITY, NEVADA

Prepared for:

Lanturn Investments
Mr. Mark Turner
3075 College Dr.
Carson City, NV 89703

Prepared by:

Manhard Consulting Ltd.
241 Ridge Street, Suite 400
Reno, NV 89501



06/08/21

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III. PROPOSED DRAINAGE FACILITIES

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FIGURE 2 – EXISTING HYDROLOGIC CONDITIONS

FIGURE 3 – PROPOSED HYDROLOGIC CONDITIONS

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**APPENDIX B – MASTER DRAINAGE STUDY FOR SILVER OAK
DEVELOPMENT BY SIERRA RESOURCE ENGINEERING, INC.
DATED MARCH 4, 1994**

I. INTRODUCTION

- B.** The following report is a Conceptual Drainage Study for Silver Oak @ College Pkwy dated June 2021.
- C.** The contact person for the preparation of this report is Spencer D. Fellows, P.E. at Manhard Consulting, 775-746-3500.
- D.** The project consists of 52 single family units, common areas, and associated roadways.
- E.** The existing Silver Oak @ College Pkwy parcel numbers are APN 007-462-16 and 007-462-17 and are 3.46 acres in combined size. The parcel slopes from the west to the east at approximately 3.5% within the confines of the project site. The proposed project site is situated within the Southwest 1/4 of the Southeast 1/4 of Section 6, Township 15 North, and Range 20 East of the Mount Diablo Meridian in Carson City, Nevada. Currently, the parcel is undeveloped and is proposed to be fully developed.

The subject property is currently zoned NB-P within Carson City and is adjacent to developed areas:

North: Sierra Place Senior Living, zoned NB-P

South: Silver Oak – Phase 17, zoned SF12-P

East: John Mankins Park and Silver Oak – Phase 21, zoned SF12-P

West: Silver Oak Golf Course, zoned SF12-P

- F.** Reference the included Vicinity Map (Figure #1).

II EXISTING AND PROPOSED HYDROLOGY

- A.** The intent of this hydrology study is to set a basis for the existing conditions for comparison to the proposed conditions, and prove that the discharge created by the proposed development was alleviated via a detention structure prior to discharging into the existing storm drain main located at the east corner of the proposed project site.

There are a total of 2 existing drainage basins, 2 proposed drainage basins, and 1 detention basin for the proposed project. Basins are represented by their boundary as well as existing and proposed conditions. Reference Figure 2 (Existing Hydrologic Conditions) and Figure 3 (Proposed Hydrologic Conditions) for a visual representation of existing basins, proposed basins, and detention basin.

- B.** The Rational Method was used to determine storm flow discharge. Data used for the Rational Method was derived from the following: NOAA Atlas 14 precipitation intensity values for a 10-minute time of concentration and runoff coefficients are from the 2009 Truckee Meadows Regional Drainage Manual.

The Modified Rational Method was used to determine the storage volume required for the increase of peak storm runoff. Data used for the Modified Rational Method was derived from the following: NOAA Atlas 14 precipitation intensity values for the 5-year and 100-year storm, and runoff curve numbers are from the 2009 Truckee Meadows Regional Drainage Manual.

The following is a description of each basin and its data characteristics. E. represents the existing basin and P. represents the proposed basin.

BASIN E-1 – The basin is 1.15 acres in size. A runoff coefficient of 0.20 was used for the 5-year storm event, and a runoff coefficient value of 0.50 was used for the 100-year storm event (based on undeveloped range area) for the existing conditions. Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge sheet flows across the proposed project site in the existing condition in a southwest to northeast direction at approximately 3.5% discharging into John Mankins Park and the existing concrete valley gutter surrounding Silver Oak Phase 21.

BASIN E-2 – The basin is 2.31 acres in size. A runoff coefficient of 0.20 was used for the 5-year storm event, and a runoff coefficient value of 0.50 was used for the 100-year storm event (based on undeveloped range area) for the existing conditions. Using a 10-

minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge sheet flows across the proposed project site in the existing condition in a southwest to northeast direction at approximately 3.5% discharging into the existing concrete valley gutter surrounding Silver Oak Phase 21.

BASIN P-1 – The basins total 1.08 acres in size. A runoff coefficient of 0.60 was used for the 5-year storm event, and a runoff coefficient value of 0.78 was used for the 100-year storm event (based 1/8-acre or Less (Multi-Unit)). Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge flows along the proposed driveways at a slope of 0.5% to 4.0% and enters the proposed storm drain network at a catch basin located in the east corner of the proposed project. The discharge will exit in the existing storm drain main located in the east corner of the proposed project site.

BASIN P-2 – The basins total 2.14 acres in size. A runoff coefficient of 0.60 was used for the 5-year storm event, and a runoff coefficient value of 0.78 was used for the 100-year storm event (based 1/8-acre or Less (Multi-Unit)). Using a 10-minute time of concentration, the intensity value for the 5-year storm event is 1.50 inches/hour, and the intensity value for the 100-year storm event is 3.62 inches/hour, respectively. Discharge flows along the proposed roads at a slope of 1.0% to 4.0% and enters the proposed storm drain network at the proposed detention basin located in the east corner of the proposed project. The discharge will exit the detention basin at a rate that equal to or less than the discharge in the existing conditions ending up in the existing storm drain main located in the east corner of the proposed project site.

Below are the analyzed values for the existing and proposed 5-yr and 100-yr storm events.

TABLE 1 – RUNOFF FLOWS (Q-CFS)

	AREA (acres)	EXISTING (5-YR)	EXISTING (100-YR)	PROPOSED (5-YR)	PROPOSED (100-YR)
E-1	1.15	0.35	2.08		
E-1	2.31	0.69	4.18		
E-Total	3.46	1.04	6.26		
P-1	1.08			0.97	3.05
P-2	2.38			2.14	6.72
P-Total	3.46			3.11	9.77

- C. The downstream drainage consists a 5-foot wide concrete valley gutter along the property line of the Silver Oak Phase 21 Development and well as a 24-inch storm drain pipe within Phase 21, which leads to West Nye Lane and farther more to the storm drain along North Carson Street.
- D. There is an existing drainage problem for the proposed project site as the site is currently in a localized low point and is not currently tied into the storm drain system running through the property. The proposed detention basin with outlets tying into the existing storm will reduce and/or prevent runoff from going into Silver Oak Phase 21 Development.
- E. The project site lies in Shaded Zone X (area of the 500-year storm event).
- F. There is no existing irrigation on the proposed site.
- G. Reference Figure 2 (Existing Hydrologic Conditions) and Figure 3 (Proposed Hydrologic Conditions) for the tributary areas of existing basin, proposed basins, and detention basin.

III. PROPOSED DRAINAGE FACILITIES

- A. The project site will be graded to allow drainage to flow into the proposed detention facility located in the east corner of the project site, into catch basins that enter manholes, and discharge through the existing storm drain network. Discharge will exit the detention

basin in a condition less than or equal to the existing condition and enter the existing storm drain network. (Reference Figure 3, Proposed Hydrologic Conditions for a graphical interpretation of the proposed flow direction).

- B.** Detention will be accomplished by meeting the requirements set forth in Division 14 of the Title 18 Appendix - Carson City Development Standards. Based on the proposed verses existing conditions, the following table dictates the required detention for all storm events as per Section 14.4 of the Carson City Development Standards Table 3 illustrates the overall increase in all storm events for the entire 3.46-acre property in the existing verses the proposed conditions.

TABLE 2 – DETENTION VOLUME (V-CF)

Storm Event	Volume Required (cf)	Volume Provided (cf)
5	1394	
100	2122	3,181

Sizing was performed using the Modified Rational Method for a 5-year and 100-year 10-minute time of concentration and the difference in storage rate (see Appendix A for calculations). The larger runoff volume increase of the two storms was used and an outlet structure was sized to control the flow to be equal to or below pre-development flows. The 100-year overflow will be flowing into the existing valley gutter to the east of the project.

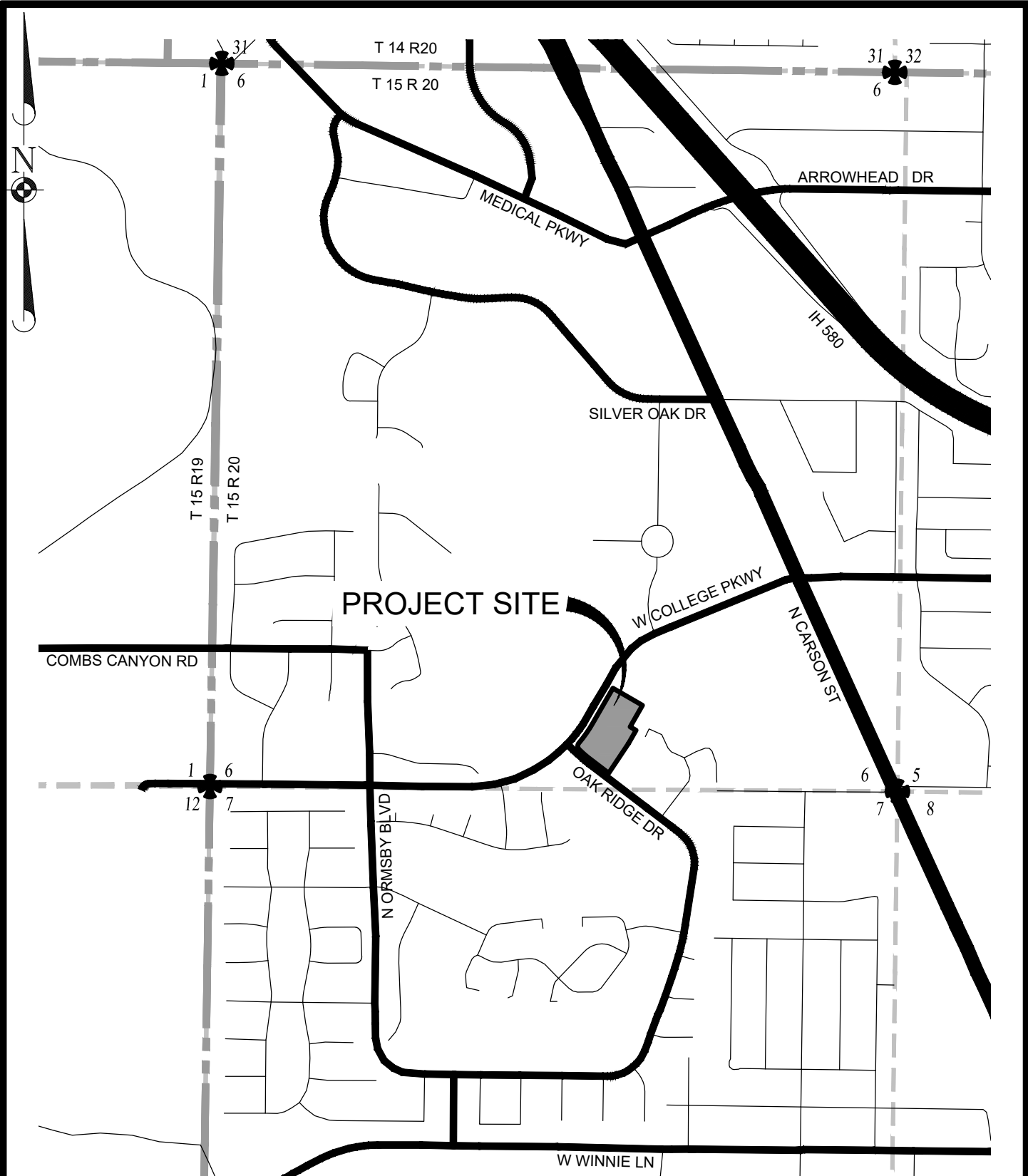
This detention volume is in addition to the overall detention provided by the Silver Oak Development. In the Master Drainage Plan for Silver Oak Development by Sierra Resource Engineering, Inc. dated March 4, 1994, (See Appendix B) the project area appears to be included in the overall design; however, the master report doesn't specifically mention project area. The proposed detention basin on-site was added in case the 3.46-acre site was overlooked or was changed from the original design.

IV. CONCLUSIONS

- A.** This report has been prepared in compliance with Division 14 of the Title 18 Appendix - Carson City Development Standards.

- B.** This report is compliant with the most current FEMA standards. Reference the included FEMA FIRMette from map #3200010084F and #3200010092G included in Appendix A.

- C.** According to the analysis contained within this report, the addition of a detention facility will detain the required amount of discharge in the required storm event with no negative impact to downstream facilities and surrounding areas.



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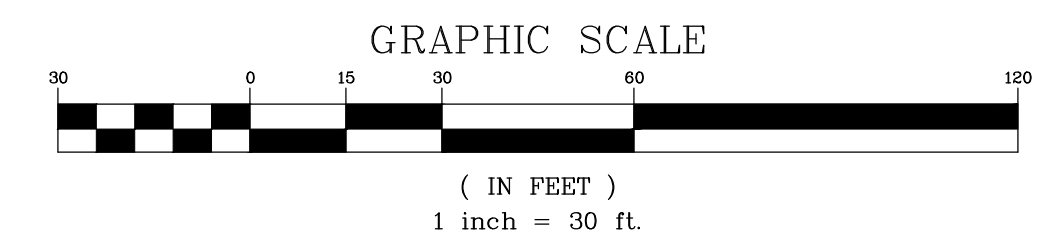
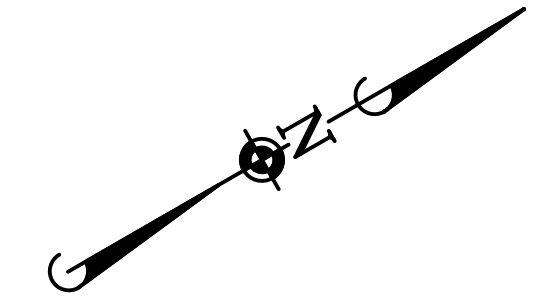
241 Ridge Street, Suite 400, Reno, NV 89501 ph:775-748-3500 fx:775-748-3520 manhard.com
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 Construction Managers • Environmental Scientists • Landscape Architects • Planners

SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
VICINITY MAP

PROJ. MGR.: SDF
 DRAWN BY: SDF
 DATE: JUN 2021
 SCALE: N.T.S.

SHEET
1 OF **2**
 LIL.CCNV06

Dwg Name: P:\lilccnv06\dwg\Eng\Final Drawings\Exhibits Eng\Vicinity Map.dwg Updated By: stellows 16:27



- LEGEND**
- STORM DRAIN W/ DIRECTION INDICATOR (DASHED IF EXISTING)
 - MANHOLE (HOLLOW IF EXISTING)
 - CATCH BASIN (HOLLOW IF EXISTING)
 - 4700 EXISTING CONTOUR LINE
 - FLOW PATH

NOTES:
 5-YR INFORMATION $C_p = 0.20$ $I_p = 1.50$ in/hr
 100-YR INFORMATION $C_{100} = 0.50$ $I_{100} = 3.62$ in/hr
 $(T_c = 10 \text{ min})$

DATE	REVISIONS	CHECK BY

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 841 Ridge Street, Suite 400, Reno, NV 89501 ph: 775-748-8800 fax: 775-748-8800 manhard.com
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SILVER OAK @ COLLEGE PKWY
 CARSON CITY, NEVADA
 PRELIMINARY EXISTING HYDROLOGICAL CONDITION

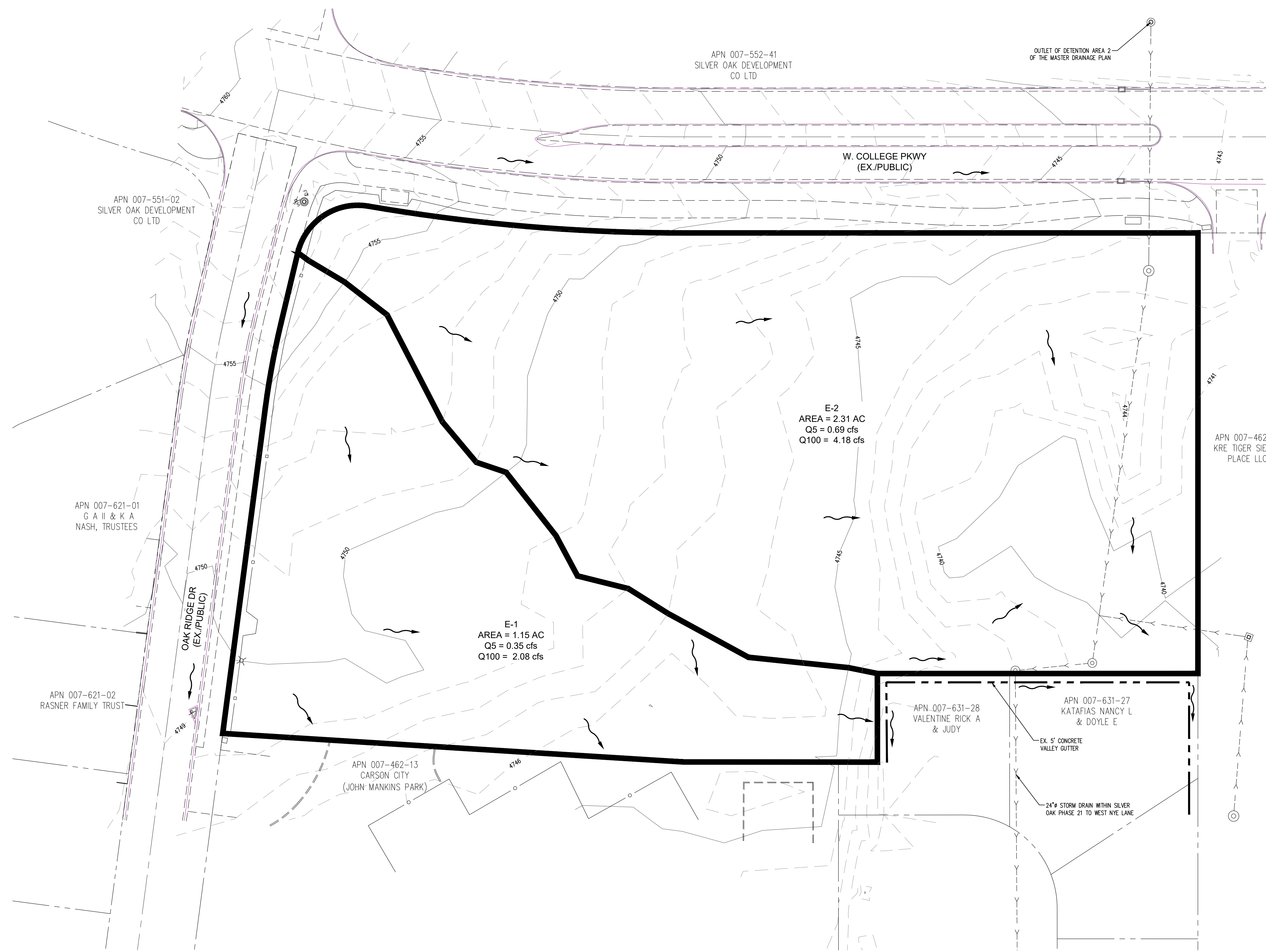
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 PROJ. ASSOC.: SDF
 DRAWN BY: ---
 DATE: JUN 2021
 SCALE: AS SHOWN

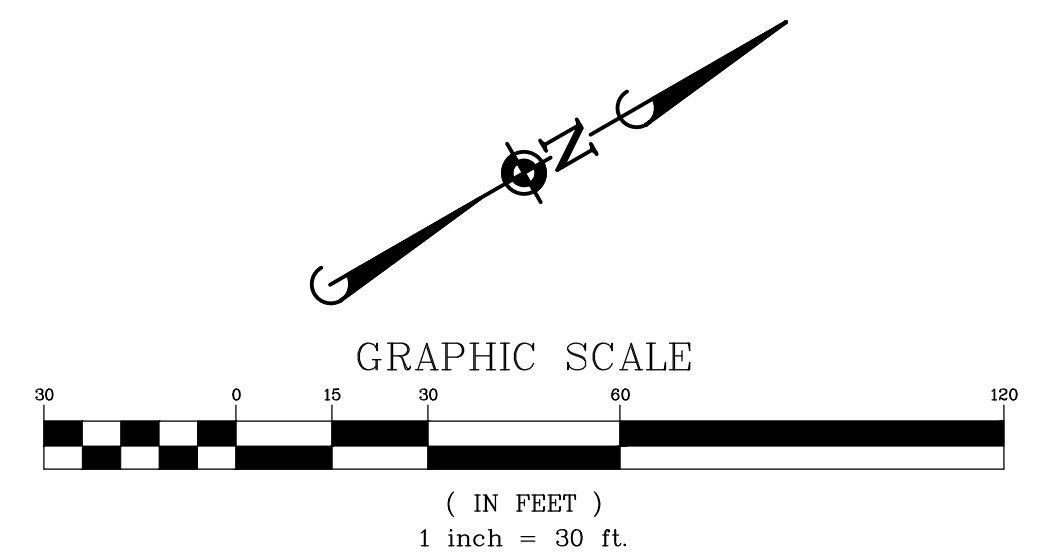
SHEET
2 OF **3**

L.L.CCNV06
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EXHIBIT

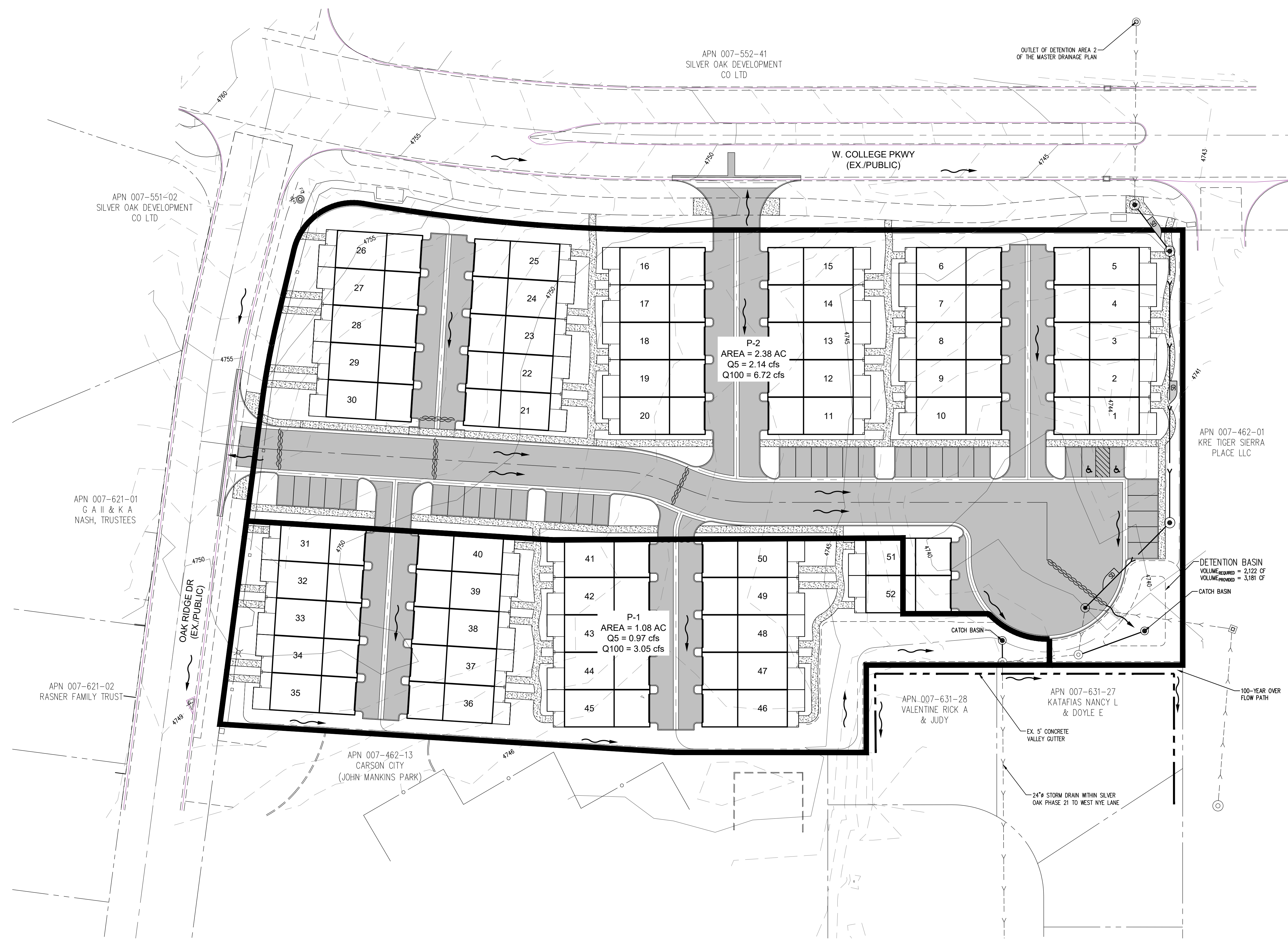
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- LEGEND**
- SD — STORM DRAIN W/ DIRECTION INDICATOR (DASHED IF EXISTING)
 - MANHOLE (HOLLOW IF EXISTING)
 - CATCH BASIN (HOLLOW IF EXISTING)
 - - 4700 EXISTING CONTOUR LINE
 - ~ ~ ~ FLOW PATH

NOTES:
 5-YR INFORMATION $C_p = 0.60$ $I_2 = 1.50$ in/hr
 100-YR INFORMATION $C_{100} = 0.78$ $I_{100} = 3.62$ in/hr
 $(T_c = 10$ min)



APN 007-551-02
SILVER OAK DEVELOPMENT
CO LTD

APN 007-552-41
SILVER OAK DEVELOPMENT
CO LTD

W. COLLEGE PKWY
(EX./PUBLIC)

APN 007-621-01
G A II & K A
NASH, TRUSTEES

APN 007-462-01
KRE TIGER SIERRA
PLACE LLC

APN 007-621-02
RASNER FAMILY TRUST

APN 007-462-13
CARSON CITY
(JOHN MANKINS PARK)

APN 007-631-28
VALENTINE RICK A
& JUDY

APN 007-631-27
KATAFIAS NANCY L
& DOYLE E

DETENTION BASIN
VOLUME REQUIRED = 2,122 CF
VOLUME PROVIDED = 3,181 CF

100-YEAR OVER
FLOW PATH

June 8, 2021 09:26 Draw Name: P:\Micro\00\Documents\Stormwater\Reports\Hydrological\Conditions.dwg Updated By: krlabou

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DATE	

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SILVER OAK @ COLLEGE PKWY
CARSON CITY, NEVADA
PRELIMINARY PROPOSED HYDROLOGICAL CONDITION

PROJ. MGR.:	SDF
PROJ. ASSOC.:	SDF
DRAWN BY:	---
DATE:	JUN 2021
SCALE:	AS SHOWN
SHEET	
3	OF 3
LIL.CCNV06	

EXHIBIT

APPENDIX A

SUPPORTING CALCULATION DATA



NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1875°, Longitude: -119.778°
Elevation: 4747.5 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 Tryppaluk, 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	1.19 (0.780-1.40)	1.48 (1.28-1.75)	1.97 (1.69-2.34)	2.44 (2.08-2.89)	3.22 (2.65-3.80)	3.91 (3.13-4.68)	4.75 (3.67-5.74)	5.76 (4.27-7.07)	7.36 (5.15-9.23)	8.81 (5.86-11.3)
10-min	0.900 (0.780-1.07)	1.12 (0.978-1.33)	1.50 (1.28-1.78)	1.86 (1.58-2.20)	2.44 (2.02-2.90)	2.98 (2.38-3.56)	3.62 (2.80-4.36)	4.39 (3.25-5.38)	5.60 (3.92-7.03)	6.70 (4.46-8.56)
15-min	0.744 (0.644-0.880)	0.928 (0.804-1.10)	1.24 (1.06-1.47)	1.54 (1.30-1.82)	2.02 (1.67-2.40)	2.46 (1.97-2.94)	2.99 (2.31-3.61)	3.62 (2.69-4.44)	4.63 (3.24-5.80)	5.54 (3.69-7.08)
30-min	0.502 (0.434-0.594)	0.626 (0.542-0.742)	0.834 (0.716-0.990)	1.03 (0.880-1.22)	1.36 (1.12-1.61)	1.66 (1.33-1.98)	2.01 (1.55-2.43)	2.44 (1.81-2.99)	3.12 (2.18-3.91)	3.73 (2.48-4.76)
60-min	0.311 (0.268-0.367)	0.387 (0.336-0.459)	0.516 (0.443-0.612)	0.640 (0.544-0.757)	0.842 (0.694-0.999)	1.03 (0.820-1.23)	1.25 (0.962-1.50)	1.51 (1.12-1.85)	1.93 (1.35-2.42)	2.31 (1.54-2.95)
2-hr	0.209 (0.186-0.240)	0.260 (0.231-0.298)	0.331 (0.292-0.378)	0.394 (0.344-0.450)	0.489 (0.415-0.560)	0.574 (0.476-0.664)	0.669 (0.541-0.784)	0.786 (0.615-0.934)	0.987 (0.738-1.22)	1.17 (0.848-1.49)
3-hr	0.167 (0.150-0.188)	0.208 (0.188-0.235)	0.261 (0.233-0.294)	0.304 (0.269-0.342)	0.365 (0.318-0.412)	0.417 (0.357-0.476)	0.476 (0.399-0.548)	0.551 (0.453-0.645)	0.675 (0.537-0.821)	0.792 (0.614-1.00)
6-hr	0.117 (0.105-0.131)	0.146 (0.131-0.164)	0.181 (0.162-0.202)	0.209 (0.186-0.233)	0.246 (0.216-0.276)	0.275 (0.238-0.311)	0.305 (0.259-0.349)	0.339 (0.283-0.393)	0.389 (0.316-0.458)	0.434 (0.345-0.519)
12-hr	0.077 (0.069-0.087)	0.097 (0.086-0.109)	0.122 (0.108-0.137)	0.141 (0.125-0.159)	0.168 (0.146-0.189)	0.188 (0.162-0.214)	0.208 (0.177-0.240)	0.229 (0.191-0.267)	0.258 (0.209-0.306)	0.280 (0.222-0.338)
24-hr	0.051 (0.046-0.056)	0.064 (0.058-0.071)	0.080 (0.073-0.089)	0.094 (0.085-0.104)	0.113 (0.101-0.125)	0.127 (0.114-0.141)	0.143 (0.126-0.159)	0.159 (0.139-0.177)	0.181 (0.156-0.203)	0.198 (0.169-0.224)
2-day	0.031 (0.027-0.034)	0.038 (0.034-0.043)	0.049 (0.044-0.055)	0.057 (0.051-0.065)	0.069 (0.061-0.078)	0.079 (0.069-0.089)	0.089 (0.077-0.101)	0.099 (0.086-0.114)	0.114 (0.096-0.132)	0.125 (0.105-0.147)
3-day	0.022 (0.020-0.025)	0.028 (0.025-0.032)	0.036 (0.032-0.041)	0.043 (0.038-0.048)	0.052 (0.046-0.059)	0.059 (0.052-0.068)	0.067 (0.058-0.077)	0.076 (0.065-0.087)	0.087 (0.073-0.101)	0.097 (0.080-0.113)
4-day	0.018 (0.016-0.021)	0.023 (0.021-0.026)	0.030 (0.027-0.034)	0.036 (0.031-0.040)	0.043 (0.038-0.049)	0.050 (0.043-0.057)	0.057 (0.049-0.065)	0.064 (0.054-0.073)	0.074 (0.062-0.086)	0.082 (0.068-0.096)
7-day	0.012 (0.011-0.014)	0.016 (0.014-0.018)	0.020 (0.018-0.023)	0.024 (0.021-0.027)	0.029 (0.026-0.033)	0.033 (0.029-0.038)	0.038 (0.033-0.043)	0.042 (0.036-0.049)	0.049 (0.041-0.057)	0.054 (0.045-0.063)
10-day	0.010 (0.008-0.011)	0.012 (0.011-0.014)	0.016 (0.014-0.018)	0.019 (0.016-0.021)	0.023 (0.020-0.026)	0.026 (0.022-0.029)	0.029 (0.025-0.033)	0.032 (0.028-0.037)	0.037 (0.031-0.043)	0.040 (0.034-0.047)
20-day	0.006 (0.005-0.007)	0.008 (0.007-0.008)	0.010 (0.009-0.011)	0.011 (0.010-0.013)	0.014 (0.012-0.015)	0.015 (0.014-0.017)	0.017 (0.015-0.019)	0.019 (0.016-0.021)	0.021 (0.018-0.024)	0.023 (0.020-0.027)
30-day	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.014-0.018)	0.017 (0.015-0.020)
45-day	0.004 (0.003-0.004)	0.005 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.011 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.014)
60-day	0.003 (0.003-0.003)	0.004 (0.004-0.004)	0.005 (0.005-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.009-0.011)	0.010 (0.009-0.012)

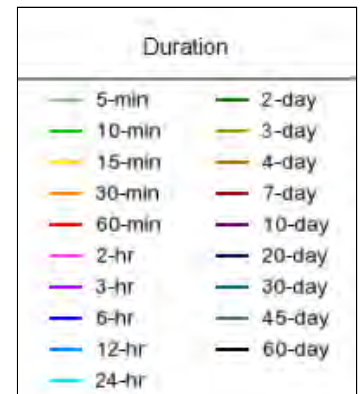
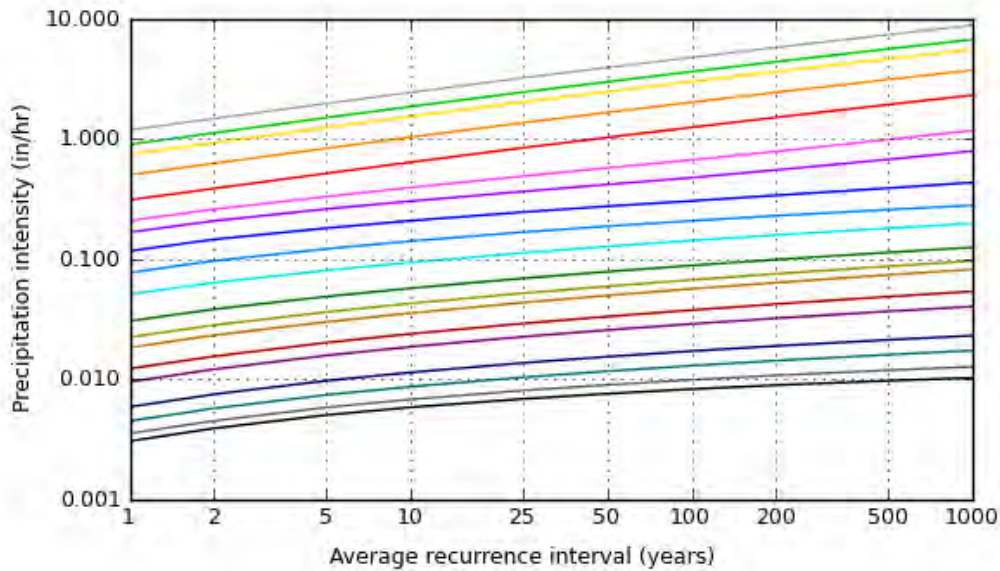
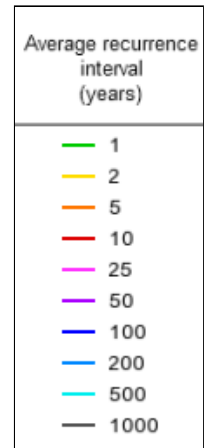
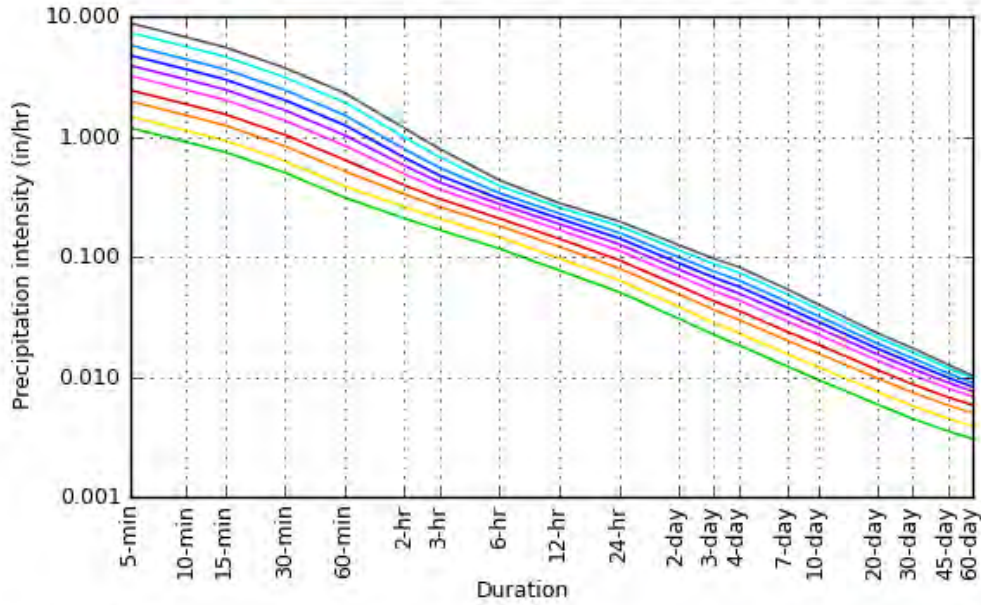
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average 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

PDS-based intensity-duration-frequency (IDF) curves

Latitude: 39.1875°, Longitude: -119.7780°



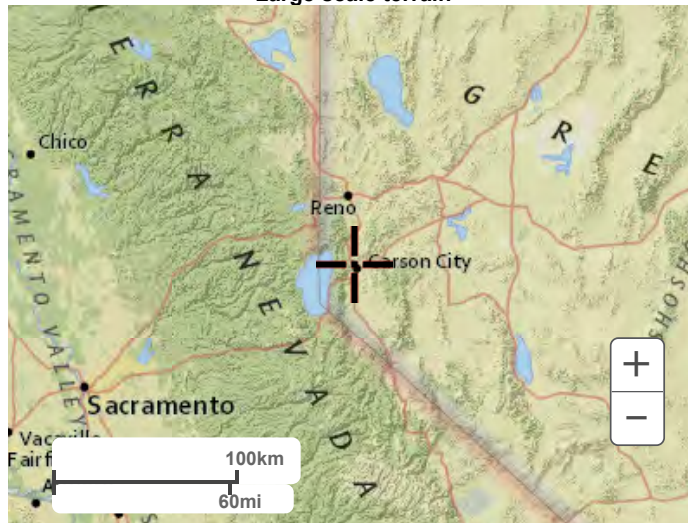
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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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Silver Spring, MD 20910
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NOAA Atlas 14, Volume 1, Version 5
Location name: Carson City, Nevada, USA*
Latitude: 39.1875°, Longitude: -119.778°
Elevation: 4747.5 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 Tryppaluk, 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

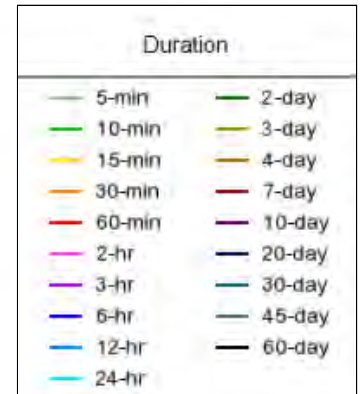
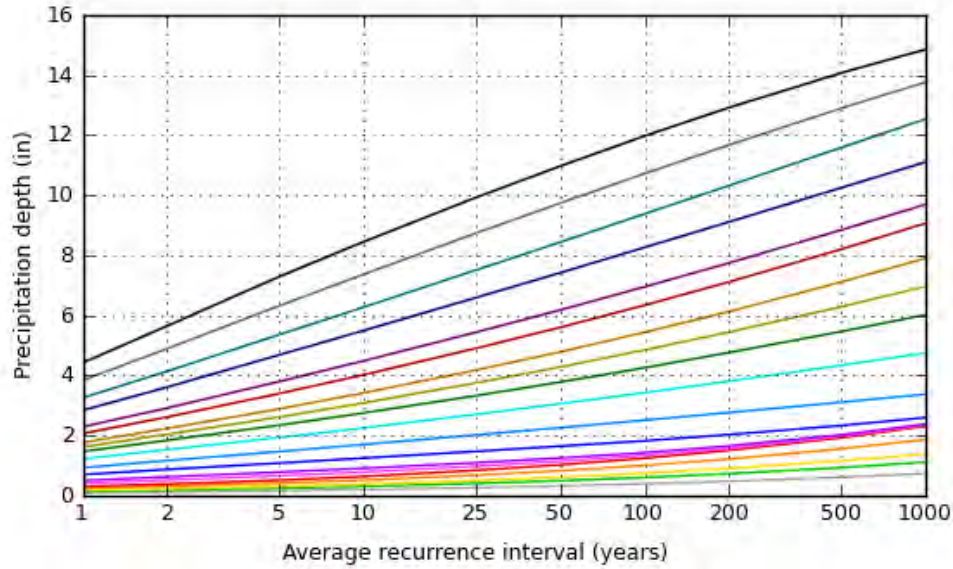
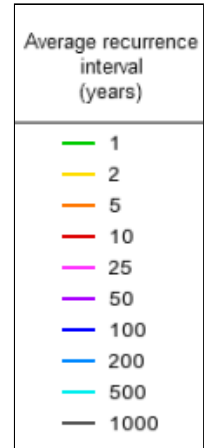
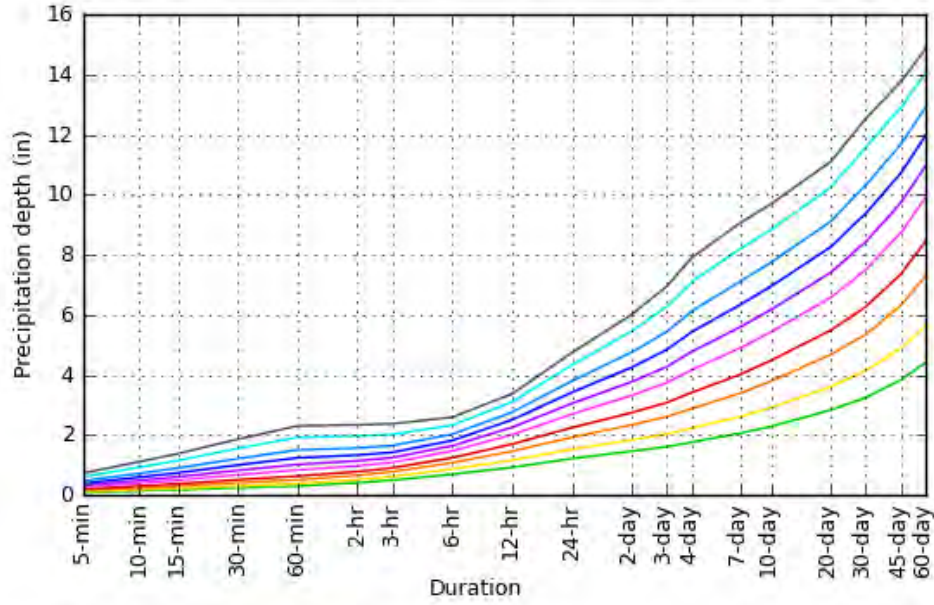
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.099 (0.085-0.117)	0.123 (0.107-0.146)	0.164 (0.141-0.195)	0.203 (0.173-0.241)	0.268 (0.221-0.317)	0.326 (0.261-0.390)	0.396 (0.306-0.478)	0.480 (0.356-0.589)	0.613 (0.429-0.769)	0.734 (0.488-0.938)
10-min	0.150 (0.130-0.178)	0.187 (0.163-0.222)	0.250 (0.214-0.296)	0.310 (0.263-0.366)	0.407 (0.336-0.483)	0.497 (0.397-0.593)	0.604 (0.466-0.727)	0.731 (0.542-0.897)	0.933 (0.653-1.17)	1.12 (0.744-1.43)
15-min	0.186 (0.161-0.220)	0.232 (0.201-0.275)	0.310 (0.265-0.367)	0.384 (0.326-0.454)	0.505 (0.417-0.599)	0.616 (0.492-0.735)	0.748 (0.577-0.902)	0.906 (0.672-1.11)	1.16 (0.809-1.45)	1.39 (0.922-1.77)
30-min	0.251 (0.217-0.297)	0.313 (0.271-0.371)	0.417 (0.358-0.495)	0.517 (0.440-0.612)	0.681 (0.561-0.807)	0.829 (0.663-0.990)	1.01 (0.777-1.22)	1.22 (0.904-1.50)	1.56 (1.09-1.95)	1.87 (1.24-2.38)
60-min	0.311 (0.268-0.367)	0.387 (0.336-0.459)	0.516 (0.443-0.612)	0.640 (0.544-0.757)	0.842 (0.694-0.999)	1.03 (0.820-1.23)	1.25 (0.962-1.50)	1.51 (1.12-1.85)	1.93 (1.35-2.42)	2.31 (1.54-2.95)
2-hr	0.418 (0.373-0.480)	0.520 (0.462-0.595)	0.662 (0.584-0.756)	0.788 (0.687-0.899)	0.978 (0.830-1.12)	1.15 (0.953-1.33)	1.34 (1.08-1.57)	1.57 (1.23-1.87)	1.97 (1.48-2.44)	2.35 (1.70-2.98)
3-hr	0.503 (0.451-0.565)	0.625 (0.564-0.706)	0.784 (0.699-0.882)	0.912 (0.809-1.03)	1.10 (0.955-1.24)	1.25 (1.07-1.43)	1.43 (1.20-1.65)	1.66 (1.36-1.94)	2.03 (1.61-2.47)	2.38 (1.85-3.01)
6-hr	0.701 (0.630-0.783)	0.874 (0.786-0.980)	1.08 (0.970-1.21)	1.25 (1.11-1.40)	1.47 (1.29-1.66)	1.65 (1.43-1.87)	1.82 (1.55-2.09)	2.03 (1.69-2.35)	2.33 (1.89-2.75)	2.60 (2.07-3.11)
12-hr	0.930 (0.829-1.04)	1.17 (1.04-1.31)	1.47 (1.30-1.65)	1.70 (1.50-1.91)	2.02 (1.76-2.28)	2.26 (1.95-2.58)	2.51 (2.13-2.89)	2.77 (2.30-3.22)	3.11 (2.52-3.69)	3.38 (2.68-4.07)
24-hr	1.22 (1.11-1.35)	1.53 (1.39-1.70)	1.93 (1.75-2.13)	2.25 (2.04-2.49)	2.70 (2.42-2.99)	3.06 (2.72-3.38)	3.43 (3.03-3.81)	3.81 (3.34-4.25)	4.34 (3.74-4.87)	4.75 (4.04-5.39)
2-day	1.47 (1.31-1.65)	1.84 (1.65-2.07)	2.35 (2.10-2.64)	2.75 (2.45-3.10)	3.32 (2.94-3.75)	3.78 (3.32-4.28)	4.26 (3.71-4.84)	4.76 (4.11-5.46)	5.46 (4.63-6.32)	6.02 (5.03-7.04)
3-day	1.62 (1.44-1.83)	2.04 (1.82-2.30)	2.62 (2.33-2.96)	3.09 (2.74-3.49)	3.75 (3.30-4.25)	4.28 (3.74-4.86)	4.85 (4.19-5.53)	5.44 (4.66-6.24)	6.28 (5.28-7.27)	6.96 (5.76-8.14)
4-day	1.77 (1.57-2.01)	2.24 (1.99-2.53)	2.89 (2.56-3.28)	3.42 (3.02-3.88)	4.17 (3.66-4.74)	4.78 (4.16-5.45)	5.43 (4.68-6.21)	6.13 (5.21-7.03)	7.11 (5.93-8.23)	7.90 (6.50-9.24)
7-day	2.07 (1.83-2.34)	2.62 (2.32-2.96)	3.40 (3.01-3.85)	4.02 (3.55-4.55)	4.90 (4.30-5.56)	5.60 (4.88-6.37)	6.34 (5.47-7.24)	7.11 (6.09-8.16)	8.20 (6.91-9.49)	9.06 (7.53-10.6)
10-day	2.29 (2.03-2.59)	2.92 (2.59-3.30)	3.80 (3.36-4.29)	4.49 (3.95-5.07)	5.43 (4.76-6.15)	6.18 (5.37-7.01)	6.95 (6.00-7.90)	7.74 (6.62-8.84)	8.83 (7.46-10.2)	9.69 (8.09-11.3)
20-day	2.84 (2.53-3.18)	3.61 (3.22-4.06)	4.68 (4.18-5.24)	5.49 (4.89-6.15)	6.58 (5.82-7.37)	7.41 (6.52-8.32)	8.26 (7.21-9.31)	9.11 (7.90-10.3)	10.2 (8.78-11.7)	11.1 (9.41-12.8)
30-day	3.25 (2.91-3.64)	4.14 (3.70-4.63)	5.35 (4.78-5.98)	6.27 (5.59-7.00)	7.50 (6.64-8.37)	8.43 (7.42-9.43)	9.37 (8.20-10.5)	10.3 (8.95-11.7)	11.6 (9.93-13.2)	12.5 (10.6-14.4)
45-day	3.84 (3.44-4.28)	4.89 (4.38-5.44)	6.31 (5.66-7.01)	7.36 (6.59-8.17)	8.73 (7.77-9.70)	9.73 (8.63-10.8)	10.7 (9.46-12.0)	11.7 (10.3-13.1)	12.9 (11.2-14.5)	13.8 (11.9-15.6)
60-day	4.42 (3.95-4.93)	5.65 (5.05-6.30)	7.28 (6.51-8.10)	8.45 (7.54-9.39)	9.91 (8.82-11.0)	11.0 (9.73-12.2)	12.0 (10.6-13.4)	12.9 (11.4-14.5)	14.1 (12.3-15.9)	14.8 (13.0-16.8)

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

PDS-based depth-duration-frequency (DDF) curves
Latitude: 39.1875°, Longitude: -119.7780°



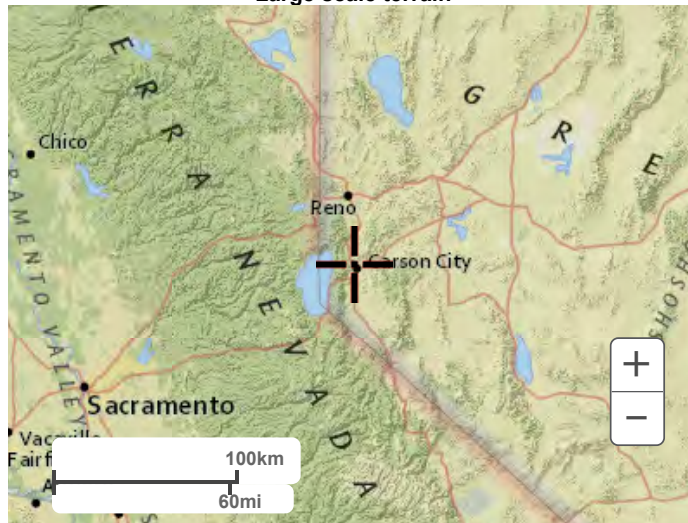
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Maps & aeriels

Small scale terrain



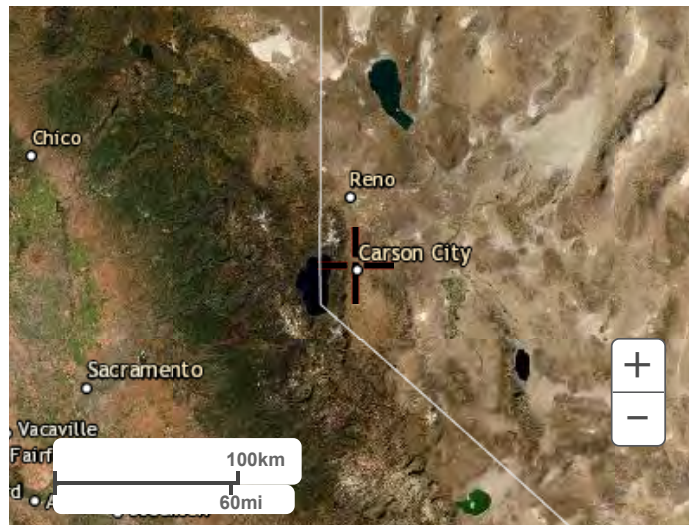
Large scale terrain



Large scale map



Large scale aerial



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**RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS**

Land Use or Surface Characteristics	Aver. % Impervious Area	Runoff Coefficients	
		5-Year (C ₅)	100-Year (C ₁₀₀)
<u>Business/Commercial:</u>			
Downtown Areas	85	.82	.85
Neighborhood Areas	70	.65	.80
<u>Residential:</u> (Average Lot Size)			
1/8 Acre or Less (Multi-Unit)	65	.60	.78
1/4 Acre	38	.50	.65
1/8 Acre	30	.45	.60
1/2 Acre	25	.40	.55
1 Acre	20	.35	.50
<u>Industrial:</u>			
	72	.68	.82
<u>Open Space:</u> (Lawns, Parks, Golf Courses)			
	5	.05	.30
<u>Undeveloped Areas:</u>			
Range	0	.20	.50
Forest	0	.05	.30
<u>Streets/Roads:</u>			
Paved	100	.88	.93
Gravel	20	.25	.50
<u>Drives/Walks:</u>			
	95	.87	.90
<u>Roof:</u>			
	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.

VERSION: April 30, 2009

REFERENCE:

USDCM, DROCOG, 1969
(with modifications)

TABLE
701

WRC ENGINEERING, INC.

RUNOFF CURVE NUMBERS FOR URBAN AREAS¹

Runoff Curve Numbers

Cover Type and Hydrologic Condition	Aver. % Impervious Area ²	Soil Comp A	Soil Comp B	Soil Comp C	Soil Comp D
<i>Fully developed urban area (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ³					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50 to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ⁴		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious only, no vegetation) ⁵		77	86	91	94
Idle lands (CNs are determined using cover types similar to those Table 702 - 3 of 4)					

¹Average runoff condition, and $I_a = 0.2S$

²The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CNs for other combinations of conditions may be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986).

³CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.

⁴Composite CNs for natural desert landscaping should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

⁵Composite CNs to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the degree of development (impervious area percentage) and the CNs for the newly graded pervious areas.

VERSION: April 30, 2009	REFERENCE:	TABLE
	210-VI-TR-55, Second Edition, June 1986	702
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RUNOFF CURVE NUMBERS FOR CULTIVATED AGRICULTURAL LANDS¹

Runoff Curve Numbers

Cover type	Treatment ²	Hydrologic condition ³	Soil Comp A	Soil Comp B	Soil Comp C	Soil Comp D
Fallow	Bare soil Crop residue cover (CR)	-	77	86	91	94
		Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
C&T + CR	Poor	65	73	79	81	
	Good	61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
C&T + CR	Poor	60	71	78	81	
	Good	58	69	77	80	
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

¹Average runoff condition, and $I_a = 0.2S$

²Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

³Hydrologic condition is based on combination of factors that affect infiltration and runoff, including: (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

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REFERENCE:

210-VI-TR-55, Second Edition, June 1986

TABLE

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RUNOFF CURVE NUMBERS FOR OTHER AGRICULTURAL LANDS¹

Runoff Curve Numbers

Cover Type	Hydrologic Condition	Soil Comp A	Soil Comp B	Soil Comp C	Soil Comp D
Pasture, grassland, or range – continuous forage for grazing ²	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow – continuous grass, protected from grazing and generally mowed for hay	-	30	58	71	78
Brush – brush-weed-grass mixture with brush the major element ³	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 ⁴	48	65	73
Woods – grass combination (orchard or tree farm) ⁵	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods ⁶	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 ⁴	55	70	77
Farmsteads – buildings, lanes, driveways, and surrounding lots	-	59	74	82	86

¹Average runoff condition, and $I_a = 0.2S$

²*Poor:* < 50% ground cover or heavily grazed with no mulch
Fair: 50 to 75% ground cover and not heavily grazed
Good: > 75% ground cover and lightly or only occasionally grazed

³*Poor:* < 50% ground cover
Fair: 50 to 75% ground cover
Good: >75% ground cover

⁴Actual curve number is less than 30; use CN = 30 for runoff computations.

⁵CNs shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CNs for woods and pasture.

⁶*Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

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WRC ENGINEERING, INC.

REFERENCE:

210-VI-TR-55, Second Edition, June 1986

TABLE

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3 of 4

RUNOFF CURVE NUMBERS FOR ARID AND SEMIARID RANGELANDS¹
Runoff Curve Numbers

Cover Description	Hydrologic Condition ²	Soil Comp A ³	Soil Comp B	Soil Comp C	Soil Comp D
Herbaceous – mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen – mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper – pinyon, juniper, or both; grass understory	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub – major plants include saltbrush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use Table 702 - 3 of 4.

²*Poor*: < 30% ground cover (litter, grass, and brush overstory)

Fair: 30 to 70% ground cover

Good: > 70% ground cover

³Curve numbers for group A have been developed only for desert shrub.

VERSION: April 30, 2009
 WRC ENGINEERING, INC.

REFERENCE:
 210-VI-TR-55, Second Edition, June 1986

TABLE
 702
 4 of 4

National Flood Hazard Layer FIRMette



119°47'1"W 39°11'29"N



Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

119°46'23"W 39°11'12"N

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- SPECIAL FLOOD HAZARD AREAS**
 - Without Base Flood Elevation (BFE) Zone A, V, A99
 - With BFE or Depth Zone AE, AO, AH, VE, AR
 - Regulatory Floodway

- OTHER AREAS OF FLOOD HAZARD**
 - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
 - Future Conditions 1% Annual Chance Flood Hazard Zone X
 - Area with Reduced Flood Risk due to Levee. See Notes. Zone X
 - Area with Flood Risk due to Levee Zone D

- OTHER AREAS**
 - NO SCREEN Area of Minimal Flood Hazard Zone X
 - Effective LOMRs
 - Area of Undetermined Flood Hazard Zone D

- GENERAL STRUCTURES**
 - Channel, Culvert, or Storm Sewer
 - Levee, Dike, or Floodwall

- OTHER FEATURES**
 - 20.2** Cross Sections with 1% Annual Chance Water Surface Elevation
 - 17.5** Coastal Transect
 - Base Flood Elevation Line (BFE)
 - Limit of Study
 - Jurisdiction Boundary
 - Coastal Transect Baseline
 - Profile Baseline
 - Hydrographic Feature

- MAP PANELS**
 - Digital Data Available
 - No Digital Data Available
 - Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **5/17/2021 at 7:20 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

RATIONAL METHOD DISCHARGE RESULTS

BASIN	RUNOFF COEFFICIENT (5-YEAR)	RUNOFF COEFFICIENT (100-YEAR)	INTENSITY (5-YEAR)	INTENSITY (100-YEAR)	AREA	Q5	Q100
E-1	0.20	0.50	1.50	3.62	1.15	0.35	2.08
E-2	0.20	0.50	1.50	3.62	2.31	0.69	4.18
E-Total					3.46	1.04	6.26

P-1	0.60	0.78	1.50	3.62	1.08	0.97	3.05
P-2	0.60	0.78	1.50	3.62	2.38	2.14	6.72
P-Total					3.46	3.11	9.77

Equations: $Q = CiA$

Silver Oak @ College Pkwy: Modified Rational Method

Basin Description: Detention Basin 1

Calc by: SDF

Date: 5/26/21

Existing Conditions

$C_5 = 0.20$
 $C_{100} = 0.50$
 $T_c = 10.0 \text{ min.}$
 $I_5 = 1.50 \text{ in/hr}$
 $I_{100} = 3.62 \text{ in/hr}$
 $A = 3.46 \text{ acres}$

Allowable Release Rates:

$Q_5 = 1.04 \text{ cfs}$
 $Q_{100} = 6.26 \text{ cfs}$
 <-- Subbasin E-1

Proposed Runoff Coefficient Calculations

$C_5 = 0.60$
 $C_{100} = 0.78$

5-Year

Storm Duration (hours)	Rain Intensity (in/hr)	Runoff Rate (cfs)	Release Rate (cfs)	Storage Rate (cfs)	Storage Required (acre-ft)
t	I	$Q=Cr*I*A$	Q_r	$Q_s=Q-Q_r$	$Q_s*t/12$
0.08	1.97	4.09	1.04	3.05	0.0212
0.17	1.50	3.11	1.04	2.08	0.0288
0.25	1.24	2.57	1.04	1.54	0.0320
0.50	0.834	1.73	1.04	0.69	0.0289
1.00	0.516	1.07	1.04	0.03	0.0028

5-Yr Required Storage: 0.032 acre-ft = 1,394 cu ft

100-Year

Storm Duration (hours)	Rain Intensity (in/hr)	Runoff Rate (cfs)	Release Rate (cfs)	Storage Rate (cfs)	Storage Required (acre-ft)
t	I	$Q=Cr*I*A$	Q_r	$Q_s=Q-Q_r$	$Q_s*t/12$
0.08	4.75	12.82	6.26	6.56	0.0455
0.17	3.62	9.77	6.26	3.51	0.0487
0.25	2.99	8.07	6.26	1.81	0.0376
0.50	2.01	5.42	6.26	-0.84	-0.0349
1.00	1.25	3.37	6.26	-2.89	-0.2408

100-Yr Required Storage: 0.049 acre-ft = 2,122 cu ft

**Silver Oak @ College Parkway
Stage-Storage Summary Tables**

DETENTION	5-Year Req'd Vol.	0.032	ac-ft	1,394	cu ft
BASIN	100-Year Req'd Vol.	0.049	ac-ft	2,122	cu ft

stage	Δ elev.	area (sq. ft.)	area (ac.)	avg. area (ac.)	storage _i (ac-ft)	Σ storage _i (ac-ft)	Σ storage _i (cu-ft)
4,737.20	0.00	16	0.00	0.00	0.00	0.00	0
4,737.70	0.50	499	0.01	0.01	0.00	0.00	129
4,738.20	0.50	770	0.02	0.01	0.01	0.01	446
4,738.70	0.50	1081	0.02	0.02	0.01	0.02	909
4,739.20	0.50	1431	0.03	0.03	0.01	0.04	1537
4,739.70	0.50	1821	0.04	0.04	0.02	0.05	2350
4,740.20	0.50	2249	0.05	0.05	0.02	0.08	3367

Weir Elev 4,740.20
Crest Elev 4,740.20

Total Provided Vol.:	0.08 ac-ft
	3367 cu ft

Worksheet for 5-yr Curb and Gutter

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.01000 ft/ft
 Normal Depth 0.26 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.13
0+02.00	0.15
0+13.50	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+13.50, 0.38)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
 Open Channel Weighting Method Pavlovskii's Method
 Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 1.25 ft³/s
 Elevation Range 0.00 to 0.50 ft
 Flow Area 0.58 ft²
 Wetted Perimeter 7.21 ft
 Hydraulic Radius 0.08 ft
 Top Width 6.96 ft
 Normal Depth 0.26 ft

Worksheet for 5-yr Curb and Gutter

Results

Critical Depth	0.28	ft
Critical Slope	0.00570	ft/ft
Velocity	2.14	ft/s
Velocity Head	0.07	ft
Specific Energy	0.33	ft
Froude Number	1.30	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.28	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00570	ft/ft

Rating Table for 5-yr Curb and Gutter

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.26 ft
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.13
0+02.00	0.15
0+13.50	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+13.50, 0.38)	0.013

Channel Slope (ft/ft)	Discharge (ft³/s)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	0.89	1.51	0.58	7.21	6.96
0.01000	1.25	2.14	0.58	7.21	6.96
0.01500	1.53	2.62	0.58	7.21	6.96
0.02000	1.77	3.03	0.58	7.21	6.96
0.02500	1.98	3.39	0.58	7.21	6.96
0.03000	2.17	3.71	0.58	7.21	6.96
0.03500	2.34	4.01	0.58	7.21	6.96
0.04000	2.50	4.28	0.58	7.21	6.96

Rating Table for 5-yr Curb and Gutter

Input Data

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.04500	2.66	4.54	0.58	7.21	6.96
0.05000	2.80	4.79	0.58	7.21	6.96

Worksheet for 5-yr 3-Foot Valley Gutter

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.01000 ft/ft
 Normal Depth 0.26 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+11.50	0.15
0+11.50	0.13
0+13.00	0.00
0+14.50	0.13
0+14.50	0.15
0+26.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+26.00, 0.38)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
 Open Channel Weighting Method Pavlovskii's Method
 Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 2.62 ft³/s
 Elevation Range 0.00 to 0.38 ft
 Flow Area 1.19 ft²
 Wetted Perimeter 14.05 ft
 Hydraulic Radius 0.08 ft
 Top Width 14.00 ft

Worksheet for 5-yr 3-Foot Valley Gutter

Results

Normal Depth	0.26	ft
Critical Depth	0.28	ft
Critical Slope	0.00545	ft/ft
Velocity	2.20	ft/s
Velocity Head	0.08	ft
Specific Energy	0.34	ft
Froude Number	1.33	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.26	ft
Critical Depth	0.28	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00545	ft/ft

Rating Table for 5-yr 3-Foot Valley Gutter

Project Description

Friction Method Manning Formula
Solve For Discharge

Input Data

Channel Slope 0.01000 ft/ft
Normal Depth 0.26 ft
Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+11.50	0.15
0+11.50	0.13
0+13.00	0.00
0+14.50	0.13
0+14.50	0.15
0+26.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+26.00, 0.38)	0.013

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	1.85	1.56	1.19	14.05	14.00
0.01000	2.62	2.20	1.19	14.05	14.00
0.01500	3.21	2.70	1.19	14.05	14.00
0.02000	3.71	3.12	1.19	14.05	14.00
0.02500	4.15	3.48	1.19	14.05	14.00
0.03000	4.54	3.82	1.19	14.05	14.00
0.03500	4.91	4.12	1.19	14.05	14.00

Rating Table for 5-yr 3-Foot Valley Gutter

Input Data

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.04000	5.25	4.41	1.19	14.05	14.00
0.04500	5.56	4.68	1.19	14.05	14.00
0.05000	5.86	4.93	1.19	14.05	14.00

Worksheet for 100yr Curb and Gutter

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.02500 ft/ft
 Normal Depth 0.38 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.13
0+02.00	0.15
0+13.50	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+13.50, 0.38)	0.013

Options

Current Roughness Weighted Method Pavlovskii's Method
 Open Channel Weighting Method Pavlovskii's Method
 Closed Channel Weighting Method Pavlovskii's Method

Results

Discharge 8.41 ft³/s
 Elevation Range 0.00 to 0.50 ft
 Flow Area 1.78 ft²
 Wetted Perimeter 13.33 ft
 Hydraulic Radius 0.13 ft
 Top Width 12.98 ft
 Normal Depth 0.38 ft

Worksheet for 100yr Curb and Gutter

Results

Critical Depth	0.48	ft
Critical Slope	0.00421	ft/ft
Velocity	4.72	ft/s
Velocity Head	0.35	ft
Specific Energy	0.73	ft
Froude Number	2.25	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.48	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00421	ft/ft

Rating Table for 100yr Curb and Gutter

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.02500 ft/ft
 Normal Depth 0.38 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.50
0+00.50	0.50
0+00.58	0.00
0+02.00	0.13
0+02.00	0.15
0+13.50	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.50)	(0+13.50, 0.38)	0.013

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	3.76	2.11	1.78	13.33	12.98
0.01000	5.32	2.99	1.78	13.33	12.98
0.01500	6.52	3.66	1.78	13.33	12.98
0.02000	7.53	4.22	1.78	13.33	12.98
0.02500	8.41	4.72	1.78	13.33	12.98
0.03000	9.22	5.17	1.78	13.33	12.98
0.03500	9.96	5.59	1.78	13.33	12.98
0.04000	10.64	5.97	1.78	13.33	12.98

Rating Table for 100yr Curb and Gutter

Input Data

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.04500	11.29	6.34	1.78	13.33	12.98
0.05000	11.90	6.68	1.78	13.33	12.98

Worksheet for 100-yr 3-Foot Valley Gutter

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02500	ft/ft
Normal Depth	0.38	ft

Section Definitions

Station (ft)	Elevation (ft)	
0+00.00		0.38
0+11.50		0.15
0+11.50		0.13
0+13.00		0.00
0+14.50		0.13
0+14.50		0.15
0+26.00		0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+26.00, 0.38)	0.013

Options

Current Roughness weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	17.31	ft ³ /s
Elevation Range	0.00 to 0.38 ft	
Flow Area	3.59	ft ²
Wetted Perimeter	26.06	ft
Hydraulic Radius	0.14	ft
Top Width	26.00	ft

Worksheet for 100-yr 3-Foot Valley Gutter

Results

Normal Depth	0.38	ft
Critical Depth	0.48	ft
Critical Slope	0.00402	ft/ft
Velocity	4.82	ft/s
Velocity Head	0.36	ft
Specific Energy	0.74	ft
Froude Number	2.29	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.38	ft
Critical Depth	0.48	ft
Channel Slope	0.02500	ft/ft
Critical Slope	0.00402	ft/ft

Rating Table for 100-yr 3-Foot Valley Gutter

Project Description

Friction Method Manning Formula
 Solve For Discharge

Input Data

Channel Slope 0.02500 ft/ft
 Normal Depth 0.38 ft
 Section Definitions

Station (ft)	Elevation (ft)
0+00.00	0.38
0+11.50	0.15
0+11.50	0.13
0+13.00	0.00
0+14.50	0.13
0+14.50	0.15
0+26.00	0.38

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 0.38)	(0+26.00, 0.38)	0.013

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.00500	7.74	2.16	3.59	26.06	26.00
0.01000	10.95	3.05	3.59	26.06	26.00
0.01500	13.41	3.73	3.59	26.06	26.00
0.02000	15.48	4.31	3.59	26.06	26.00
0.02500	17.31	4.82	3.59	26.06	26.00
0.03000	18.96	5.28	3.59	26.06	26.00
0.03500	20.48	5.70	3.59	26.06	26.00

Rating Table for 100-yr 3-Foot Valley Gutter

Input Data

Channel Slope (ft/ft)	Discharge (ft ³ /s)	Velocity (ft/s)	Flow Area (ft ²)	Wetted Perimeter (ft)	Top Width (ft)
0.04000	21.89	6.10	3.59	26.06	26.00
0.04500	23.22	6.47	3.59	26.06	26.00
0.05000	24.48	6.82	3.59	26.06	26.00

APPENDIX B

MASTER DRAINAGE STUDY FOR SILVER OAK DEVELOPMENT

BY SIERRA RESOURCE ENGINEERING, INC.
MARCH 4, 1994

94001

0615200.004

—Silver Oak Development Master Drainage Plan —

**SILVER OAK
DEVELOPMENT**

MASTER DRAINAGE PLAN

MARCH 4, 1994



54 LAKE BLVD. SUITE 101
DAYTON, NEVADA 89403

SIERRA RESOURCE ENGINEERING, INC.

CIVIL ENGINEERS
LAND SURVEYORS

WATER RIGHTS
LAND USE PLANNING

(702) 246-7300

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Introduction

This master drainage plan for Silver Oak outlines the background, hydrology, phasing, and flood routing for the entire development. Additionally, the specific hydrology and hydraulic calculations required for the approval of Silver Oak Phase I have been included.

All locations and sizes of hydraulic structures are approximate at this stage of development. While every effort has been made to produce a conservative model that will require little adjustment, modifications in the final design of the subdivision, commercial properties and golf course will inevitably lead to some minor changes in the drainage plan. The purpose of this plan is to illustrate the methodology of how we intend to deal with drainage issues as well as the plan feasibility of this plan based on design criteria.

Background

The master drainage plan for Silver Oak presented in this report is the result of a cooperative effort between Sierra Resource Engineering, Inc., and Carson City Public Works Department.

Developments are typically required to restrict flows to the pre-development condition of the construction site. The Carson City Public Works Department requested Sierra Resource Engineering to investigate the possibility of the Silver Oak Development limiting flows from drainage to the west of the development to 5 and 17 cfs for 5 and 25 year storms, respectively. These flow rates would reduce or eliminate potential flood problems to the east due to limited infrastructure.

A preliminary plan submitted to Public Works for review and comment listed design criteria as agreed upon by Carson City and Sierra Resource Engineering, storm hydrographs, results of literature research and on-site investigations, approximate locations detention basins and possible routing, as well as a basic outline for the working of the overall plan.

Our preliminary master drainage plan concluded that it was possible for the Silver Oak Development to exceed current requirements and limit flows to the above referenced amounts. This is possible only because of the extraordinary amount of open space created by the golf course. In the spirit of improving the community, the Silver Oak Development has agreed to limit these flows.

This report will address all comments made by Carson City regarding the preliminary study. We hope that this cooperative effort will provide a plan which services the development and improves the flood management program for the entire community.

Hydrology

Storm runoff has been calculated using an EDS (Engineering Design Software) design software package. This package offers both Rational and SCS methods to compute flood hydrographs. As per our agreement with Carson City, all models for storm detention have been generated using TR55 storm hydrographs based on a 25 year, 24 hour storm with IA rainfall distribution type. All CN numbers were chosen using the 1975 SCS soil survey.

Storm runoff values from the 1993 FEMA study for Carson City are appreciably higher than ours. This can be attributed to the study contractor using a SCS Type II rainfall distribution.

Phasing

Phasing of the drainage improvements will depend on the housing and golf course development. As such, it is difficult to forecast an exact time of construction. However, we can divide the project into three zones draining into different basins. Any new construction in any of these three zones would trigger the construction of the detention and metering structures servicing it. Each zone^{and} its hydraulic structures and requirements are as follows:

Zone I

Zone I will include almost all property south of Community College Parkway. This zone could require one detention basin (to be discussed in detail), a drainage easement, and drainage swales on the west property line to direct sheet flows to Winnie Lane and Community College Parkway. Sheet flows from off-site will be limited to those between Murphy Drive and the property boundary. This is due to the sever cut in Murphy Drive diverting flows to the south.

The Phase I development detention will be accommodated in this zone when Phase II begins construction. This is required due to the low elevations associated with Phase I. Detention for Phase I will be accommodated within the drainage easement should any further phases fail to be built.

Detention Basin I

This basin will detain all on-site flows to the south of Community College Parkway and southwest of the school site with the exception of Phase I. The flows from this basin will be metered along with those from Basin 2 to an approximate Q_{max} of 17 cfs for a 25 year, 24 hour event. The outlet control structure will be routed to the drainage easement along West Nye Lane. No flows from off-site will be routed to this basin. At the present, this basin is tentatively located in the 11th fairway. This is an approximate location. As the golf course design evolves, some of this volume may be distributed throughout the course as small ponds or depressions. Open channels directing flows to the basin are also approximate and subject to some change as the golf course design is developed.

Zone II

Zone II extends north from Community College Parkway to a line running east and west from approximately Country Club Drive to Radcliff Drive in University Heights Phase II. The detention basin in this zone primarily is

designed to accommodate flows from drainage Basin "B" (Combs Canyon).

Detention Basin II

This basin is tentatively located in the 10th fairway. Drainage Basin "B" storm flows from off-site will be routed across Ormsby via a culvert and through the open channel. Again, as with the channels leading to the #1 basin, the locations shown on this plan are approximate as subject to some adjustment to accommodate the final golf course and residential design. Flows from this basin will be metered along with the flows from Basin #1 to a ~~maximum~~ combine maximum flow of approximately 17 cfs and exit the project via the drainage easement along Nye Lane. *now 19'*

Flood Routing (100 year)

100 year floods will enter this zone at the culvert crossing on Ormsby; however, these flows will enter from the street surface as they will be entering the site from Combs Canyon Road. Flood paths for these storms will follow the open channel paths to the detention basin area; but, will most probably be incorporated into the entire fairway width. Instead of exiting the detention area via a culvert, they will be allowed to crest Community College Parkway and follow that path off-site. Due to the depressed section on Community College Parkway, flows will enter the K-Mart site at this low point and exit at the southeast end of their parking lot.

This depression in Community College Parkway was originally designed to act as a weir for flows in excess of a 10 year event, and assumed no improvements would be made adjacent to this collector. If no development were to occur north of Community College Parkway, flows would naturally be directed across the K-Mart site as dictated by the street design. At this stage in design, it would be reasonable to assume that 100 year flows be directed *will*

down this street and be allowed to drain off at the depression as the design intended.

Zone III

Zone III extends from the Zone II boundary to the northern edge of the project. This zone includes two detention basins (III and IV). Drainage swales along the western edge of this zone will collect off-site sheet flows and direct them to the open channel network connected to detention basin IV.

Detention Basin III

Basin III is located in the driving range and will accommodate flows from Combs Canyon (Basin C). Open channel improvements starting behind the 16th tee along the property line will be made to collect and divert flows from Combs Canyon to Basin #3. As with all open channels, the location is approximate and subject to some adjustment. Flows from this basin along with those with Basin #4 will be metered to a combined maximum Q of approximately 17 cfs.

Detention Basin IV

Basin #4 primarily accommodates flows from drainage basin D. Open channels route flows through the course to this basin. A culvert crossing behind the 9th tee carries flows across Silver Oak Drive to the basin.

Flows from this basin for a 25 year, 24 hour storm will be metered and combined with those from basin #3 for a combined Q_{max} of 17 cfs. These flows will exit the project at the broadleaf culvert.

Flood Routing (100 year)

100 year floods will enter this zone through the open channel improvements at the bottom of Combs Canyon and north end of University Heights. As with the Zone II path, this will also approximately follow the 25 year, 24 hour open channel except it will likely

extend the width of the fairway before entering the detention basin area. The detention area will fill until the water surface matches the elevation of Silver Oak Drive between the tourist and general commercial sites. Once this elevation is reached, Silver Oak Drive will carry these flows off-site.

Silver Oak Phase I

Zone III extends from the Zone II boundary to the northern edge of the project. This zone includes two detention basins (III and IV). Drainage swales along the western edge of this zone will collect off-site sheet flows & direct them to the open channel network connected to detention basin IV.

Phase I being a part of Zone I but lower than the elevation of the detention basin, presents some unique conditions. The detention requirements for this phase will ultimately be accommodated by metering flows from detention Basin I to make up the difference of direct flows released to the drainage easement. However, assuming these improvements are never built, we will bond for detention within the drainage easement adjacent to Nye Lane under a separate contract.

Hydrographs and critical cross sections for this phase of development are included in this section as required by Carson City Public Works.

Summary

While every effort has been made to present the plan in a format that is self-explanatory, some questions are bound to arise. We would be happy to answer these questions at any time.

Actual sizing of the outlet of the outlet control structures will commence immediately. As mentioned earlier, this will require coordination between golf course designers and our engineering staff.

Further analysis of the 100 year flood route will be required. This includes total volume of the golf course

west of the commercial development, soil investigation,
and possible firm map revisions.

Summary of Results

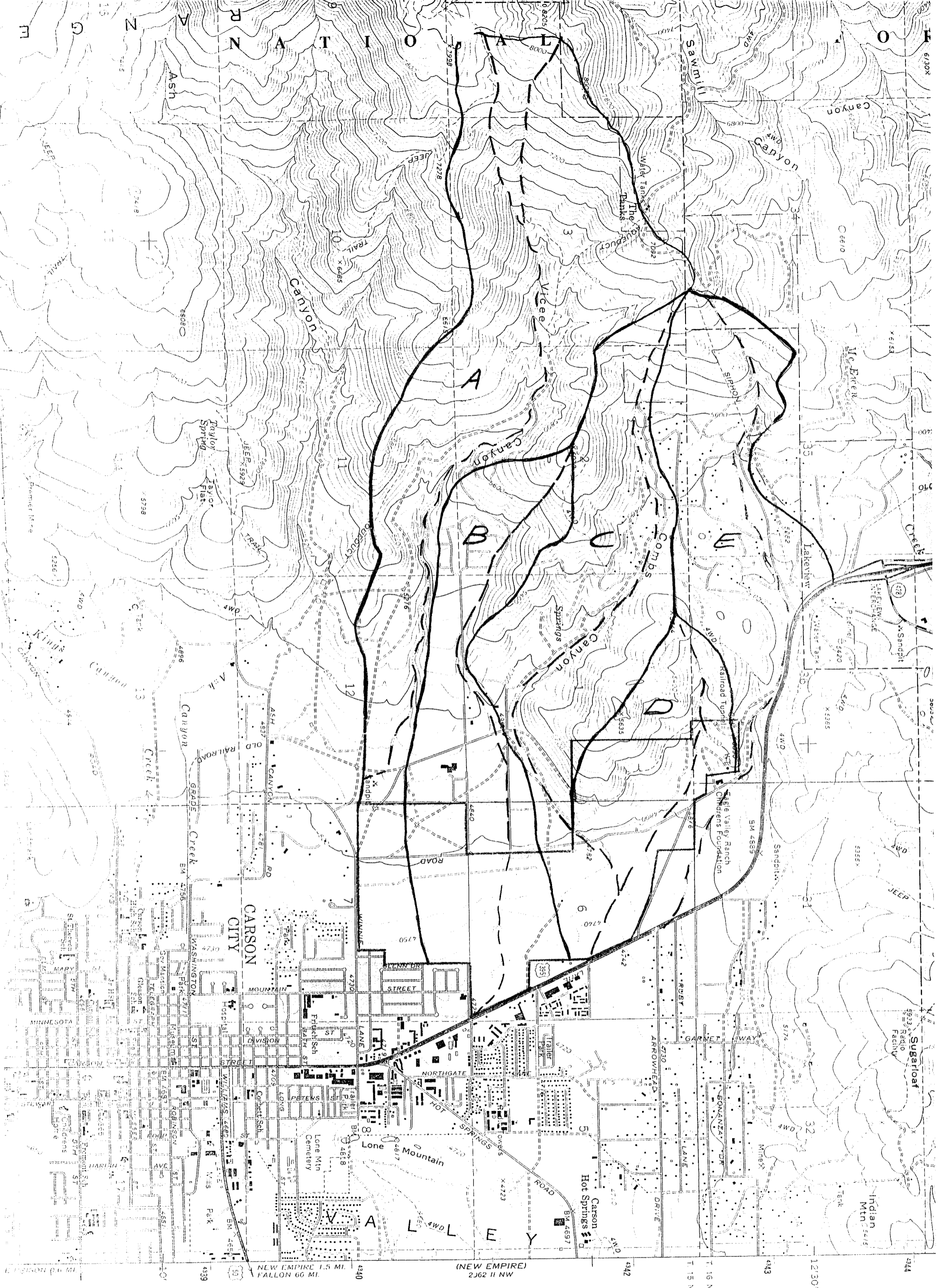
Dedicated Detention Area Storage

Area		5 yr/24 hr	25 YR/24 HR	100 YR/ 24 HR
1	Qin (cfs)	3.95	12.8	28.83
	Qout (cfs)	.92	7	28.83
	Storage (ac ft)	4.2	5.9	-0-
2	Qin	10.32	32.3	213.87
	Qout	4	10	213.87
	Storage	9.36	24	-0-
3	Qin	11.9	29.3	256
	Qout	4	12	256
	Storage	10.1	27.1	-0-
4	Qin	6.2	21.12	48.4
	Qout	1	5	48.4
	Storage	6.9	14.35	-0-

Hydrography Summary

	Off Site Flows Drainage				
				BASIN	BASIN
	ZONE I	ZONE II	ZONE III	B	C
	POST	POST	POST		
5 yr/24 hr TA	3.95	10.32	6.77	8.06	40.82
tc (min)	95.14	70.01	79.44	83.30	90.96
time to peak (min)	1035.00	1079.00	1027.00	1092.00	1275.00
25 yr/24 hr IA	13.71	31.27	21.12	23.41	93.15
tc (min)	95.14	70.01	79.44	83.30	90.96
time to peak (min)	555.00	552.00	546.00	559.00	870.00
100 yr/24 hr IA	28.83	18.86	48.41	--	--
tc (min)	95.14	70.01	79.44	--	--
time to peak (min)	540.00	517.00	533.00	--	--
100 yr/24 hr II	--	--	--	213.87	256.08
tc (min)	--	--	--	83.30	113.24
time to peak (min)	--	--	--	767.00	792.00

Phase I Calculations



HISTORIC DRAINAGE

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 1.33 (cfs)
 Volume..... = 0.08 (acft)
 Time Interval..... = 7 (min)
 Time to Peak..... = 46.15 (min)
 Time of Base..... = 92.30 (min)
 Multiplication factor..... = 1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient..... = 0.40000
 Receding limb factor..... = 1.00000

[RESERVOIR STORAGE]

Maximum Outflow..... = 0.00000 (cfs)
 Maximum Storage..... = 0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area..... = 4.32 (ac)
 Curve Number..... = 73
 Runoff coefficient..... = 0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02100
 Flow Length (L)..... = 1440.00 (ft)
 Time of Concentration..... = 46.15 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SYNTHETIC
 Total Precipitation..... = 0.59 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 0.77 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 7 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	7	0.09	0.09	0.20	0.20
2	14	0.09	0.18	0.20	0.40
3	21	0.09	0.27	0.20	0.60
4	28	0.09	0.36	0.20	0.80
5	35	0.09	0.45	0.20	1.01
6	42	0.09	0.54	0.20	1.21
7	49	0.05	0.59	0.04	1.24
8	56	0.00	0.59	-0.20	1.04
9	63	0.00	0.59	-0.20	0.84
10	70	0.00	0.59	-0.20	0.64
11	77	0.00	0.59	-0.20	0.44
12	84	0.00	0.59	-0.20	0.24
13	91	0.00	0.59	-0.20	0.04

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HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	1.33 (cfs)
Volume.....	=	0.08 (acft)
Time Interval.....	=	7 (min)
Time to Peak.....	=	46.15 (min)
Time of Base.....	=	92.30 (min)
Multiplication factor.....	=	1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient.....	=	0.40000
Receding limb factor.....	=	1.00000

[RESERVOIR STORAGE]

Maximum Outflow.....	=	0.00000 (cfs)
Maximum Storage.....	=	0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area.....	=	4.32 (ac)
Curve Number.....	=	73
Runoff coefficient.....	=	0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.02100
Flow Length (L).....	=	1440.00 (ft)
Time of Concentration.....	=	46.15 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SYNTHETIC
Total Precipitation.....	=	0.59 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	0.77 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 22
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW WEST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 7 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	7	0.09	0.09	0.20	0.20
2	14	0.09	0.18	0.20	0.40
3	21	0.09	0.27	0.20	0.60
4	28	0.09	0.36	0.20	0.80
5	35	0.09	0.45	0.20	1.01
6	42	0.09	0.54	0.20	1.21
7	49	0.05	0.59	0.04	1.24
8	56	0.00	0.59	-0.20	1.04
9	63	0.00	0.59	-0.20	0.84
10	70	0.00	0.59	-0.20	0.64
11	77	0.00	0.59	-0.20	0.44
12	84	0.00	0.59	-0.20	0.24
13	91	0.00	0.59	-0.20	0.04

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HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	0.48 (cfs)
Volume.....	=	0.02 (acft)
Time Interval.....	=	5 (min)
Time to Peak.....	=	33.90 (min)
Time of Base.....	=	67.80 (min)
Multiplication factor.....	=	1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient.....	=	0.40000
Receding limb factor.....	=	1.00000

[RESERVOIR STORAGE]

Maximum Outflow.....	=	0.00000 (cfs)
Maximum Storage.....	=	0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area.....	=	1.30 (ac)
Curve Number.....	=	73
Runoff coefficient.....	=	0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.01000
Flow Length (L).....	=	540.00 (ft)
Time of Concentration.....	=	33.90 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SYNTHETIC
Total Precipitation.....	=	0.53 (in)
Return Period.....	=	5 (yr)
Storm Duration.....	=	0.57 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 5 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	5	0.08	0.08	0.07	0.07
2	10	0.08	0.15	0.07	0.14
3	15	0.08	0.23	0.07	0.21
4	20	0.08	0.31	0.07	0.29
5	25	0.08	0.39	0.07	0.36
6	30	0.08	0.46	0.07	0.43
7	35	0.06	0.53	0.04	0.47
8	40	0.00	0.53	-0.07	0.40
9	45	0.00	0.53	-0.07	0.33
10	50	0.00	0.53	-0.07	0.25
11	55	0.00	0.53	-0.07	0.18
12	60	0.00	0.53	-0.07	0.11
3	65	0.00	0.53	-0.07	0.04

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HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	0.93 (cfs)
Volume.....	=	0.04 (acft)
Time Interval.....	=	5 (min)
Time to Peak.....	=	33.90 (min)
Time of Base.....	=	67.80 (min)
Multiplication factor.....	=	1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient.....	=	0.40000
Receding limb factor.....	=	1.00000

[RESERVOIR STORAGE]

Maximum Outflow.....	=	0.00000 (cfs)
Maximum Storage.....	=	0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area.....	=	1.30 (ac)
Curve Number.....	=	73
Runoff coefficient.....	=	0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.01000
Flow Length (L).....	=	540.00 (ft)
Time of Concentration.....	=	33.90 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SYNTHETIC
Total Precipitation.....	=	1.01 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	0.57 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 19
 TYPE : MOD. RATIONAL
 DESCRIPTION : STORM DRAIN AT KIMBERLY AND GOLD MEADOW EAST SIDE

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 5 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	5	0.15	0.15	0.14	0.14
2	10	0.15	0.30	0.14	0.27
3	15	0.15	0.45	0.14	0.41
4	20	0.15	0.60	0.14	0.55
5	25	0.15	0.75	0.14	0.69
6	30	0.15	0.90	0.14	0.82
7	35	0.12	1.01	0.08	0.90
8	40	0.00	1.01	-0.14	0.76
9	45	0.00	1.01	-0.14	0.63
10	50	0.00	1.01	-0.14	0.49
11	55	0.00	1.01	-0.14	0.35
12	60	0.00	1.01	-0.14	0.21
3	65	0.00	1.01	-0.14	0.08

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 3.90 (cfs)
 Volume..... = 0.28 (acft)
 Time Interval..... = 9 (min)
 Time to Peak..... = 52.77 (min)
 Time of Base..... = 105.54 (min)
 Multiplication factor..... = 1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient..... = 0.40000
 Receding limb factor..... = 1.00000

[RESERVOIR STORAGE]

Maximum Outflow..... = 0.00000 (cfs)
 Maximum Storage..... = 0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area..... = 13.80 (ac)
 Curve Number..... = 73
 Runoff coefficient..... = 0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02000
 Flow Length (L)..... = 1724.00 (ft)
 Time of Concentration..... = 52.77 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SYNTHETIC
 Total Precipitation..... = 0.62 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 0.88 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 9 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	9	0.11	0.11	0.67	0.67
2	18	0.11	0.21	0.67	1.33
3	27	0.11	0.32	0.67	2.00
4	36	0.11	0.42	0.67	2.66
5	45	0.11	0.53	0.67	3.33
6	54	0.09	0.62	0.48	3.81
7	63	0.00	0.62	-0.67	3.14
8	72	0.00	0.62	-0.67	2.48
9	81	0.00	0.62	-0.67	1.81
10	90	0.00	0.62	-0.67	1.15
11	99	0.00	0.62	-0.67	0.48

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HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	7.51 (cfs)
Volume.....	=	0.55 (acft)
Time Interval.....	=	9 (min)
Time to Peak.....	=	52.77 (min)
Time of Base.....	=	105.54 (min)
Multiplication factor.....	=	1.00

[RATIONAL HYDROGRAPH INFORMATION]

Runoff Coeficient.....	=	0.40000
Receding limb factor.....	=	1.00000

[RESERVOIR STORAGE]

Maximum Outflow.....	=	0.00000 (cfs)
Maximum Storage.....	=	0.00000 (acft)

[BASIN DESCRIPTION]

Watershed Area.....	=	13.80 (ac)
Curve Number.....	=	73
Runoff coefficient.....	=	0.40

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.02000
Flow Length (L).....	=	1724.00 (ft)
Time of Concentration.....	=	52.77 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SYNTHETIC
Total Precipitation.....	=	1.20 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	0.88 (hr)

HYDROGRAPH REPORT

RECORD NUMBER : 18
 TYPE : MOD. RATIONAL
 DESCRIPTION : STOTM DRAIN AT KIMBERLY AND SHADOW BROOK CT

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 9 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
1	9	0.20	0.20	1.28	1.28
2	18	0.20	0.41	1.28	2.56
3	27	0.20	0.61	1.28	3.84
4	36	0.20	0.82	1.28	5.12
5	45	0.20	1.02	1.28	6.41
6	54	0.18	1.20	0.93	7.34
7	63	0.00	1.20	-1.28	6.06
8	72	0.00	1.20	-1.28	4.77
9	81	0.00	1.20	-1.28	3.49
10	90	0.00	1.20	-1.28	2.21
11	99	0.00	1.20	-1.28	0.93

INLET GRATE CAPACITY
AT KIMBERLY & SHADOW BROOK CT.

$$S_L = 3.12\% \quad S_T = 8\%$$

$$D = 2.4'' = .2' \quad K = 37$$

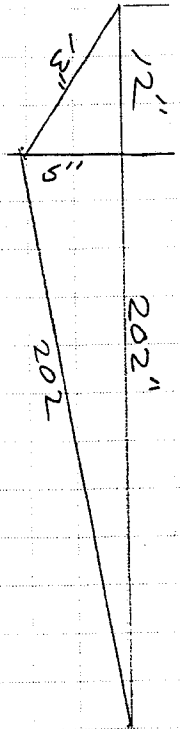
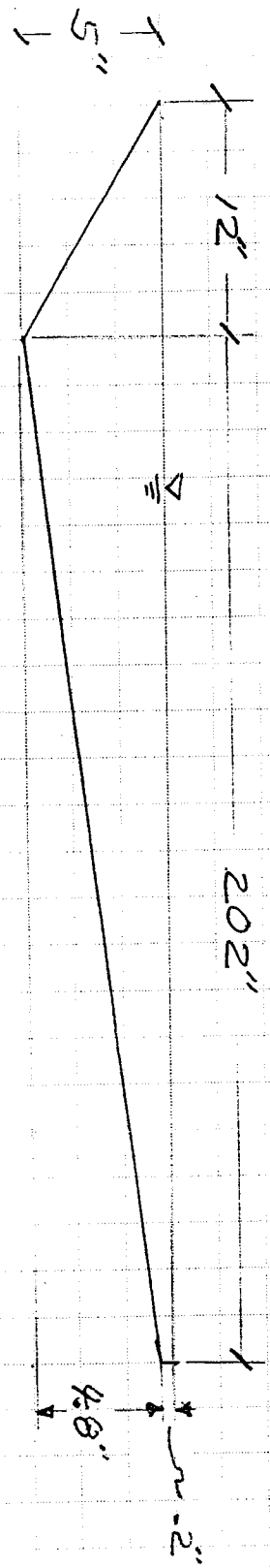
$$Q_{5\% / TL} = 3.89 \text{ cfs}$$

INLET GRATE CAPACITY:
NEENAH R-3246-A

$$Q = K D^{5/8} = (37)(.2)^{5/8} = 2.3 \text{ cfs}$$

$$Q_{\text{BYPASS}} = 3.89 - 2.3 = .59 \text{ cfs}$$

TYPE II CURB & GUTTER FULL STREET



$$A = \frac{5 \times 202}{2} + \frac{5 \times 12}{2} = 536 \text{ in}^2 = 3.7 \text{ FT}^2$$

$$P = 13 + 202 = 225 \text{ in} = 18.75 \text{ FT}$$

$$R = A/P = 3.7 / 18.75 = 0.19$$

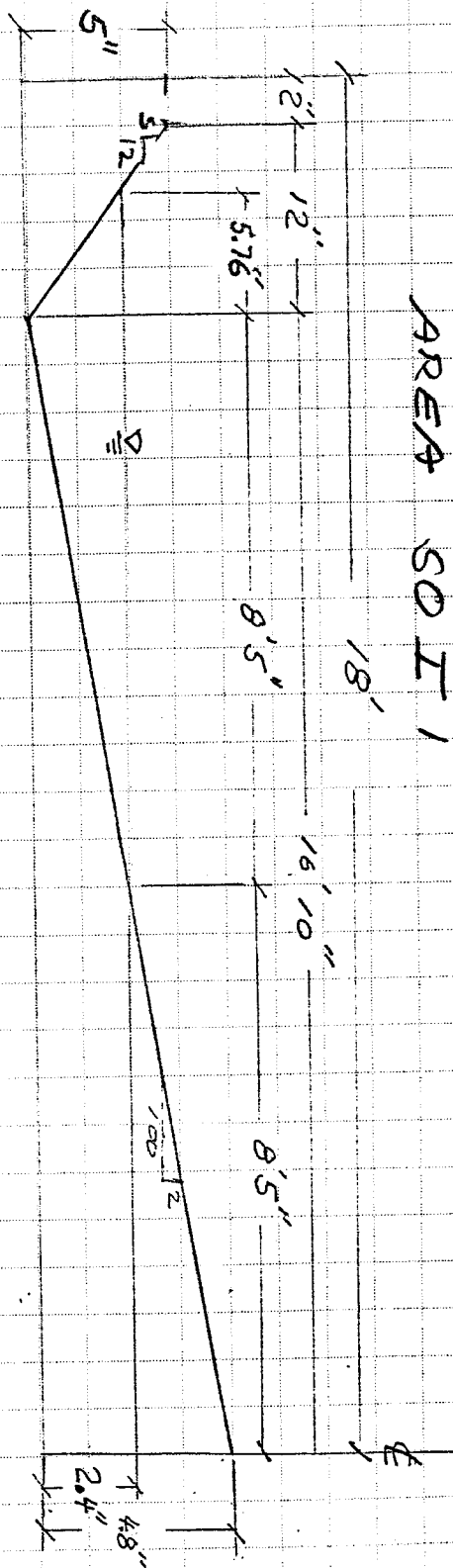
$$Q2 = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$5 = 0.0313$
 $n = 0.13$

$$= \underline{\underline{25.64}} = 45$$

THE L CONFORMATION

AREA SO I I



1 LAUE OPEN
 KIMBERLY & SHADOW BROOK
 5YR EC = DURATION

$$A = \frac{6.24 \times 101}{2} + \frac{5.76 \times 2.4}{2} = 128.11 \text{ m}^2 = 0.89 \text{ FT}^2$$

$$P = 6.24 + 101 = 107.24 = 8.94 \text{ FT}$$

$$R = A/P = 0.89 / 8.94 = 0.099$$

$$n = 0.13 \quad 5 = 0$$

$$Q_2 = \frac{1.0486}{0.013} (0.89)^{0.099} (0.13)^{1/2} = 3.92 \text{ CAS}$$

KIMBERLY & SHADOW BROOK CT.

SLOPE	LENGTH	L x S
.004	407	1.628
.03	505	15.15
.02	612	12.24
.313	<u>200</u>	<u>6.26</u>
	Σ 1724	35.28

$$WT \text{ SLOPE} = \frac{35.28}{1724} = .020$$

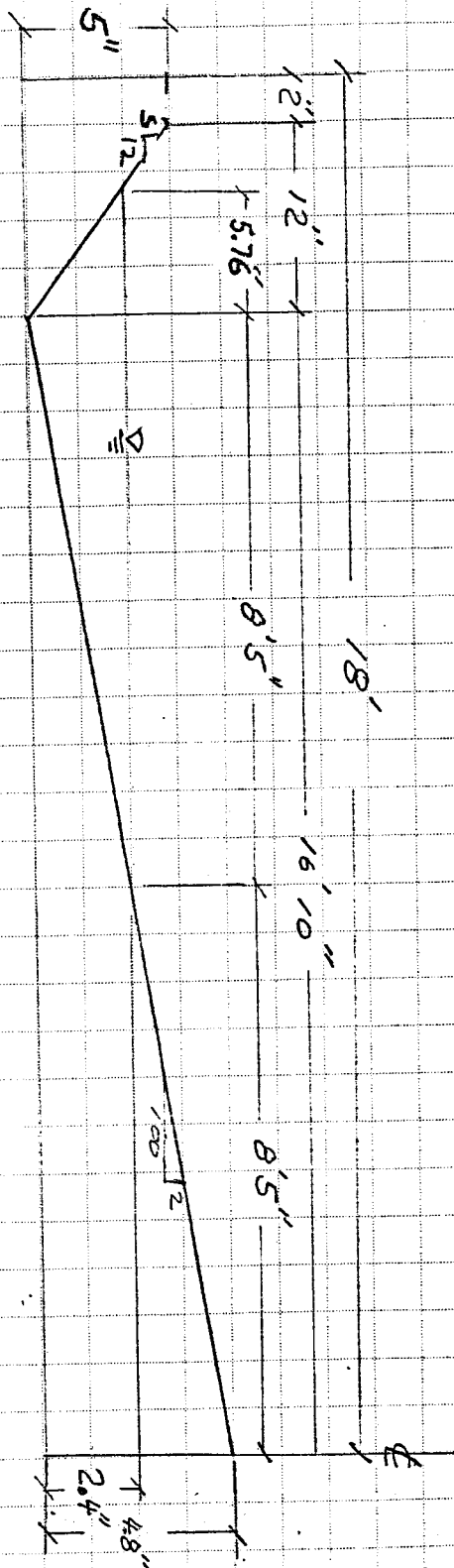
$$AREA = 13.8 \text{ acres}$$

$$Q_{max}^{5yr} = 3.89 \text{ cfs} \quad Q_{max}^{100yr} = 7.51$$

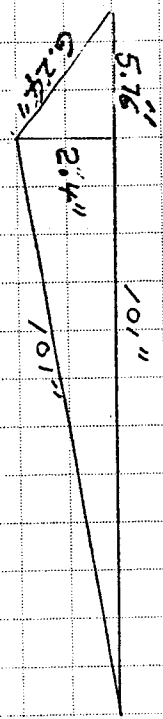
$$Q_{max}^{5yr} \text{ SECTION} = 3.92 \text{ cfs}$$

$$Q_{max}^{100yr} \text{ SECTION} = 25.64 \text{ cfs}$$

TYPE II CURB & GUTTER / LAVER OPEN



1 LAVER OPEN
 KIMBERLY & GOLD CT
 5YR TC = DURATION



$$A = \frac{2.4 \times 10.1}{2} + \frac{5.76 \times 2.4}{2} = 128.11 \text{ in}^2 = .89 \text{ FT}^2$$

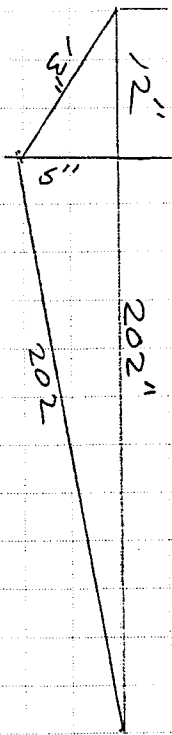
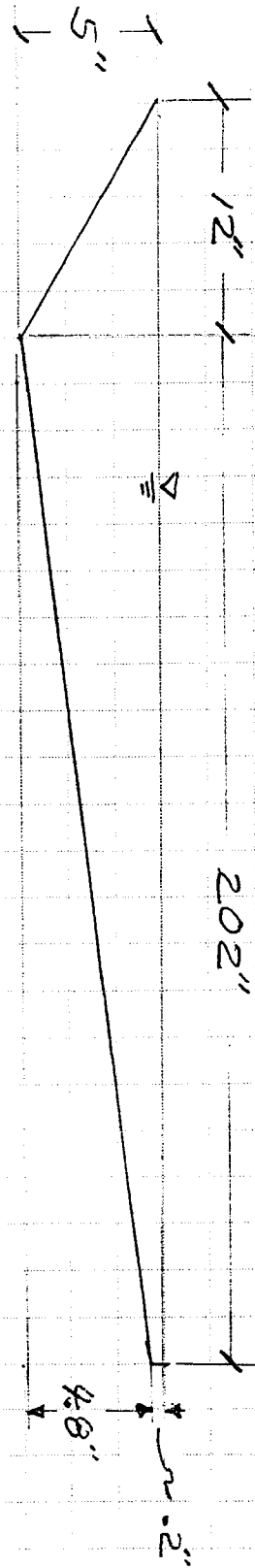
$$P = 6.24 + 10.1 = 16.34 \text{ FT}$$

$$R = A/P = .89 / 16.34 = .054$$

$$n = .013 \quad S = .016$$

$$Q = \frac{1.486}{.013} (.054)^{2/3} (.016)^{1/2} = 1.40 \text{ cfs}$$

TYPE II CURB & GUTTER (FULL STREET) 185



$$A = \frac{5 \times 202}{2} + \frac{5 \times 12}{2} = 536 \text{ in}^2 = 3.7 \text{ ft}^2$$

$$P = 13 + 202 = 225 \text{ in} = 18.75 \text{ ft}$$

$$R = A/P = 3.7 / 18.75 = 0.19$$

$$Q_2 = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

$$S = 0.004$$

$$n = 0.13$$

$$= \underline{\underline{9.16}}$$

INLET GRATE CAPACITY EAST SIDE
KIMBERLY & GOLD MEADOW CT

$$SL = .004 \quad S_e = 8\%$$

$$D = .2' \quad K = 12$$

INLET GRATE CAPACITY

$$Q = KD^{5/3} = (12)(.2)^{5/3} = .82$$

$$Q = Q_{max} - Q_{inlet} = 1.17 - .82 = .35 \text{ cfs OK}$$

(EAST SIDE)
 KIMBERLY & GOLD MEADOW CT

SLOPE	LP	S x L
.0313	47	1.47
.004	313	1.25
.015	<u>180</u>	<u>2.7</u>
	Σ 540	Σ 5.42

WT SLOPE = $\frac{5.42}{540} = .01$

AREA = 1.3 acres

$n = .013$ $s = .01$ $LP = 540$ $Q_{BYPASS} = .59 cfs$

$Q_{max}^{5yr} = .48 cfs$ $Q_{max}^{100yr} = .93 cfs$

$Q_{max}^{5yr} SECTION = 1.40 cfs$

$Q_{max}^{100yr} SECTION = 9.16$
 □

HYDRAULICS AND HYDROLOGY

Drain Entrance Location	Kimberly and Shadow Brook Court	Kimberly and Gold Meadow Court	Kimberly and Gold Meadow Court
		East	West
Area	13.8 acres	1.3	4.32
Wt. Slope	.020 FT/FT	.010	.021
Length of Path	1724 FT	540	1444
CN	73	73	73
C	.4	.4	.4
Q max (5 year, tc=duration)	3.89 cfs	.48	1.32
Q max (100 year, tc=duration)	7.51 cfs	.93	2.56
Q max street section (5 year)	3.92 cfs	1.40	1.40
Q max street section (100 year)	25.64 cfs	9.16	9.16
Q inlet	2.3 cfs	.82	.82
Q bypass	.59 cfs	0	.50
Q carryover	0 cfs	.35	0

(WEST SIDE)
INLET GRATE CAPACITY
KIMBERLY & GOLD MEADOW CT

$$S_L = .004 \quad S_E = 8\%$$

$$D = .2' \quad K = 12$$

INLET GRATE CAPACITY

$$Q = KD^{5/3} = (12)(.2)^{5/3} = .82 \text{ cfs}$$

$$Q = Q_{\max} - Q_{\text{inlet}} = 1.32 - .82 = .50 \text{ cfs OK}$$

HYDROGRAPH REPORT

RECORD NUMBER : 24
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 3.01 (cfs)
 Volume..... = 3.36 (acft)
 Time Interval..... = 19 (min)
 Time to Peak..... = 1140.00 (min)
 Time of Base..... = 1748.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 18
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 97.37 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 19 (min)
 Time to Peak..... = 76.42 (min)
 Time of Base..... = 382.12 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 68.78 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 164.00 (ac)
 Curve Number..... = 68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4830.00 (ft)
 Time of Concentration..... = 114.64 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 18
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 PRE DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME (min)	FLOW (cfs)
19	14.00
38	45.33
57	84.75
76	97.32
95	87.62
114	67.02
133	42.04
152	27.80
171	19.06
190	12.64
209	8.45
228	5.53
247	3.72
266	2.51
285	1.67
304	1.11
323	0.81
342	0.52
361	0.27
380	0.03

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
513	0.05
532	0.18
551	0.41
570	0.72
589	1.04
608	1.32
627	1.56
646	1.75
665	1.92
684	2.06
703	2.17
722	2.27
741	2.34
760	2.39
779	2.43
798	2.47
817	2.51
836	2.56
855	2.62
874	2.66
893	2.71
912	2.75

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
931	2.79
950	2.83
969	2.87
988	2.90
1007	2.92
1026	2.95
1045	2.97
1064	2.98
1083	3.00
1102	3.00
1121	3.01
1140	3.01
1159	3.01
1178	3.01
1197	3.00
1216	2.99
1235	2.98
1254	2.96
1273	2.95
1292	2.93
1311	2.90
1330	2.88

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
1349	2.85
1368	2.82
1387	2.79
1406	2.76
1425	2.65
1444	2.40
1463	1.95
1482	1.44
1501	0.99
1520	0.65
1539	0.43
1558	0.29
1577	0.19
1596	0.13
1615	0.08
1634	0.05
1653	0.04
1672	0.02
1691	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 3.95 (cfs)
 Volume..... = 4.95 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 1035.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
HOUSING	92.00	75
GOLF COURSE & OPEN SPACE	50.20	61
CONDOS	21.50	85
Overall Approximation	163.70	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME (min)	FLOW (cfs)
15	15.56
30	49.98
45	97.25
60	116.48
75	110.14
90	89.13
105	59.09
120	39.21
135	27.30
150	18.45
165	12.51
180	8.53
195	5.79
210	3.97
225	2.71
240	1.81
255	1.26
270	0.93
285	0.59
300	0.32
315	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
480	0.08
495	0.36
510	0.89
525	1.56
540	2.22
555	2.77
570	3.14
585	3.35
600	3.48
615	3.56
630	3.61
645	3.65
660	3.69
675	3.73
690	3.75
705	3.77
720	3.78
735	3.78
750	3.77
765	3.75
780	3.73
795	3.71

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
810	3.71
825	3.73
840	3.75
855	3.78
870	3.80
885	3.82
900	3.84
915	3.86
930	3.88
945	3.90
960	3.92
975	3.93
990	3.94
1005	3.94
1020	3.95
1035	3.95
1050	3.95
1065	3.95
1080	3.94
1095	3.94
1110	3.93
1125	3.92

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1140	3.91
1155	3.89
1170	3.87
1185	3.86
1200	3.84
1215	3.81
1230	3.79
1245	3.76
1260	3.74
1275	3.71
1290	3.68
1305	3.65
1320	3.62
1335	3.58
1350	3.55
1365	3.51
1380	3.47
1395	3.43
1410	3.39
1425	3.35
1440	3.24
1455	2.96

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1470	2.46
1485	1.88
1500	1.33
1515	0.90
1530	0.61
1545	0.41
1560	0.28
1575	0.19
1590	0.13
1605	0.09
1620	0.06
1635	0.04
1650	0.02
1665	0.02

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HYDROGRAPH REPORT

RECORD NUMBER : 24
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	7.69 (cfs)
Volume.....	=	9.05 (acft)
Time Interval.....	=	19 (min)
Time to Peak.....	=	608.00 (min)
Time of Base.....	=	1748.00 (min)
Multiplication factor.....	=	1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #.....	=	18
Unit hydrograph type.....	=	CURVILINEAR UH
Peak Discharge.....	=	97.37 (cfs)
Shape Factor.....	=	484.00
Time Interval.....	=	19 (min)
Time to Peak.....	=	76.42 (min)
Time of Base.....	=	382.12 (min)
Rainfall Excess.....	=	1.00 (in)
Basin Lag Time.....	=	68.78 (min)

[BASIN DESCRIPTION]

Watershed Area.....	=	164.00 (ac)
Curve Number.....	=	68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.01900
Flow Length (L).....	=	4830.00 (ft)
Time of Concentration.....	=	114.64 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	3.10 (in)
Return Period.....	=	25 (yr)
Storm Duration.....	=	24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 18
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 PRE DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME (min)	FLOW (cfs)
19	14.00
38	45.33
57	84.75
76	97.32
95	87.62
114	67.02
133	42.04
152	27.80
171	19.06
190	12.64
209	8.45
228	5.53
247	3.72
266	2.51
285	1.67
304	1.11
323	0.81
342	0.52
361	0.27
380	0.03

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
456	0.02
475	0.33
494	1.29
513	2.99
532	4.88
551	6.38
570	7.31
589	7.66
608	7.69
627	7.65
646	7.57
665	7.48
684	7.41
703	7.34
722	7.27
741	7.19
760	7.08
779	6.97
798	6.88
817	6.83
836	6.83
855	6.83

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
874	6.83
893	6.84
912	6.85
931	6.86
950	6.87
969	6.88
988	6.88
1007	6.87
1026	6.87
1045	6.85
1064	6.83
1083	6.81
1102	6.78
1121	6.74
1140	6.70
1159	6.66
1178	6.61
1197	6.56
1216	6.50
1235	6.44
1254	6.37
1273	6.31

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
1292	6.24
1311	6.16
1330	6.08
1349	6.00
1368	5.92
1387	5.83
1406	5.74
1425	5.51
1444	4.96
1463	4.03
1482	2.98
1501	2.05
1520	1.34
1539	0.89
1558	0.60
1577	0.39
1596	0.26
1615	0.17
1634	0.11
1653	0.07
1672	0.05
1691	0.03

HYDROGRAPH REPORT

RECORD NUMBER : 24
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 19 min)

TIME	OUTFLOW
(min)	(cfs)
1710	0.02

3/4/94

HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 13.71 (cfs)
 Volume..... = 12.33 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 555.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
HOUSING	92.00	75
GOLF COURSE & OPEN SPACE	50.20	61
CONDOS	21.50	85
Overall Approximation	163.70	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.17 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME (min)	FLOW (cfs)
15	15.56
30	49.98
45	97.25
60	116.48
75	110.14
90	89.13
105	59.09
120	39.21
135	27.30
150	18.45
165	12.51
180	8.53
195	5.79
210	3.97
225	2.71
240	1.81
255	1.26
270	0.93
285	0.59
300	0.32
315	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
420	0.02
435	0.12
450	0.37
465	1.12
480	2.88
495	5.81
510	9.17
525	11.78
540	13.26
555	13.71
570	13.42
585	12.89
600	12.33
615	11.77
630	11.30
645	10.93
660	10.63
675	10.39
690	10.17
705	9.98
720	9.80
735	9.63

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
750	9.45
765	9.27
780	9.10
795	8.94
810	8.84
825	8.81
840	8.79
855	8.78
870	8.75
885	8.73
900	8.71
915	8.71
930	8.70
945	8.68
960	8.66
975	8.64
990	8.62
1005	8.59
1020	8.56
1035	8.52
1050	8.48
1065	8.44

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1080	8.39
1095	8.34
1110	8.29
1125	8.24
1140	8.18
1155	8.12
1170	8.06
1185	7.99
1200	7.93
1215	7.86
1230	7.78
1245	7.71
1260	7.63
1275	7.55
1290	7.47
1305	7.39
1320	7.31
1335	7.22
1350	7.13
1365	7.04
1380	6.95
1395	6.86

HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1410	6.77
1425	6.67
1440	6.43
1455	5.87
1470	4.88
1485	3.72
1500	2.64
1515	1.78
1530	1.20
1545	0.82
1560	0.55
1575	0.37
1590	0.25
1605	0.17
1620	0.11
1635	0.07
1650	0.05
1665	0.03
1680	0.02

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HYDROGRAPH REPORT

RECORD NUMBER : 25
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 28.83 (cfs)
 Volume..... = 21.42 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 540.00 (min)
 Time of Base..... = 1710.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 19
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 117.11 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 63.43 (min)
 Time of Base..... = 317.13 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 57.08 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
HOUSING	92.00	75
GOLF COURSE & OPEN SPACE	50.20	61
CONDOS	21.50	85
Overall Approximation	163.70	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.01900
 Flow Length (L)..... = 4380.00 (ft)
 Time of Concentration..... = 95.14 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 4.17 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 19
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 1 POST DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME (min)	FLOW (cfs)
15	15.56
30	49.98
45	97.25
60	116.48
75	110.14
90	89.13
105	59.09
120	39.21
135	27.30
150	18.45
165	12.51
180	8.53
195	5.79
210	3.97
225	2.71
240	1.81
255	1.26
270	0.93
285	0.59
300	0.32
315	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
360	0.03
375	0.15
390	0.43
405	0.92
420	1.63
435	2.55
450	3.74
465	5.88
480	9.97
495	16.16
510	22.61
525	26.99
540	28.83
555	28.52
570	26.95
585	25.17
600	23.49
615	21.98
630	20.73
645	19.74
660	18.95
675	18.30

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
690	17.75
705	17.26
720	16.83
735	16.42
750	16.01
765	15.62
780	15.26
795	14.92
810	14.70
825	14.58
840	14.49
855	14.42
870	14.34
885	14.26
900	14.19
915	14.13
930	14.08
945	14.02
960	13.95
975	13.88
990	13.81
1005	13.73

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1020	13.65
1035	13.56
1050	13.47
1065	13.38
1080	13.28
1095	13.18
1110	13.07
1125	12.96
1140	12.85
1155	12.73
1170	12.62
1185	12.49
1200	12.37
1215	12.24
1230	12.11
1245	11.98
1260	11.85
1275	11.71
1290	11.57
1305	11.43
1320	11.29
1335	11.14

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1350	10.99
1365	10.84
1380	10.69
1395	10.54
1410	10.38
1425	10.22
1440	9.85
1455	8.98
1470	7.46
1485	5.69
1500	4.04
1515	2.72
1530	1.84
1545	1.25
1560	0.85
1575	0.57
1590	0.38
1605	0.26
1620	0.17
1635	0.11
1650	0.07
1665	0.05

HYDROGRAPH REPORT

RECORD NUMBER : 25
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 1 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 15 min)

TIME	OUTFLOW
(min)	(cfs)
1680	0.03
1695	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 26
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	1.63 (cfs)
Volume.....	=	1.83 (acft)
Time Interval.....	=	13 (min)
Time to Peak.....	=	1118.00 (min)
Time of Base.....	=	1638.00 (min)
Multiplication factor.....	=	1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #.....	=	20
Unit hydrograph type.....	=	CURVILINEAR UH
Peak Discharge.....	=	75.10 (cfs)
Shape Factor.....	=	484.00
Time Interval.....	=	13 (min)
Time to Peak.....	=	53.47 (min)
Time of Base.....	=	267.37 (min)
Rainfall Excess.....	=	1.00 (in)
Basin Lag Time.....	=	48.13 (min)

[BASIN DESCRIPTION]

Watershed Area.....	=	88.50 (ac)
Curve Number.....	=	68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.02700
Flow Length (L).....	=	3850.00 (ft)
Time of Concentration.....	=	80.21 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	2.17 (in)
Return Period.....	=	5 (yr)
Storm Duration.....	=	24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 20
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	10.42
26	33.64
39	64.00
52	74.89
65	69.02
78	54.17
91	34.45
104	23.10
117	15.87
130	10.57
143	7.20
156	4.81
169	3.23
182	2.17
195	1.47
208	0.99
221	0.71
234	0.49
247	0.29
260	0.10

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
507	0.03
520	0.09
533	0.20
546	0.35
559	0.51
572	0.65
585	0.76
598	0.85
611	0.93
624	1.00
637	1.06
650	1.11
663	1.16
676	1.20
689	1.23
702	1.26
715	1.29
728	1.31
741	1.32
754	1.33
767	1.33
780	1.34

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
793	1.35
806	1.37
819	1.40
832	1.42
845	1.44
858	1.45
871	1.47
884	1.48
897	1.50
910	1.51
923	1.53
936	1.54
949	1.55
962	1.57
975	1.58
988	1.58
1001	1.59
1014	1.60
1027	1.61
1040	1.61
1053	1.62
1066	1.62

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1079	1.62
1092	1.63
1105	1.63
1118	1.63
1131	1.63
1144	1.63
1157	1.62
1170	1.62
1183	1.62
1196	1.61
1209	1.61
1222	1.60
1235	1.60
1248	1.59
1261	1.58
1274	1.57
1287	1.57
1300	1.56
1313	1.55
1326	1.54
1339	1.53
1352	1.51

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1417	5.21
1430	5.03
1443	4.56
1456	3.73
1469	2.78
1482	1.93
1495	1.27
1508	0.85
1521	0.57
1534	0.38
1547	0.25
1560	0.17
1573	0.11
1586	0.07
1599	0.05
1612	0.03
1625	0.02

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HYDROGRAPH REPORT

RECORD NUMBER : 28
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 13.29 (cfs)
 Volume..... = 14.78 (acft)
 Time Interval..... = 14 (min)
 Time to Peak..... = 574.00 (min)
 Time of Base..... = 1680.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 22
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 204.55 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 14 (min)
 Time to Peak..... = 59.01 (min)
 Time of Base..... = 295.04 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 53.11 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 266.00 (ac)
 Curve Number..... = 68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 88.51 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 22
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME (min)	FLOW (cfs)
14	27.31
28	87.80
42	170.38
56	203.50
70	191.91
84	154.73
98	102.11
112	67.74
126	47.17
140	31.75
154	21.58
168	14.69
182	9.96
196	6.81
210	4.63
224	3.09
238	2.17
252	1.59
266	1.01
280	0.52
294	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
462	0.14
476	0.90
490	2.79
504	5.72
518	8.76
532	11.14
546	12.60
560	13.21
574	13.29
588	13.15
602	12.91
616	12.67
630	12.47
644	12.29
658	12.15
672	12.04
686	11.94
700	11.85
714	11.77
728	11.67
742	11.52
756	11.36

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

Table with 2 columns: TIME (min) and OUTFLOW (cfs). Data points range from 770 to 1064 minutes and 11.05 to 11.20 cfs.

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
1078	11.02
1092	10.98
1106	10.94
1120	10.89
1134	10.84
1148	10.78
1162	10.72
1176	10.66
1190	10.59
1204	10.52
1218	10.44
1232	10.37
1246	10.29
1260	10.20
1274	10.12
1288	10.03
1302	9.94
1316	9.84
1330	9.74
1344	9.64
1358	9.54
1372	9.43

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
1386	9.33
1400	9.22
1414	9.10
1428	8.79
1442	8.03
1456	6.67
1470	5.08
1484	3.60
1498	2.42
1512	1.63
1526	1.11
1540	0.75
1554	0.51
1568	0.34
1582	0.23
1596	0.15
1610	0.10
1624	0.06
1638	0.04
1652	0.02
1666	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	21.12 (cfs)
Volume.....	=	18.24 (acft)
Time Interval.....	=	13 (min)
Time to Peak.....	=	546.00 (min)
Time of Base.....	=	1664.00 (min)
Multiplication factor.....	=	1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #.....	=	23
Unit hydrograph type.....	=	CURVILINEAR UH
Peak Discharge.....	=	219.26 (cfs)
Shape Factor.....	=	484.00
Time Interval.....	=	13 (min)
Time to Peak.....	=	52.96 (min)
Time of Base.....	=	264.79 (min)
Rainfall Excess.....	=	1.00 (in)
Basin Lag Time.....	=	47.66 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	60.60	61
HOUSING	65.00	75
CONDOS	19.40	85
COMMERCIAL	28.00	94
UNDEVELOPED	79.60	68
MAINTENANCE	3.30	70
Overall Approximation	255.90	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.05000
Flow Length (L).....	=	6400.00 (ft)
Time of Concentration.....	=	79.44 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	3.10 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	24.00 (hr)

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	30.90
26	99.88
39	188.58
52	218.86
65	199.71
78	155.04
91	98.04
104	65.36
117	44.77
130	29.83
143	20.16
156	13.37
169	8.91
182	6.04

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
195	4.06
208	2.73
221	1.96
234	1.31
247	0.74
260	0.20

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
416	0.01
429	0.09
442	0.32
455	0.96
468	2.58
481	5.93
494	10.87

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
507	15.90
520	19.38
533	20.98
546	21.12
559	20.46
572	19.61
585	18.69
598	17.79
611	17.06
624	16.48
637	16.03
650	15.66
663	15.34
676	15.09
689	14.85
702	14.64
715	14.43
728	14.22
741	13.97
754	13.72
767	13.48
780	13.25

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
793	13.13
806	13.10
819	13.13
832	13.15
845	13.14
858	13.09
871	13.05
884	13.03
897	13.02
910	13.02
923	13.01
936	12.99
949	12.97
962	12.95
975	12.92
988	12.88
1001	12.85
1014	12.80
1027	12.76
1040	12.71
1053	12.65
1066	12.60

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1079	12.54
1092	12.47
1105	12.40
1118	12.33
1131	12.26
1144	12.18
1157	12.10
1170	12.02
1183	11.94
1196	11.85
1209	11.76
1222	11.66
1235	11.57
1248	11.47
1261	11.37
1274	11.26
1287	11.16
1300	11.05
1313	10.94
1326	10.83
1339	10.71
1352	10.60

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1365	10.48
1378	10.36
1391	10.24
1404	10.12
1417	9.99
1430	9.62
1443	8.72
1456	7.13
1469	5.32
1482	3.69
1495	2.42
1508	1.62
1521	1.09
1534	0.73
1547	0.48
1560	0.32
1573	0.21
1586	0.14
1599	0.09
1612	0.06
1625	0.03
1638	0.02

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)

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HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 48.41 (cfs)
 Volume..... = 33.27 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 533.00 (min)
 Time of Base..... = 1664.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 23
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 219.26 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 52.96 (min)
 Time of Base..... = 264.79 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 47.66 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	60.60	61
HOUSING	65.00	75
CONDOS	19.40	85
COMMERCIAL	28.00	94
UNDEVELOPED	79.60	68
MAINTENANCE	3.30	70
Overall Approximation	255.90	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 79.44 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	4.17 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	24.00 (hr)

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	30.90
26	99.88
39	188.58
52	218.86
65	199.71
78	155.04
91	98.04
104	65.36
117	44.77
130	29.83
143	20.16
156	13.37
169	8.91
182	6.04

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
195	4.06
208	2.73
221	1.96
234	1.31
247	0.74
260	0.20

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
351	0.02
364	0.11
377	0.39
390	0.96
403	1.84
416	2.97
429	4.33

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
442	5.96
455	8.36
468	12.88
481	20.94
494	31.71
507	41.56
520	47.18
533	48.41
546	46.63
559	43.59
572	40.58
585	37.75
598	35.19
611	33.12
624	31.51
637	30.23
650	29.19
663	28.32
676	27.59
689	26.95
702	26.36
715	25.81

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
728	25.29
741	24.73
754	24.17
767	23.64
780	23.14
793	22.84
806	22.70
819	22.66
832	22.64
845	22.53
858	22.39
871	22.25
884	22.15
897	22.08
910	22.01
923	21.94
936	21.86
949	21.77
962	21.68
975	21.58
988	21.48
1001	21.37

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1014	21.25
1027	21.13
1040	21.01
1053	20.88
1066	20.75
1079	20.61
1092	20.47
1105	20.32
1118	20.17
1131	20.02
1144	19.86
1157	19.70
1170	19.54
1183	19.37
1196	19.20
1209	19.03
1222	18.85
1235	18.67
1248	18.49
1261	18.31
1274	18.12
1287	17.93

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1300	17.73
1313	17.54
1326	17.34
1339	17.14
1352	16.94
1365	16.73
1378	16.52
1391	16.31
1404	16.10
1417	15.89
1430	15.29
1443	13.84
1456	11.31
1469	8.44
1482	5.85
1495	3.85
1508	2.58
1521	1.73
1534	1.15
1547	0.77
1560	0.51
1573	0.33

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
1586	0.22
1599	0.14
1612	0.09
1625	0.05
1638	0.03
1651	0.01

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 8.06 (cfs)
 Volume..... = 9.34 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1092.00 (min)
 Time of Base..... = 1664.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GLENBROOK WOODED & PASTURE	157.00	78
HAYBOURNE PASTURE	41.00	67
SURPRISE PASTURE	166.00	67
TOIYABE WOODED	6.00	65
TOLL PASTURE	37.00	48
Overall Approximation	407.00	69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	FLOW (cfs)
1	13	43.47
2	26	139.39
3	39	273.55
4	52	330.45
5	65	315.17
6	78	257.86
7	91	173.35
8	104	115.16
9	117	80.14
10	130	54.77
11	143	37.24
12	156	25.27
13	169	17.21
14	182	11.89
15	195	8.16
16	208	5.53
17	221	3.79
18	234	2.80
19	247	1.87
20	260	1.06
21	273	0.28

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
37	481	0.11	0.93	0.01	0.01
38	494	0.06	0.99	0.09	0.09
39	507	0.04	1.03	0.27	0.36
40	520	0.04	1.07	0.54	0.91
41	533	0.04	1.11	0.76	1.67
42	546	0.03	1.14	0.87	2.54
43	559	0.03	1.17	0.84	3.37
44	572	0.03	1.20	0.68	4.05
45	585	0.03	1.22	0.52	4.58
46	598	0.02	1.25	0.40	4.98
47	611	0.02	1.27	0.33	5.31
48	624	0.02	1.29	0.29	5.60
49	637	0.02	1.32	0.25	5.84

50	650	0.02	1.34	0.21	6.05
51	663	0.02	1.36	0.18	6.24
52	676	0.02	1.38	0.16	6.40
53	689	0.02	1.40	0.14	6.54
54	702	0.02	1.42	0.12	6.66
55	715	0.02	1.44	0.10	6.75
56	728	0.02	1.45	0.08	6.83

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
57	741	0.02	1.47	0.04	6.88
58	754	0.02	1.49	0.02	6.89
59	767	0.02	1.50	0.01	6.90
60	780	0.02	1.52	0.00	6.89
61	793	0.02	1.54	0.04	6.93
62	806	0.02	1.56	0.08	7.01
63	819	0.02	1.57	0.10	7.11
64	832	0.02	1.59	0.10	7.22
65	845	0.02	1.60	0.08	7.30
66	858	0.02	1.62	0.06	7.36
67	871	0.02	1.63	0.06	7.42
68	884	0.02	1.65	0.06	7.48
69	897	0.02	1.67	0.07	7.55
70	910	0.02	1.68	0.07	7.62
71	923	0.02	1.70	0.06	7.68
72	936	0.01	1.71	0.06	7.74
73	949	0.01	1.73	0.05	7.79
74	962	0.01	1.74	0.05	7.84
75	975	0.01	1.75	0.04	7.88
76	988	0.01	1.77	0.04	7.92
77	1001	0.01	1.78	0.03	7.95
78	1014	0.01	1.80	0.03	7.98
79	1027	0.01	1.81	0.02	8.00
80	1040	0.01	1.82	0.02	8.02
81	1053	0.01	1.84	0.02	8.04
82	1066	0.01	1.85	0.01	8.05
83	1079	0.01	1.86	0.01	8.05
84	1092	0.01	1.88	0.00	8.06
85	1105	0.01	1.89	0.00	8.06
86	1118	0.01	1.90	0.00	8.05
87	1131	0.01	1.92	-0.01	8.05
88	1144	0.01	1.93	-0.01	8.03
89	1157	0.01	1.94	-0.01	8.02
90	1170	0.01	1.95	-0.02	8.00
91	1183	0.01	1.96	-0.02	7.98
92	1196	0.01	1.98	-0.02	7.96
93	1209	0.01	1.99	-0.03	7.93
94	1222	0.01	2.00	-0.03	7.90
95	1235	0.01	2.01	-0.03	7.86
96	1248	0.01	2.02	-0.04	7.83
97	1261	0.01	2.03	-0.04	7.79
98	1274	0.01	2.04	-0.04	7.74
99	1287	0.01	2.06	-0.05	7.70

100	1300	0.01	2.07	-0.05	7.65
101	1313	0.01	2.08	-0.05	7.60
102	1326	0.01	2.09	-0.05	7.54
3	1339	0.01	2.10	-0.06	7.49
104	1352	0.01	2.11	-0.06	7.43
105	1365	0.01	2.12	-0.06	7.37
106	1378	0.01	2.13	-0.06	7.31

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 5 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
107	1391	0.01	2.14	-0.07	7.24
108	1404	0.01	2.14	-0.07	7.17
109	1417	0.01	2.15	-0.07	7.10
110	1430	0.01	2.16	-0.22	6.88
111	1443	0.01	2.17	-0.56	6.32
112	1456	0.00	2.17	-1.03	5.28
113	1469	0.00	2.17	-1.22	4.06
114	1482	0.00	2.17	-1.16	2.91
115	1495	0.00	2.17	-0.94	1.97
116	1508	0.00	2.17	-0.63	1.33
117	1521	0.00	2.17	-0.42	0.91
118	1534	0.00	2.17	-0.29	0.62
9	1547	0.00	2.17	-0.20	0.42
120	1560	0.00	2.17	-0.14	0.28
121	1573	0.00	2.17	-0.09	0.19
122	1586	0.00	2.17	-0.06	0.13
123	1599	0.00	2.17	-0.04	0.09
124	1612	0.00	2.17	-0.03	0.06
125	1625	0.00	2.17	-0.02	0.04
126	1638	0.00	2.17	-0.01	0.02
127	1651	0.00	2.17	-0.01	0.01
128	1664	0.00	2.17	-0.01	0.00

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 23.41 (cfs)
 Volume..... = 24.22 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 559.00 (min)
 Time of Base..... = 1677.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GLENBROOK WOODED & PASTURE	157.00	78
HAYBOURNE PASTURE	41.00	67
SURPRISE PASTURE	166.00	67
TOIYABE WOODED	6.00	65
TOLL PASTURE	37.00	48
Overall Approximation	407.00	69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	FLOW (cfs)
1	13	43.47
2	26	139.39
3	39	273.55
4	52	330.45
5	65	315.17
6	78	257.86
7	91	173.35
8	104	115.16
9	117	80.14
10	130	54.77
11	143	37.24
12	156	25.27
13	169	17.21
14	182	11.89
15	195	8.16
16	208	5.53
17	221	3.79
18	234	2.80
19	247	1.87
20	260	1.06
21	273	0.28

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
34	442	0.06	0.92	0.00	0.00
35	455	0.09	1.02	0.14	0.14
36	468	0.16	1.17	0.85	0.99
37	481	0.15	1.33	2.55	3.54
38	494	0.09	1.41	4.60	8.14
39	507	0.06	1.48	5.58	13.72
40	520	0.06	1.53	4.74	18.46
41	533	0.05	1.59	3.14	21.60
42	546	0.05	1.63	1.52	23.11
43	559	0.04	1.67	0.30	23.41
44	572	0.04	1.71	-0.26	23.15
45	585	0.04	1.75	-0.52	22.63
46	598	0.04	1.78	-0.65	21.99

47	611	0.03	1.82	-0.59	21.40
48	624	0.03	1.85	-0.47	20.93
50	637	0.03	1.88	-0.37	20.56
51	650	0.03	1.91	-0.31	20.25
52	663	0.03	1.94	-0.26	20.00
53	676	0.03	1.97	-0.21	19.78
	689	0.03	2.00	-0.20	19.58

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
54	702	0.03	2.03	-0.18	19.40
55	715	0.03	2.05	-0.19	19.22
56	728	0.03	2.08	-0.19	19.02
57	741	0.03	2.10	-0.25	18.77
58	754	0.02	2.12	-0.28	18.50
59	767	0.02	2.15	-0.27	18.23
60	780	0.02	2.17	-0.26	17.97
61	793	0.02	2.20	-0.14	17.83
62	806	0.02	2.22	-0.02	17.82
63	819	0.02	2.24	0.06	17.87
64	832	0.02	2.27	0.07	17.94
65	845	0.02	2.29	0.02	17.97
66	858	0.02	2.31	-0.01	17.95
67	871	0.02	2.34	-0.02	17.93
68	884	0.02	2.36	0.00	17.93
69	897	0.02	2.38	0.02	17.95
70	910	0.02	2.40	0.02	17.97
71	923	0.02	2.42	0.02	17.99
72	936	0.02	2.44	0.01	18.00
73	949	0.02	2.47	0.00	18.00
74	962	0.02	2.49	-0.01	18.00
75	975	0.02	2.51	-0.01	17.99
76	988	0.02	2.53	-0.02	17.97
77	1001	0.02	2.55	-0.03	17.94
78	1014	0.02	2.57	-0.03	17.91
79	1027	0.02	2.59	-0.04	17.87
80	1040	0.02	2.61	-0.05	17.82
81	1053	0.02	2.63	-0.05	17.77
82	1066	0.02	2.65	-0.06	17.72
83	1079	0.02	2.66	-0.06	17.65
84	1092	0.02	2.68	-0.07	17.58
85	1105	0.02	2.70	-0.07	17.51
86	1118	0.02	2.72	-0.08	17.43
87	1131	0.02	2.74	-0.09	17.34
88	1144	0.02	2.76	-0.09	17.25
89	1157	0.02	2.77	-0.10	17.16
90	1170	0.02	2.79	-0.10	17.06
91	1183	0.02	2.81	-0.10	16.95
92	1196	0.02	2.82	-0.11	16.84
93	1209	0.02	2.84	-0.11	16.73
94	1222	0.02	2.86	-0.12	16.61
95	1235	0.02	2.87	-0.12	16.49
96	1248	0.02	2.89	-0.13	16.36

97	1261	0.02	2.91	-0.13	16.23
98	1274	0.02	2.92	-0.13	16.10
99	1287	0.02	2.94	-0.14	15.96
0	1300	0.02	2.95	-0.14	15.82
101	1313	0.01	2.97	-0.15	15.67
102	1326	0.01	2.98	-0.15	15.53
103	1339	0.01	3.00	-0.15	15.37

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 25 YR/ 24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
104	1352	0.01	3.01	-0.16	15.22
105	1365	0.01	3.02	-0.16	15.06
106	1378	0.01	3.04	-0.16	14.90
107	1391	0.01	3.05	-0.16	14.73
108	1404	0.01	3.06	-0.17	14.57
109	1417	0.01	3.08	-0.17	14.39
110	1430	0.01	3.09	-0.48	13.91
111	1443	0.01	3.10	-1.16	12.76
112	1456	0.00	3.10	-2.09	10.66
113	1469	0.00	3.10	-2.47	8.19
114	1482	0.00	3.10	-2.33	5.86
115	1495	0.00	3.10	-1.90	3.96
116	1508	0.00	3.10	-1.28	2.69
117	1521	0.00	3.10	-0.85	1.84
118	1534	0.00	3.10	-0.59	1.25
119	1547	0.00	3.10	-0.40	0.85
120	1560	0.00	3.10	-0.27	0.57
121	1573	0.00	3.10	-0.19	0.39
122	1586	0.00	3.10	-0.13	0.26
123	1599	0.00	3.10	-0.09	0.17
124	1612	0.00	3.10	-0.06	0.11
125	1625	0.00	3.10	-0.04	0.07
126	1638	0.00	3.10	-0.03	0.04
127	1651	0.00	3.10	-0.02	0.02
128	1664	0.00	3.10	-0.01	0.01
129	1677	0.00	3.10	-0.01	0.00

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 93.15 (cfs)
 Volume..... = 125.86 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 870.00 (min)
 Time of Base..... = 2310.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 524.53 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 60.64 (min)
 Time of Base..... = 303.20 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 54.58 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 701.00 (ac)
 Curve Number..... = 69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 90.96 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	FLOW (cfs)
1	15	12.97
2	30	39.57
3	45	74.81
4	60	118.43
5	75	172.90
6	90	242.10
7	105	323.44
8	120	396.23
9	135	454.40
10	150	495.54
11	165	519.65
12	180	523.98
13	195	520.76
14	210	502.18
15	225	474.30
16	240	443.02
17	255	408.24
18	270	364.99
19	285	314.75
20	300	268.00
21	315	229.71
22	330	200.17
23	345	174.22
24	360	152.41
25	375	135.13
26	390	119.34
27	405	104.45
28	420	91.47
29	435	78.50
30	450	69.39
31	465	60.74
32	480	53.10
33	495	46.61
34	510	40.19
35	525	35.43
36	540	30.68
37	555	26.85
38	570	23.61
39	585	20.53
40	600	18.15
41	615	15.77
42	630	13.89
43	645	12.16
44	660	10.58

45	675	9.28
46	690	7.98
47	705	7.08
48	720	6.21
49	735	5.52
50	750	5.00
51	765	4.48

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	FLOW (cfs)
52	780	3.96
53	795	3.44
54	810	2.92
55	825	2.44
56	840	2.01
57	855	1.57
58	870	1.14
59	885	0.71
60	900	0.28

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
30	450	0.07	0.96	0.01	0.01
31	465	0.18	1.14	0.17	0.18
32	480	0.18	1.32	0.63	0.81
33	495	0.10	1.42	1.29	2.11
34	510	0.07	1.49	2.04	4.14
35	525	0.07	1.56	2.92	7.07
36	540	0.06	1.61	4.03	11.09
37	555	0.05	1.66	5.31	16.41
38	570	0.04	1.70	6.50	22.90
39	585	0.04	1.75	7.27	30.17
40	600	0.04	1.79	7.66	37.83
41	615	0.04	1.83	7.72	45.55
42	630	0.04	1.86	7.44	52.99
43	645	0.04	1.90	6.96	59.95
44	660	0.03	1.93	6.39	66.34
45	675	0.03	1.97	5.66	71.99
46	690	0.03	2.00	4.92	76.91
47	705	0.03	2.03	4.25	81.16
48	720	0.03	2.06	3.51	84.67
49	735	0.03	2.09	2.66	87.33
50	750	0.03	2.12	1.86	89.20
51	765	0.03	2.15	1.28	90.48
52	780	0.03	2.17	0.91	91.38
53	795	0.03	2.20	0.65	92.03
54	810	0.03	2.23	0.44	92.47

55	825	0.03	2.26	0.31	92.78
56	840	0.03	2.28	0.22	93.01
57	855	0.03	2.31	0.12	93.12
8	870	0.03	2.33	0.03	93.15
59	885	0.03	2.36	-0.02	93.14
60	900	0.03	2.38	-0.06	93.08
61	915	0.03	2.41	-0.05	93.03

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
62	930	0.02	2.43	-0.05	92.98
63	945	0.02	2.46	-0.05	92.93
64	960	0.02	2.48	-0.04	92.89
65	975	0.02	2.51	-0.03	92.86
66	990	0.02	2.53	-0.01	92.85
67	1005	0.02	2.55	-0.01	92.84
68	1020	0.02	2.58	0.00	92.84
69	1035	0.02	2.60	0.00	92.84
70	1050	0.02	2.62	-0.01	92.83
71	1065	0.02	2.64	-0.03	92.80
72	1080	0.02	2.67	-0.06	92.74
73	1095	0.02	2.69	-0.08	92.65
74	1110	0.02	2.71	-0.11	92.55
75	1125	0.02	2.73	-0.14	92.41
76	1140	0.02	2.75	-0.17	92.24
77	1155	0.02	2.77	-0.20	92.04
78	1170	0.02	2.79	-0.23	91.81
79	1185	0.02	2.81	-0.26	91.55
80	1200	0.02	2.83	-0.29	91.26
81	1215	0.02	2.85	-0.32	90.93
82	1230	0.02	2.87	-0.36	90.58
83	1245	0.02	2.89	-0.39	90.19
84	1260	0.02	2.90	-0.43	89.76
85	1275	0.02	2.92	-0.46	89.30
86	1290	0.02	2.94	-0.50	88.80
87	1305	0.02	2.96	-0.53	88.27
88	1320	0.02	2.97	-0.56	87.70
89	1335	0.02	2.99	-0.60	87.11
90	1350	0.02	3.01	-0.63	86.47
91	1365	0.02	3.02	-0.66	85.81
92	1380	0.02	3.04	-0.69	85.12
93	1395	0.02	3.05	-0.71	84.40
94	1410	0.02	3.07	-0.74	83.67
95	1425	0.02	3.09	-0.76	82.90
96	1440	0.01	3.10	-0.89	82.01
97	1455	0.01	3.11	-1.13	80.88
98	1470	-0.01	3.10	-1.43	79.45
99	1485	0.00	3.10	-1.80	77.65
100	1500	0.00	3.10	-2.25	75.40
101	1515	0.00	3.10	-2.80	72.60
102	1530	0.00	3.10	-3.45	69.15
103	1545	0.00	3.10	-4.01	65.13
104	1560	0.00	3.10	-4.45	60.68

105	1575	0.00	3.10	-4.74	55.94
106	1590	0.00	3.10	-4.89	51.06
107	1605	0.00	3.10	-4.87	46.19
3	1620	0.00	3.10	-4.78	41.41
109	1635	0.00	3.10	-4.58	36.83
110	1650	0.00	3.10	-4.30	32.53
111	1665	0.00	3.10	-3.99	28.54

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 25 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
112	1680	0.00	3.10	-3.66	24.88
113	1695	0.00	3.10	-3.26	21.62
114	1710	0.00	3.10	-2.82	18.80
115	1725	0.00	3.10	-2.40	16.39
116	1740	0.00	3.10	-2.06	14.33
117	1755	0.00	3.10	-1.80	12.53
118	1770	0.00	3.10	-1.57	10.96
119	1785	0.00	3.10	-1.37	9.59
120	1800	0.00	3.10	-1.21	8.38
121	1815	0.00	3.10	-1.07	7.31
122	1830	0.00	3.10	-0.94	6.37
123	1845	0.00	3.10	-0.82	5.55
124	1860	0.00	3.10	-0.71	4.85
125	1875	0.00	3.10	-0.62	4.22
126	1890	0.00	3.10	-0.55	3.68
127	1905	0.00	3.10	-0.48	3.20
128	1920	0.00	3.10	-0.42	2.78
129	1935	0.00	3.10	-0.36	2.42
130	1950	0.00	3.10	-0.32	2.10
131	1965	0.00	3.10	-0.28	1.83
132	1980	0.00	3.10	-0.24	1.59
133	1995	0.00	3.10	-0.21	1.38
134	2010	0.00	3.10	-0.18	1.19
135	2025	0.00	3.10	-0.16	1.03
136	2040	0.00	3.10	-0.14	0.89
137	2055	0.00	3.10	-0.12	0.76
138	2070	0.00	3.10	-0.11	0.66
139	2085	0.00	3.10	-0.09	0.56
140	2100	0.00	3.10	-0.08	0.48
141	2115	0.00	3.10	-0.07	0.41
142	2130	0.00	3.10	-0.06	0.34
143	2145	0.00	3.10	-0.06	0.29
144	2160	0.00	3.10	-0.05	0.24
145	2175	0.00	3.10	-0.04	0.20
146	2190	0.00	3.10	-0.04	0.16
147	2205	0.00	3.10	-0.03	0.12
148	2220	0.00	3.10	-0.03	0.09
149	2235	0.00	3.10	-0.02	0.07
150	2250	0.00	3.10	-0.02	0.05
151	2265	0.00	3.10	-0.02	0.03
152	2280	0.00	3.10	-0.01	0.02
153	2295	0.00	3.10	-0.01	0.01
154	2310	0.00	3.10	-0.01	0.00

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 213.87 (cfs)
 Volume..... = 46.52 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 767.00 (min)
 Time of Base..... = 1677.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 3
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 332.57 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 13 (min)
 Time to Peak..... = 55.53 (min)
 Time of Base..... = 277.65 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 49.98 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GLENBROOK WOODED & PASTURE	157.00	78
HAYBOURNE PASTURE	41.00	67
SURPRISE PASTURE	166.00	67
TOIYABE WOODED	6.00	65
TOLL PASTURE	37.00	48
Overall Approximation	407.00	69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12000
 Flow Length (L)..... = 10600.00 (ft)
 Time of Concentration..... = 83.30 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 3
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS II
Total Precipitation.....	=	4.17 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	24.00 (hr)

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	43.47
26	139.39
39	273.55
52	330.45
65	315.17
78	257.86
91	173.35
104	115.16
117	80.14
130	54.77
143	37.24
156	25.27
169	17.21
182	11.89

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : CURVILINEAR UH
DESCRIPTION : AREA B UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME (min)	FLOW (cfs)
195	8.16
208	5.53
221	3.79
234	2.80
247	1.87
260	1.06
273	0.28

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
650	0.01
663	0.11
676	0.52
689	1.60
702	5.38
715	26.62
728	75.00
741	144.72
754	196.72
767	213.87
780	201.84
793	169.90
806	137.79
819	113.52
832	94.84
845	80.15
858	68.64
871	59.67
884	52.74
897	47.37
910	43.17
923	39.87

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
936	37.24
949	34.93
962	32.78
975	30.76
988	29.01
1001	27.57
1014	26.36
1027	25.35
1040	24.50
1053	23.76
1066	23.10
1079	22.48
1092	21.89
1105	21.32
1118	20.76
1131	20.21
1144	19.66
1157	19.10
1170	18.55
1183	18.00
1196	17.44
1209	16.88

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1222	16.34
1235	15.83
1248	15.40
1261	15.04
1274	14.76
1287	14.53
1300	14.35
1313	14.19
1326	14.05
1339	13.93
1352	13.81
1365	13.70
1378	13.59
1391	13.48
1404	13.37
1417	13.27
1430	12.87
1443	11.84
1456	9.91
1469	7.63
1482	5.46
1495	3.69

HYDROGRAPH REPORT

RECORD NUMBER : 3
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA B OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1508	2.50
1521	1.71
1534	1.16
1547	0.79
1560	0.53
1573	0.36
1586	0.24
1599	0.16
1612	0.10
1625	0.07
1638	0.04
1651	0.02
1664	0.01

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 40.82 (cfs)
 Volume..... = 48.60 (acft)
 Time Interval..... = 15 (min)
 Time to Peak..... = 1275.00 (min)
 Time of Base..... = 2310.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 524.53 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 15 (min)
 Time to Peak..... = 60.64 (min)
 Time of Base..... = 303.20 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 54.58 (min)

[BASIN DESCRIPTION]

Watershed Area..... = 701.00 (ac)
 Curve Number..... = 69

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 90.96 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	FLOW (cfs)
1	15	12.97
2	30	39.57
3	45	74.81
4	60	118.43
5	75	172.90
6	90	242.10
7	105	323.44
8	120	396.23
9	135	454.40
10	150	495.54
11	165	519.65
12	180	523.98
13	195	520.76
14	210	502.18
15	225	474.30
16	240	443.02
17	255	408.24
18	270	364.99
19	285	314.75
20	300	268.00
21	315	229.71
22	330	200.17
23	345	174.22
24	360	152.41
25	375	135.13
26	390	119.34
27	405	104.45
28	420	91.47
29	435	78.50
30	450	69.39
31	465	60.74
32	480	53.10
33	495	46.61
34	510	40.19
35	525	35.43
36	540	30.68
37	555	26.85
38	570	23.61
39	585	20.53
40	600	18.15
41	615	15.77
42	630	13.89
43	645	12.16
44	660	10.58

45	675	9.28
46	690	7.98
47	705	7.08
48	720	6.21
49	735	5.52
50	750	5.00
51	765	4.48

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	FLOW (cfs)
52	780	3.96
53	795	3.44
54	810	2.92
55	825	2.44
56	840	2.01
57	855	1.57
58	870	1.14
59	885	0.71
60	900	0.28

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
32	480	0.13	0.92	0.00	0.00
33	495	0.07	0.99	0.03	0.03
34	510	0.05	1.04	0.08	0.11
35	525	0.05	1.09	0.18	0.29
36	540	0.04	1.13	0.31	0.60
37	555	0.03	1.16	0.47	1.07
38	570	0.03	1.19	0.67	1.74
39	585	0.03	1.22	0.92	2.66
40	600	0.03	1.25	1.18	3.85
41	615	0.03	1.28	1.43	5.27
42	630	0.03	1.30	1.63	6.90
43	645	0.03	1.33	1.78	8.68
44	660	0.02	1.35	1.88	10.57
45	675	0.02	1.38	1.95	12.51
46	690	0.02	1.40	1.96	14.48
47	705	0.02	1.42	1.94	16.42
48	720	0.02	1.44	1.90	18.32
49	735	0.02	1.46	1.82	20.14
50	750	0.02	1.48	1.72	21.86
51	765	0.02	1.50	1.59	23.45
52	780	0.02	1.52	1.44	24.88
53	795	0.02	1.54	1.30	26.18
54	810	0.02	1.56	1.17	27.35
55	825	0.02	1.58	1.06	28.41
56	840	0.02	1.60	0.97	29.38

57	855	0.02	1.62	0.88	30.26
58	870	0.02	1.63	0.82	31.08
59	885	0.02	1.65	0.77	31.84
60	900	0.02	1.67	0.72	32.56
61	915	0.02	1.69	0.67	33.23
62	930	0.02	1.70	0.63	33.86
63	945	0.02	1.72	0.60	34.46

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
64	960	0.02	1.74	0.57	35.03
65	975	0.02	1.75	0.55	35.58
66	990	0.02	1.77	0.52	36.10
67	1005	0.02	1.79	0.50	36.60
68	1020	0.02	1.80	0.47	37.07
69	1035	0.02	1.82	0.45	37.52
70	1050	0.02	1.84	0.42	37.94
71	1065	0.02	1.85	0.39	38.33
72	1080	0.02	1.87	0.36	38.69
73	1095	0.02	1.88	0.33	39.03
74	1110	0.01	1.90	0.31	39.33
75	1125	0.01	1.91	0.27	39.61
76	1140	0.01	1.92	0.25	39.85
77	1155	0.01	1.94	0.22	40.07
78	1170	0.01	1.95	0.19	40.26
79	1185	0.01	1.97	0.16	40.42
80	1200	0.01	1.98	0.13	40.55
81	1215	0.01	1.99	0.11	40.66
82	1230	0.01	2.01	0.08	40.74
83	1245	0.01	2.02	0.05	40.79
84	1260	0.01	2.03	0.03	40.82
85	1275	0.01	2.05	0.00	40.82
86	1290	0.01	2.06	-0.02	40.80
87	1305	0.01	2.07	-0.05	40.75
88	1320	0.01	2.08	-0.07	40.68
89	1335	0.01	2.09	-0.09	40.59
90	1350	0.01	2.11	-0.12	40.47
91	1365	0.01	2.12	-0.14	40.33
92	1380	0.01	2.13	-0.16	40.17
93	1395	0.01	2.14	-0.18	39.99
94	1410	0.01	2.15	-0.20	39.78
95	1425	0.01	2.16	-0.22	39.56
96	1440	0.01	2.17	-0.30	39.26
97	1455	0.01	2.18	-0.42	38.84
98	1470	-0.01	2.17	-0.58	38.26
99	1485	0.00	2.17	-0.77	37.49
100	1500	0.00	2.17	-1.00	36.49
101	1515	0.00	2.17	-1.28	35.21
102	1530	0.00	2.17	-1.61	33.60
103	1545	0.00	2.17	-1.90	31.69
104	1560	0.00	2.17	-2.13	29.56
105	1575	0.00	2.17	-2.28	27.28
106	1590	0.00	2.17	-2.36	24.92

107	1605	0.00	2.17	-2.36	22.56
108	1620	0.00	2.17	-2.33	20.24
109	1635	0.00	2.17	-2.23	18.01
)	1650	0.00	2.17	-2.10	15.91
111	1665	0.00	2.17	-1.95	13.96
112	1680	0.00	2.17	-1.79	12.17
113	1695	0.00	2.17	-1.60	10.57

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 5 YR/24 HR IA

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 15 min)

TIME INTV	TIME (min)	INCREMENTAL RAINFALL (in)	CUMULATIVE RAINFALL (in)	INCREMENTAL OUTFLOW (cfs)	DESIGN OUTFLOW (cfs)
					9.20
114	1710	0.00	2.17	-1.38	8.02
115	1725	0.00	2.17	-1.18	7.01
116	1740	0.00	2.17	-1.01	6.13
117	1755	0.00	2.17	-0.88	5.37
118	1770	0.00	2.17	-0.77	4.70
119	1785	0.00	2.17	-0.67	4.10
120	1800	0.00	2.17	-0.59	3.58
121	1815	0.00	2.17	-0.52	3.12
122	1830	0.00	2.17	-0.46	2.72
123	1845	0.00	2.17	-0.40	2.37
124	1860	0.00	2.17	-0.35	2.07
25	1875	0.00	2.17	-0.30	1.80
126	1890	0.00	2.17	-0.27	1.57
127	1905	0.00	2.17	-0.23	1.36
128	1920	0.00	2.17	-0.20	1.19
129	1935	0.00	2.17	-0.18	1.03
130	1950	0.00	2.17	-0.16	0.90
131	1965	0.00	2.17	-0.13	0.78
132	1980	0.00	2.17	-0.12	0.68
133	1995	0.00	2.17	-0.10	0.59
134	2010	0.00	2.17	-0.09	0.51
135	2025	0.00	2.17	-0.08	0.44
136	2040	0.00	2.17	-0.07	0.38
137	2055	0.00	2.17	-0.06	0.32
138	2070	0.00	2.17	-0.05	0.28
139	2085	0.00	2.17	-0.05	0.24
140	2100	0.00	2.17	-0.04	0.20
141	2115	0.00	2.17	-0.03	0.17
142	2130	0.00	2.17	-0.03	0.14
143	2145	0.00	2.17	-0.03	0.12
144	2160	0.00	2.17	-0.02	0.10
145	2175	0.00	2.17	-0.02	0.08
146	2190	0.00	2.17	-0.02	0.06
147	2205	0.00	2.17	-0.02	0.05
148	2220	0.00	2.17	-0.01	0.03
149	2235	0.00	2.17	-0.01	0.02
150	2250	0.00	2.17	-0.01	0.02
151	2265	0.00	2.17	-0.01	0.01
152	2280	0.00	2.17	-0.01	0.00
153	2295	0.00	2.17	0.00	0.00
154	2310	0.00	2.17	0.00	0.00

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HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 256.08 (cfs)
 Volume..... = 72.38 (acft)
 Time Interval..... = 18 (min)
 Time to Peak..... = 792.00 (min)
 Time of Base..... = 1764.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 1
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 419.55 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 18 (min)
 Time to Peak..... = 75.49 (min)
 Time of Base..... = 377.45 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 67.94 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
CORBETT	187.00	68
SUPRISE	25.00	51
SUPRISE	66.00	60
GLENBROOK	315.00	70
KOONTZ	76.00	70
SUB	19.00	51
TOLL	10.00	30
Overall Approximation	698.00	67

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.12450
 Flow Length (L)..... = 14900.00 (ft)
 Time of Concentration..... = 113.24 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 2
 TYPE : COMPUTED FLOOD
 DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS II
Total Precipitation.....	=	4.17 (in)
Return Period.....	=	100 (yr)
Storm Duration.....	=	24.00 (hr)

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

TIME (min)	FLOW (cfs)
18	56.47
36	181.67
54	351.10
72	417.61
90	392.14
108	314.39
126	205.96
144	136.87
162	95.12
180	63.63
198	43.45
216	29.48
234	19.94
252	13.59

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 1
 TYPE : CURVILINEAR UH
 DESCRIPTION : AREA C UH OFF-SITE

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

TIME (min)	FLOW (cfs)
270	9.20
288	6.17
306	4.35
324	3.15
342	1.97
360	0.97

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 18 min)

TIME (min)	OUTFLOW (cfs)
684	0.26
702	3.09
720	33.00
738	99.27
756	190.33
774	244.93
792	256.07

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

TIME	OUTFLOW
(min)	(cfs)
810	234.87
828	192.09
846	157.47
864	131.81
882	110.62
900	94.62
918	82.26
936	72.72
954	65.29
972	59.22
990	54.11
1008	49.92
1026	46.45
1044	43.47
1062	40.93
1080	38.72
1098	37.07
1116	35.61
1134	34.24
1152	32.94
1170	31.66
1188	30.40

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

TIME	OUTFLOW
(min)	(cfs)
1206	29.15
1224	27.92
1242	26.76
1260	25.73
1278	24.89
1296	24.22
1314	23.70
1332	23.28
1350	22.92
1368	22.61
1386	22.32
1404	22.06
1422	21.80
1440	21.06
1458	19.24
1476	15.96
1494	12.13
1512	8.57
1530	5.73
1548	3.87
1566	2.63
1584	1.77

HYDROGRAPH REPORT

RECORD NUMBER : 2
TYPE : COMPUTED FLOOD
DESCRIPTION : AREA C OFF SITE 100YR/24HR II

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 18 min)

TIME	OUTFLOW
(min)	(cfs)
1602	1.19
1620	0.80
1638	0.53
1656	0.35
1674	0.23
1692	0.15
1710	0.09
1728	0.05
1746	0.03

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1365	1.50
1378	1.49
1391	1.48
1404	1.46
1417	1.45
1430	1.40
1443	1.28
1456	1.05
1469	0.79
1482	0.55
1495	0.36
1508	0.24
1521	0.16
1534	0.11
1547	0.07
1560	0.05
1573	0.03
1586	0.02
1599	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 2.32 (cfs)
 Volume..... = 2.93 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 572.00 (min)
 Time of Base..... = 1628.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	35.50	61
HOUSING	26.50	75
CONDOS	19.00	85
COMMERCIAL	7.50	94
Overall Approximation	88.50	73

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 2.17 (in)
 Return Period..... = 5 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME (min)	FLOW (cfs)
11	11.37
22	36.49
33	71.21
44	85.54
55	81.13
66	65.90
77	43.90
88	29.15
99	20.29
110	13.76
121	9.34
132	6.36
143	4.32
154	2.97
165	2.03
176	1.37
187	0.94
198	0.70
209	0.45
220	0.25
231	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
473	0.05
484	0.23
495	0.60
506	1.07
517	1.52
528	1.87
539	2.09
550	2.22
561	2.30
572	2.32
583	2.31
594	2.29
605	2.28
616	2.27
627	2.27
638	2.27
649	2.26
660	2.26
671	2.26
682	2.26
693	2.26
704	2.27

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
715	2.26
726	2.25
737	2.22
748	2.21
759	2.19
770	2.17
781	2.16
792	2.15
803	2.16
814	2.18
825	2.20
836	2.21
847	2.22
858	2.22
869	2.22
880	2.23
891	2.24
902	2.25
913	2.25
924	2.26
935	2.27
946	2.27

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
957	2.27
968	2.27
979	2.28
990	2.28
1001	2.28
1012	2.28
1023	2.28
1034	2.28
1045	2.27
1056	2.27
1067	2.27
1078	2.26
1089	2.26
1100	2.25
1111	2.25
1122	2.24
1133	2.23
1144	2.22
1155	2.22
1166	2.21
1177	2.20
1188	2.19

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1199	2.18
1210	2.17
1221	2.16
1232	2.14
1243	2.13
1254	2.12
1265	2.11
1276	2.09
1287	2.08
1298	2.06
1309	2.05
1320	2.03
1331	2.02
1342	2.00
1353	1.99
1364	1.97
1375	1.95
1386	1.94
1397	1.92
1408	1.90
1419	1.88
1430	1.86

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1441	1.80
1452	1.65
1463	1.38
1474	1.06
1485	0.75
1496	0.51
1507	0.34
1518	0.23
1529	0.16
1540	0.11
1551	0.07
1562	0.05
1573	0.03
1584	0.02
1595	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 26
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	4.51 (cfs)
Volume.....	=	4.92 (acft)
Time Interval.....	=	13 (min)
Time to Peak.....	=	559.00 (min)
Time of Base.....	=	1651.00 (min)
Multiplication factor.....	=	1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #.....	=	20
Unit hydrograph type.....	=	CURVILINEAR UH
Peak Discharge.....	=	75.10 (cfs)
Shape Factor.....	=	484.00
Time Interval.....	=	13 (min)
Time to Peak.....	=	53.47 (min)
Time of Base.....	=	267.37 (min)
Rainfall Excess.....	=	1.00 (in)
Basin Lag Time.....	=	48.13 (min)

[BASIN DESCRIPTION]

Watershed Area.....	=	88.50 (ac)
Curve Number.....	=	68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.02700
Flow Length (L).....	=	3850.00 (ft)
Time of Concentration.....	=	80.21 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	3.10 (in)
Return Period.....	=	5 (yr)
Storm Duration.....	=	24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 20
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	10.42
26	33.64
39	64.00
52	74.89
65	69.02
78	54.17
91	34.45
104	23.10
117	15.87
130	10.57
143	7.20
156	4.81
169	3.23
182	2.17
195	1.47
208	0.99
221	0.71
234	0.49
247	0.29
260	0.10

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
455	0.01
468	0.14
481	0.59
494	1.46
507	2.55
520	3.49
533	4.12
546	4.43
559	4.51
572	4.49
585	4.42
598	4.31
611	4.22
624	4.15
637	4.09
650	4.05
663	4.01
676	3.98
689	3.95
702	3.92
715	3.89
728	3.85

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
741	3.81
754	3.76
767	3.71
780	3.66
793	3.64
806	3.64
819	3.66
832	3.68
845	3.69
858	3.68
871	3.68
884	3.69
897	3.69
910	3.70
923	3.71
936	3.71
949	3.71
962	3.71
975	3.71
988	3.71
1001	3.71
1014	3.70

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1027	3.69
1040	3.69
1053	3.68
1066	3.67
1079	3.65
1092	3.64
1105	3.63
1118	3.61
1131	3.60
1144	3.58
1157	3.56
1170	3.54
1183	3.52
1196	3.50
1209	3.47
1222	3.45
1235	3.43
1248	3.40
1261	3.37
1274	3.35
1287	3.32
1300	3.29

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1313	3.26
1326	3.23
1339	3.20
1352	3.17
1365	3.14
1378	3.10
1391	3.07
1404	3.03
1417	3.00
1430	2.89
1443	2.63
1456	2.16
1469	1.62
1482	1.13
1495	0.75
1508	0.50
1521	0.34
1534	0.23
1547	0.15
1560	0.10
1573	0.07
1586	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 26
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 PRE-DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1599	0.03
1612	0.02
1625	0.01

HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 8.56 (cfs)
 Volume..... = 6.75 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 528.00 (min)
 Time of Base..... = 1639.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	35.50	61
HOUSING	26.50	75
CONDOS	19.00	85
COMMERCIAL	7.50	94
Overall Approximation	88.50	73

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 3.10 (in)
 Return Period..... = 25 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME (min)	FLOW (cfs)
11	11.37
22	36.49
33	71.21
44	85.54
55	81.13
66	65.90
77	43.90
88	29.15
99	20.29
110	13.76
121	9.34
132	6.36
143	4.32
154	2.97
165	2.03
176	1.37
187	0.94
198	0.70
209	0.45
220	0.25
231	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
418	0.04
429	0.11
440	0.26
451	0.51
462	1.01
473	1.99
484	3.60
495	5.54
506	7.23
517	8.25
528	8.56
539	8.42
550	8.09
561	7.72
572	7.33
583	6.95
594	6.60
605	6.33
616	6.12
627	5.96
638	5.82
649	5.70

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
660	5.60
671	5.51
682	5.44
693	5.37
704	5.32
715	5.26
726	5.18
737	5.08
748	5.00
759	4.92
770	4.85
781	4.79
792	4.74
803	4.74
814	4.75
825	4.77
836	4.77
847	4.75
858	4.74
869	4.72
880	4.72
891	4.72

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
902	4.71
913	4.71
924	4.70
935	4.70
946	4.69
957	4.68
968	4.67
979	4.66
990	4.64
1001	4.63
1012	4.62
1023	4.60
1034	4.58
1045	4.56
1056	4.55
1067	4.53
1078	4.51
1089	4.48
1100	4.46
1111	4.44
1122	4.42
1133	4.39

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1144	4.37
1155	4.34
1166	4.31
1177	4.29
1188	4.26
1199	4.23
1210	4.20
1221	4.17
1232	4.14
1243	4.11
1254	4.08
1265	4.05
1276	4.01
1287	3.98
1298	3.95
1309	3.91
1320	3.88
1331	3.84
1342	3.81
1353	3.77
1364	3.73
1375	3.70

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 25YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1386	3.66
1397	3.62
1408	3.58
1419	3.54
1430	3.50
1441	3.39
1452	3.10
1463	2.59
1474	1.98
1485	1.41
1496	0.95
1507	0.64
1518	0.44
1529	0.30
1540	0.20
1551	0.14
1562	0.09
1573	0.06
1584	0.04
1595	0.03
1606	0.02
1617	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 27
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 18.86 (cfs)
 Volume..... = 12.14 (acft)
 Time Interval..... = 11 (min)
 Time to Peak..... = 517.00 (min)
 Time of Base..... = 1639.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 21
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 86.03 (cfs)
 Shape Factor..... = 484.00

 Time Interval..... = 11 (min)
 Time to Peak..... = 46.68 (min)
 Time of Base..... = 233.38 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 42.01 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	35.50	61
HOUSING	26.50	75
CONDOS	19.00	85
COMMERCIAL	7.50	94
Overall Approximation	88.50	73

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.02700
 Flow Length (L)..... = 3850.00 (ft)
 Time of Concentration..... = 70.01 (min)

[RAINFALL DESCRIPTION]

Distribution Type..... = SCS IA
 Total Precipitation..... = 4.17 (in)
 Return Period..... = 100 (yr)
 Storm Duration..... = 24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 21
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 2 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME (min)	FLOW (cfs)
11	11.37
22	36.49
33	71.21
44	85.54
55	81.13
66	65.90
77	43.90
88	29.15
99	20.29
110	13.76
121	9.34
132	6.36
143	4.32
154	2.97
165	2.03
176	1.37
187	0.94
198	0.70
209	0.45
220	0.25
231	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
352	0.04
363	0.13
374	0.29
385	0.54
396	0.87
407	1.26
418	1.69
429	2.16
440	2.71
451	3.40
462	4.63
473	6.88
484	10.40
495	14.32
506	17.40
517	18.86
528	18.81
539	17.89
550	16.70
561	15.56
572	14.49
583	13.49

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
594	12.62
605	11.94
616	11.42
627	11.00
638	10.65
649	10.34
660	10.08
671	9.87
682	9.67
693	9.51
704	9.36
715	9.22
726	9.04
737	8.83
748	8.66
759	8.49
770	8.36
781	8.21
792	8.12
803	8.08
814	8.08
825	8.09

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
836	8.07
847	8.03
858	7.98
869	7.94
880	7.91
891	7.89
902	7.87
913	7.85
924	7.82
935	7.80
946	7.77
957	7.74
968	7.70
979	7.67
990	7.64
1001	7.60
1012	7.56
1023	7.53
1034	7.49
1045	7.45
1056	7.40
1067	7.36

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1078	7.32
1089	7.27
1100	7.23
1111	7.18
1122	7.13
1133	7.09
1144	7.04
1155	6.99
1166	6.94
1177	6.88
1188	6.83
1199	6.78
1210	6.72
1221	6.67
1232	6.61
1243	6.56
1254	6.50
1265	6.44
1276	6.39
1287	6.33
1298	6.27
1309	6.21

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1320	6.15
1331	6.09
1342	6.03
1353	5.96
1364	5.90
1375	5.84
1386	5.77
1397	5.71
1408	5.64
1419	5.58
1430	5.51
1441	5.33
1452	4.88
1463	4.07
1474	3.11
1485	2.22
1496	1.49
1507	1.01
1518	0.69
1529	0.47
1540	0.31
1551	0.21

HYDROGRAPH REPORT

RECORD NUMBER : 27
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 11 min)

TIME	OUTFLOW
(min)	(cfs)
1562	0.14
1573	0.10
1584	0.06
1595	0.04
1606	0.03
1617	0.02

HYDROGRAPH REPORT

RECORD NUMBER : 31
 TYPE : COMBINE
 DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 10.32 (cfs)
 Volume..... = 12.26 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1079.00 (min)
 Time of Base..... = 1664.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 30 TYPE : MANUAL
 DESCRIPTION : IMPORTED AREA B OFF SITE 5 YR/ 24 HR IA
 Peak Discharge..... = 8.06 (cfs)
 Time to Peak..... = 1092.00 (min)
 Time Interval..... = 13 (min)
 HYDROGRAPH # 27 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA
 Peak Discharge..... = 18.86 (cfs)
 Time to Peak..... = 517.00 (min)
 Time Interval..... = 11 (min)

[Combine Hydrograph Flow Values]
 (The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
468	0.03
481	0.19
494	0.66
507	1.47
520	2.52
533	3.64
546	4.71
559	5.65
572	6.38

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
585	6.89
598	7.27
611	7.59
624	7.87
637	8.11
650	8.32
663	8.50
676	8.66
689	8.80
702	8.92
715	9.02
728	9.08
741	9.09
754	9.09
767	9.07
780	9.05
793	9.08
806	9.18
819	9.30
832	9.42
845	9.51
858	9.58
871	9.64
884	9.71
897	9.79
910	9.87
923	9.94
936	10.00
949	10.06
962	10.11
975	10.15
988	10.19
1001	10.23
1014	10.25
1027	10.28

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
1040	10.30
1053	10.31
1066	10.31
1079	10.32
1092	10.31
1105	10.31
1118	10.29
1131	10.28
1144	10.26
1157	10.23
1170	10.20
1183	10.17
1196	10.14
1209	10.09
1222	10.05
1235	10.00
1248	9.95
1261	9.90
1274	9.84
1287	9.78
1300	9.71
1313	9.64
1326	9.57
1339	9.50
1352	9.42
1365	9.34
1378	9.26
1391	9.17
1404	9.08
1417	8.99
1430	8.74
1443	8.09
1456	6.84
1469	5.27
1482	3.74

HYDROGRAPH REPORT

RECORD NUMBER : 31
TYPE : COMBINE
DESCRIPTION : COMBINED FLOWS DRAINAGE BASIN 2, ZONE 2 5YR/24HR

[Combine Hydrograph Flow Values]
(The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
1495	2.49
1508	1.67
1521	1.13
1534	0.75
1547	0.50
1560	0.34
1573	0.22
1586	0.15
1599	0.10
1612	0.06
1625	0.04
1638	0.02
1651	0.01
1664	0.00

HYDROGRAPH REPORT

RECORD NUMBER : 33
 TYPE : COMBINE
 DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 31.27 (cfs)
 Volume..... = 30.97 (acft)
 Time Interval..... = 12 (min)
 Time to Peak..... = 552.00 (min)
 Time of Base..... = 1680.00 (min)

[COMBINE HYDROGRAPH RECORD #]

HYDROGRAPH # 32 TYPE : MANUAL
 DESCRIPTION : IMPORTED AREA B OFF SITE 25YR/ 24 HR IA
 Peak Discharge..... = 23.41 (cfs)
 Time to Peak..... = 559.00 (min)
 Time Interval..... = 13 (min)
 HYDROGRAPH # 27 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 2 POST DEVELOPMENT 100YR/24HR IA
 Peak Discharge..... = 18.86 (cfs)
 Time to Peak..... = 517.00 (min)
 Time Interval..... = 11 (min)

[Combine Hydrograph Flow Values]
 (The time interval is 12 min)

TIME (min)	OUTFLOW (cfs)
408	0.01
420	0.05
432	0.16
444	0.38
456	0.94
468	2.54
480	6.36
492	12.45
504	19.35

HYDROGRAPH REPORT

RECORD NUMBER : 33
TYPE : COMBINE
DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
(The time interval is 12 min)

TIME (min)	OUTFLOW (cfs)
516	25.15
528	28.95
540	30.80
552	31.27
564	30.92
576	30.18
588	29.27
600	28.35
612	27.56
624	26.94
636	26.44
648	26.01
660	25.65
672	25.36
684	25.09
696	24.84
708	24.61
720	24.36
732	24.07
744	23.73
756	23.39
768	23.08
780	22.76
792	22.59
804	22.55
816	22.61
828	22.69
840	22.72
852	22.71
864	22.68
876	22.65
888	22.66
900	22.67
912	22.69
924	22.70

HYDROGRAPH REPORT

RECORD NUMBER : 33
TYPE : COMBINE
DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
(The time interval is 12 min)

TIME (min)	OUTFLOW (cfs)
936	22.70
948	22.69
960	22.68
972	22.65
984	22.62
996	22.59
1008	22.54
1020	22.49
1032	22.44
1044	22.37
1056	22.30
1068	22.23
1080	22.15
1092	22.06
1104	21.97
1116	21.87
1128	21.76
1140	21.65
1152	21.54
1164	21.42
1176	21.30
1188	21.17
1200	21.03
1212	20.90
1224	20.75
1236	20.61
1248	20.46
1260	20.30
1272	20.14
1284	19.98
1296	19.82
1308	19.65
1320	19.47
1332	19.29
1344	19.11

HYDROGRAPH REPORT

RECORD NUMBER : 33
 TYPE : COMBINE
 DESCRIPTION : COMBINED DRAINAGE B ZONE 2 25YR/24

[Combine Hydrograph Flow Values]
 (The time interval is 12 min)

TIME (min)	OUTFLOW (cfs)
1356	18.93
1368	18.74
1380	18.55
1392	18.36
1404	18.16
1416	17.96
1428	17.50
1440	16.42
1452	14.41
1464	11.68
1476	8.81
1488	6.27
1500	4.31
1512	2.98
1524	2.06
1536	1.42
1548	0.98
1560	0.67
1572	0.46
1584	0.32
1596	0.22
1608	0.15
1620	0.10
1632	0.06
1644	0.03
1656	0.02
1668	0.01
1680	0.00

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HYDROGRAPH REPORT

RECORD NUMBER : 28
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge.....	=	4.90 (cfs)
Volume.....	=	5.50 (acft)
Time Interval.....	=	14 (min)
Time to Peak.....	=	1120.00 (min)
Time of Base.....	=	1680.00 (min)
Multiplication factor.....	=	1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #.....	=	22
Unit hydrograph type.....	=	CURVILINEAR UH
Peak Discharge.....	=	204.55 (cfs)
Shape Factor.....	=	484.00
Time Interval.....	=	14 (min)
Time to Peak.....	=	59.01 (min)
Time of Base.....	=	295.04 (min)
Rainfall Excess.....	=	1.00 (in)
Basin Lag Time.....	=	53.11 (min)

[BASIN DESCRIPTION]

Watershed Area.....	=	266.00 (ac)
Curve Number.....	=	68

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S).....	=	0.05000
Flow Length (L).....	=	6400.00 (ft)
Time of Concentration.....	=	88.51 (min)

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	2.17 (in)
Return Period.....	=	5 (yr)
Storm Duration.....	=	24.00 (hr)

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 22
TYPE : CURVILINEAR UH
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME (min)	FLOW (cfs)
14	27.31
28	87.80
42	170.38
56	203.50
70	191.91
84	154.73
98	102.11
112	67.74
126	47.17
140	31.75
154	21.58
168	14.69
182	9.96
196	6.81
210	4.63
224	3.09
238	2.17
252	1.59
266	1.01
280	0.52
294	0.04

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
504	0.05
518	0.19
532	0.48
546	0.89
560	1.36
574	1.80
588	2.18
602	2.49
616	2.75
630	2.98
644	3.17
658	3.34
672	3.49
686	3.61
700	3.73
714	3.82
728	3.90
742	3.95
756	3.98
770	4.01
784	4.02
798	4.07

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
812	4.13
826	4.21
840	4.28
854	4.33
868	4.38
882	4.43
896	4.48
910	4.53
924	4.58
938	4.63
952	4.67
966	4.71
980	4.74
994	4.77
1008	4.80
1022	4.82
1036	4.84
1050	4.86
1064	4.87
1078	4.88
1092	4.89
1106	4.90

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
1120	4.90
1134	4.90
1148	4.89
1162	4.89
1176	4.88
1190	4.87
1204	4.85
1218	4.84
1232	4.82
1246	4.80
1260	4.78
1274	4.75
1288	4.72
1302	4.70
1316	4.67
1330	4.63
1344	4.60
1358	4.56
1372	4.52
1386	4.48
1400	4.44
1414	4.40

HYDROGRAPH REPORT

RECORD NUMBER : 28
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 PRE-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 14 min)

TIME	OUTFLOW
(min)	(cfs)
1428	4.25
1442	3.89
1456	3.24
1470	2.47
1484	1.75
1498	1.17
1512	0.79
1526	0.54
1540	0.36
1554	0.25
1568	0.17
1582	0.11
1596	0.07
1610	0.05
1624	0.03
1638	0.02
1652	0.01

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HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[HYDROGRAPH INFORMATION]

Peak Discharge..... = 6.17 (cfs)
 Volume..... = 7.68 (acft)
 Time Interval..... = 13 (min)
 Time to Peak..... = 1027.00 (min)
 Time of Base..... = 1651.00 (min)
 Multiplication factor..... = 1.00

[UNIT HYDROGRAPH INFORMATION]

Unit hydrograph #..... = 23
 Unit hydrograph type..... = CURVILINEAR UH
 Peak Discharge..... = 219.26 (cfs)
 Shape Factor..... = 484.00
 Time Interval..... = 13 (min)
 Time to Peak..... = 52.96 (min)
 Time of Base..... = 264.79 (min)
 Rainfall Excess..... = 1.00 (in)
 Basin Lag Time..... = 47.66 (min)

[BASIN DESCRIPTION]

[WEIGHTED WATERSHED AREA]

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	60.60	61
HOUSING	65.00	75
CONDOS	19.40	85
COMMERCIAL	28.00	94
UNDEVELOPED	79.60	68
MAINTENANCE	3.30	70
Overall Approximation	255.90	72

[TIME CONCENTRATION -- SCS LAG]

Channel Slope (S)..... = 0.05000
 Flow Length (L)..... = 6400.00 (ft)
 Time of Concentration..... = 79.44 (min)

HYDROGRAPH REPORT

RECORD NUMBER : 29
 TYPE : COMPUTED FLOOD
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[RAINFALL DESCRIPTION]

Distribution Type.....	=	SCS IA
Total Precipitation.....	=	2.17 (in)
Return Period.....	=	5 (yr)
Storm Duration.....	=	24.00 (hr)

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
13	30.90
26	99.88
39	188.58
52	218.86
65	199.71
78	155.04
91	98.04
104	65.36
117	44.77
130	29.83
143	20.16
156	13.37
169	8.91
182	6.04

UNIT HYDROGRAPH REPORT

RECORD NUMBER : 23
 TYPE : CURVILINEAR UH
 DESCRIPTION : ZONE 3 POST-DEVELOPMENT

[Unit Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	FLOW (cfs)
195	4.06
208	2.73
221	1.96
234	1.31
247	0.74
260	0.20

[Hydrograph Flow Values Time vs. Flow]
 (The time interval is 13 min)

TIME (min)	OUTFLOW (cfs)
468	0.02
481	0.21
494	0.76
507	1.74
520	2.85
533	3.85
546	4.63

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
559	5.13
572	5.42
585	5.57
598	5.64
611	5.69
624	5.74
637	5.78
650	5.82
663	5.85
676	5.88
689	5.90
702	5.91
715	5.92
728	5.92
741	5.89
754	5.84
767	5.79
780	5.75
793	5.75
806	5.78
819	5.84
832	5.89

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
845	5.92
858	5.94
871	5.96
884	5.99
897	6.02
910	6.05
923	6.07
936	6.10
949	6.12
962	6.13
975	6.15
988	6.16
1001	6.17
1014	6.17
1027	6.17
1040	6.17
1053	6.17
1066	6.16
1079	6.15
1092	6.14
1105	6.13
1118	6.11

HYDROGRAPH REPORT

RECORD NUMBER : 29
TYPE : COMPUTED FLOOD
DESCRIPTION : ZONE 3 POST-DEVELOPMENT 5YR/24HR IA

[Hydrograph Flow Values Time vs. Flow]
(The time interval is 13 min)

TIME	OUTFLOW
(min)	(cfs)
1131	6.09
1144	6.07
1157	6.05
1170	6.03
1183	6.00
1196	5.97
1209	5.94
1222	5.91
1235	5.87
1248	5.84
1261	5.80
1274	5.76
1287	5.72
1300	5.67
1313	5.63
1326	5.58
1339	5.53
1352	5.48
1365	5.43
1378	5.38
1391	5.32
1404	5.27

REVISIONS

NO.	DATE	DESCRIPTION
1	1-3-95	RETENTION BASINS W/1 PHASE 2
2	1-27-95	GOLF COURSE ROUTING PHASE 1

BASIN	A.P.N.
1A, 1C	8-061-29
1B	8-061-67
2, 3, 4	8-061-39
A, B	7-422-13

SILVER OAK CONSULTANTS
 PROJECT MANAGER: JAMES W. WILSON, P.E.
 CIVIL ENGINEER
 1425 E. 15th Street, Suite 100
 Carson City, NV 89701
 (702) 441-1100 Fax (702) 441-1111

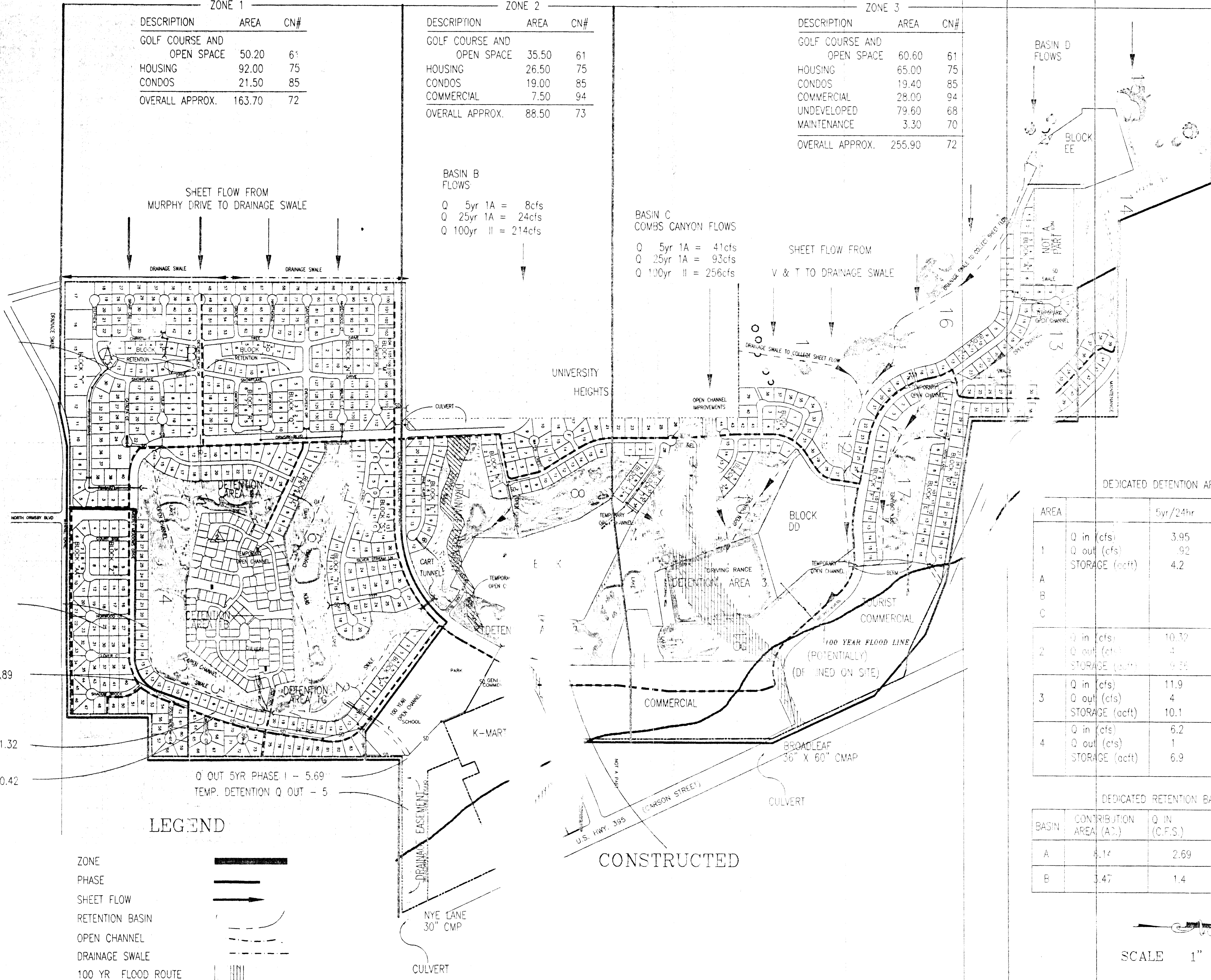
CARSON CITY
 SILVER OAK
 MASTER
 DRAINAGE PLAN

JOB No. 94138
 DATE JAN 2, 1995
 VERT SCALE N/A
 HORIZ SCALE 1" = 400'
 DRAWN BY JRS
 CHECKED BY RM
 SHEET 1 OF 1
 SHEETS 1 SHEETS

ZONE 1			ZONE 2			ZONE 3		
DESCRIPTION	AREA	CN#	DESCRIPTION	AREA	CN#	DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	50.20	61	GOLF COURSE AND OPEN SPACE	35.50	61	GOLF COURSE AND OPEN SPACE	60.60	61
HOUSING	92.00	75	HOUSING	26.50	75	HOUSING	65.00	75
CONDOS	21.50	85	CONDOS	19.00	85	CONDOS	19.40	85
COMMERCIAL	7.50	94	COMMERCIAL	7.50	94	COMMERCIAL	28.00	94
UNDEVELOPED			UNDEVELOPED			UNDEVELOPED	79.60	68
MAINTENANCE			MAINTENANCE			MAINTENANCE	3.30	70
OVERALL APPROX.	163.70	72	OVERALL APPROX.	88.50	73	OVERALL APPROX.	255.90	72

BASIN B FLOWS
 Q 5yr 1A = 8cfs
 Q 25yr 1A = 24cfs
 Q 100yr II = 214cfs

BASIN C COMBS CANYON FLOWS
 Q 5yr 1A = 41cfs
 Q 25yr 1A = 93cfs
 Q 100yr II = 256cfs



DEDICATED DETENTION AREA STORAGE AND FLOWS

AREA		5yr/24hr	25yr/24hr	100yr/24hr
1	Q in (cfs)	3.95	12.8	28.83
	Q out (cfs)	92	7	28.83
	STORAGE (acft)	4.2	0	0
A	Q in (cfs)		0.6	
	STORAGE (acft)		1.8	
B	Q in (cfs)		3.6	
	STORAGE (acft)		0.6	
2	Q in (cfs)	10.32	32.3	213.87
	Q out (cfs)	4	10	213
	STORAGE (acft)	9.33	24	0
3	Q in (cfs)	11.9	29.3	256
	Q out (cfs)	4	12	216
	STORAGE (acft)	10.1	27.1	83
4	Q in (cfs)	6.2	21.12	48.4
	Q out (cfs)	1	5	102.03
	STORAGE (acft)	6.9	14.35	19.59

DEDICATED RETENTION BASINS

BASIN	CONTRIBUTION AREA (AC.)	Q IN (C.F.S.)	VOLUME IN (AC./FT.)	STORAGE (AC./FT.)
A	8.14	2.69	0.12	0.12
B	3.47	1.4	0.05	0.05

SCALE 1" = 400'

MASTER DRAINAGE PLAN

CONSTRUCTED

CONSTRUCTED

CONSTRUCTED

Q IN 5YR - 3.89
 Q IN 5YR - 1.32
 Q IN 5YR - 0.42

Q OUT 5YR PHASE I - 5.69
 TEMP. DETENTION Q OUT - 5

LEGEND

ZONE	[Symbol]
PHASE	[Symbol]
SHEET FLOW	[Symbol]
RETENTION BASIN	[Symbol]
OPEN CHANNEL	[Symbol]
DRAINAGE SWALE	[Symbol]
100 YR FLOOD ROUTE	[Symbol]
CULVERT	[Symbol]
CATCH BASIN	[Symbol]
STORM DRAIN	[Symbol]
STORM DRAIN MANHOLE	[Symbol]

PLAN HOLD CORPORATION • IRVINE CALIFORNIA
 REGISTERED NUMBER 07548
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 REGISTERED NUMBER 07548
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 PLAN HOLD CORPORATION • IRVINE CALIFORNIA
 REGISTERED NUMBER 07548

2236

REVISIONS

NO.	DATE	DESCRIPTION
1	1-3-96	RETENTION BASINS, W. 1 PHASE 2
2	1-27-96	GOLF COURSE BOILING PHASE 1

ZONE 1

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	50.20	61
HOUSING	92.00	75
CONDOS	21.50	85
OVERALL APPROX.	163.70	72

ZONE 2

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	35.50	61
HOUSING	26.50	75
CONDOS	19.00	85
COMMERCIAL	7.50	94
OVERALL APPROX.	88.50	73

ZONE 3

DESCRIPTION	AREA	CN#
GOLF COURSE AND OPEN SPACE	60.60	61
HOUSING	65.00	75
CONDOS	19.40	85
COMMERCIAL	28.00	94
UNDEVELOPED	79.60	68
MAINTENANCE	3.30	70
OVERALL APPROX.	255.90	72

BASIN B FLOWS
Q 5yr 1A = 8cfs
Q 25yr 1A = 24cfs
Q 100yr II = 214cfs

BASIN C COMBS CANYON FLOWS
Q 5yr 1A = 41cfs
Q 25yr 1A = 93cfs
Q 100yr II = 256cfs

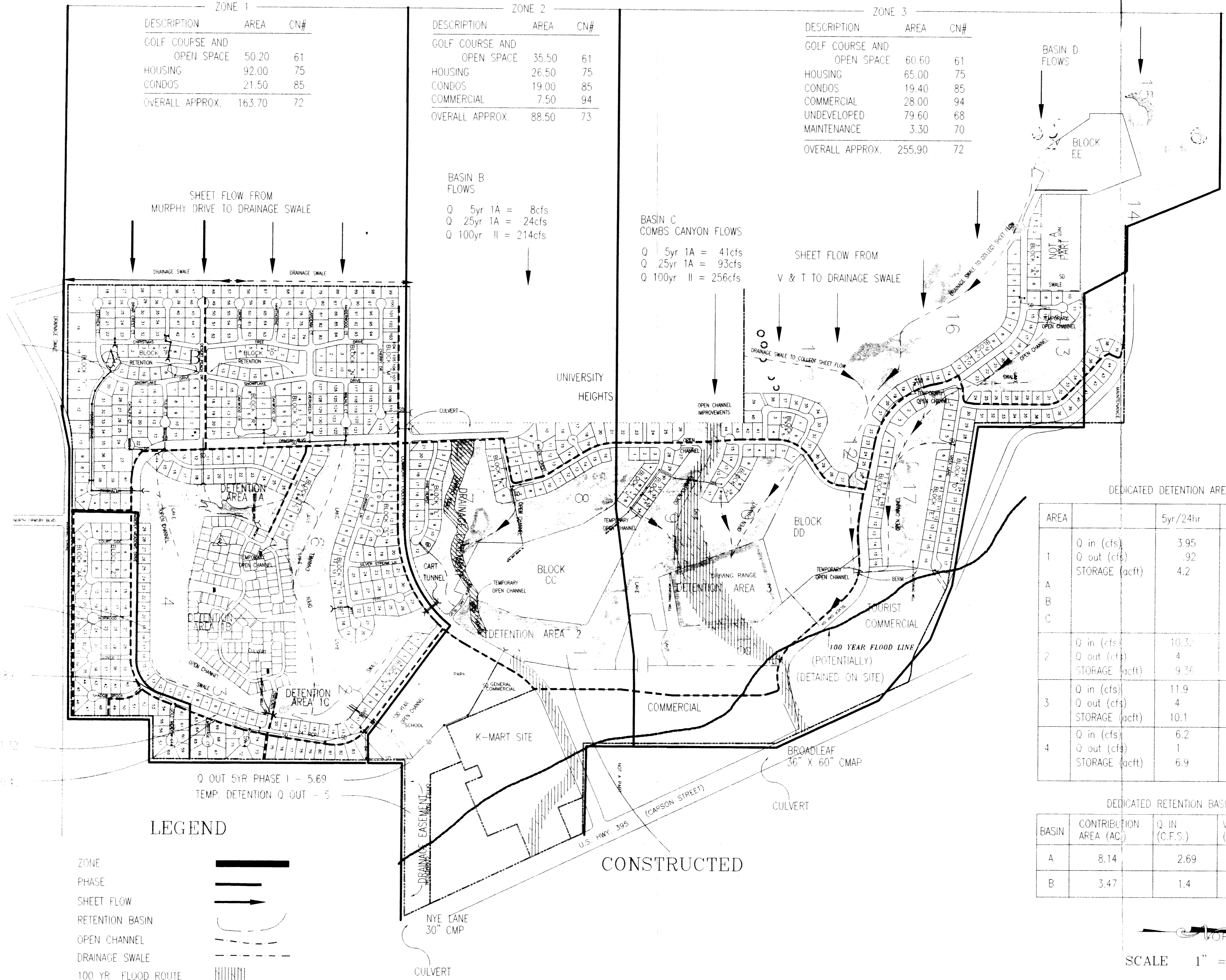
BASIN	A.P.N.
1A, 1C	8-061-29
1B	8-061-67
2, 3, 4	8-061-39
A, B	7-422-13

DEDICATED DETENTION AREA STORAGE AND FLOWS

AREA		5yr/24hr	25yr/24hr	100yr/24hr
1	Q in (cfs)	3.95	12.8	28.83
	Q out (cfs)	.92	7	28.83
	STORAGE (acft)	4.2		0
A	Q in (cfs)		0.6	
	Q out (cfs)		1.8	
	STORAGE (acft)		3.6	
2	Q in (cfs)	10.50	32.3	215.87
	Q out (cfs)	4	10	213
	STORAGE (acft)	9.36	24	0
3	Q in (cfs)	11.9	29.3	256
	Q out (cfs)	4	12	216
	STORAGE (acft)	10.1	27.1	83
4	Q in (cfs)	6.2	21.12	48.4
	Q out (cfs)	1	5	102.03
	STORAGE (acft)	6.9	14.35	19.59

DEDICATED RETENTION BASINS

BASIN	CONTRIBUTION AREA (AC)	Q IN (C.F.S.)	VOLUME IN (AC/FT)	STORAGE (AC/FT)
A	8.14	2.69	0.12	0.12
B	3.47	1.4	0.05	0.05



CONSTRUCTED

CONSTRUCTED

CONSTRUCTED

LEGEND

- ZONE
- PHASE
- SHEET FLOW
- RETENTION BASIN
- OPEN CHANNEL
- DRAINAGE SWALE
- 100 YR. FLOOD ROUTE
- CULVERT
- CATCH BASIN
- STORM DRAIN
- STORM DRAIN MANHOLE

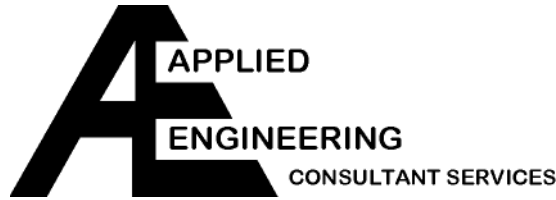
MASTER DRAINAGE PLAN

NORTH
SCALE 1" = 400'

SILVER STATE CONSULTANTS
1000 W. 10TH ST. SUITE 100
DENVER, CO 80202
TEL: 303.733.1100 FAX: 303.733.1101

CARSON CITY
SILVER OAK
MASTER
DRAINAGE PLAN

JOB No. 94136
DATE JAN 2, 1996
VERT SCALE N/A
HORIZ SCALE 1" = 400'
DRAWN BY JRS
CHECKED BY RM
SHEET 1 OF 1 SHEETS
FILE NO. 207702



4825 Convair Drive, Suite 17; Carson City, Nevada 89706
Telephone (775) 888-9939, Fax (775) 888-9469

November 12, 2015
Project No. 124-44-15

Mr. Mark Turner
Silver Oak Development
3075 College Drive
Carson City, Nevada 89703

Re: Geotechnical Investigation
Proposed Phase 21 Single Family Residential Development
Silver Oak Planned Unit Development
Oak Ridge Drive (APN: 007-462-12)
Carson City, Nevada

Dear Mr. Turner:

This report presents the results of our Geotechnical Investigation performed for the Proposed Phase 21 Single Family Residential Development Project to be located on Oak Ridge Drive (APN: 007-462-12) within the Silver Oak Planned Unit Development in Carson City, Nevada. A project vicinity map for the single family residential development is presented on Plate 1.

Our scope of work was to excavate several test pits within the proposed Phase 21 Residential Development boundaries, evaluate the subsurface soils encountered, and provide site specific recommendations to aid in the design and construction of the proposed residential structures and associated improvements. These recommendations addressed Portland Cement Concrete foundation and slab-on-grade preparation procedures, including overexcavation requirements, if needed, asphaltic concrete pavement structural sections and other relevant site specific items.

We understand the proposed single family residential development will consist of 31 parcels on Oak Ridge Drive (APN: 007-462-12) within Phase 21 of the Silver Oak Planned Unit Development in Carson City, Nevada. The project site is bounded by Oak Ridge Drive and the Silver Oak Park Site adjacent to the southern boundary; the existing closed K-Mart Commercial Parcel adjacent to the northern boundary; by a proposed future school parcel to the west and by existing single family residential lots and the Nye Lane Medical Building Complex to the east. Our firm has previously prepared a geotechnical investigation and earthquake fault review for the Phase 17 Residential Subdivision dated April 4, 2013 in the

vicinity of the proposed Phase 21 Residential Subdivision. Our firm also provided review of previously prepared geotechnical investigations for the K-Mart Shopping Center, prepared by SEA Incorporated, dated August 13, 1993 and the overall Silver Oak Planned Community Site Feasibility Study, prepared by Pezonella and Associates dated January 12, 1994. The Phase 21 Residential Subdivision geotechnical investigation encompasses both the past established geotechnical information and the current geotechnical data / information obtained.

It is also our understanding that the project will consist of an approximate 8.0 acre site. Tentative construction plans include conventional Portland Cement concrete foundations and slab-on-grade with wood framed walls and a wood panelized roofing system. We are anticipating minimal earthwork to attain proper drainage. However, overexcavation of unsuitable soils may be needed pending in-place soil characteristics and subsequent geotechnical recommendations to attain acceptable structural support. Exterior site improvements including flexible asphaltic concrete and Portland cement concrete flatwork are also anticipated.

The project is located in the northern portion of Carson City, which is within the western portion of Eagle Valley. Eagle Valley is a structural basin bounded to the west by the Carson Range (a spur of the Sierra Nevada Mountains), to the north by the Virginia Range and to the east by the Pine Nut Mountains. To the south, an alluvial divide separates Eagle Valley from Carson Valley.

The valley sediments are unconsolidated and partially consolidated materials derived from erosion of the surrounding mountains, which are composed of Tertiary and Quaternary volcanic rocks and Mesozoic granodiorites and metavolcanics. Sediments in the basin are mid-to late- Pleistocene alluvial deposits consisting of silty sands and gravels with some interbeds of sandy silts and clays. The subsurface soils would be considered to be within the Soil Profile Type Sd as shown within Table 16-J of the 2012 International Building Code (I.B.C.). The site lies within Seismic Zone 3 as categorized by the Uniform Building Code and has a corresponding Seismic Zone factor (Z) of 0.30.

The Earthquake Hazards Map – Carson City Quadrangle by Trexler and Bell (1979) published by the Nevada Bureau of Mines and Geology indicated that the Phase 21 residential development site lies within the vicinity of a southwest to northeast trending indeterminate (questionable) Holocene aged faults (less than 10,000 years old). The Nevada Earthquake Safety Council has developed the criteria for the evaluation of the Quaternary age earthquake faults and defines active faulting as those exhibiting displacement within the last 10,000 years. Furthermore two (2) Master Theses were prepared by Kirkham (1976) and Rogers (1975) and inferred that several faults also cross within the southeastern boundaries of the Silver Oak Planned Unit Development. Based upon our review the mapped faulting in the vicinity of the residential development is not considered to be present on the property and that no further mitigation of the fault hazard was recommended.

The Geologic Mapping completed by Trexler (1977) Carson City Folio, Nevada Bureau of Mines and Geology (Map 1Ag) indicates that the proposed single family residential development is underlain by Quaternary Aged (Qal) soils consisting of alluvial - plain sand, silt,

and gravel deposits which are considered to be moderately to poorly bedded, poorly to moderately sorted, angular to subrounded materials placed within broad surfaces of low gradient areas.

The criteria for the evaluation of Quaternary earthquake faults was not previously regulated by the State of Nevada. Most previously accepted geological constraints in Nevada relied on criteria methods established by the State of California. The Alquist-Priolo Act of 1972 (California) defined active faults as those with evidence of displacement within the past 11,000 years (Holocene Aged). The faults with evidence of displacement during the Pleistocene time period (11,000 to 2,000,000 years ago) are generally considered potentially active. The Nevada Earthquake Safety Council (1998) had adopted the criteria regarding Holocene Quaternary age earthquake faults less than 10,000 years. Holocene Active Faults normally require a minimum setback of 50 feet for occupied structures. Occupied structures are defined as having a human occupancy rate of more than 2,000 hours per year. Furthermore no “Critical Facility” is permitted to be placed over a fault trace of a Late Quaternary Active Fault, which are defined as evidence of movements within the past 130,000 years. “Critical Facility” is defined as buildings or structures that are considered critical to the function of a community such as hospitals, fire stations, emergency management operations centers and schools. The single family residence structures are considered to be occupied non-critical structures and the intended construction methodology is considered to be suitable to resist earthquake induced stresses without experiencing catastrophic failure.

Holocene faulting within the vicinity are considered to have the potential for a large magnitude ($M \geq 7$ Type) earthquake and have Slip Rates (SR) less than 5 mm/year. The maximum credible earthquake for the vicinity of the project is 7.5 in magnitude. In accordance with the USGS the ground motion corresponding to a 2% probability of exceeding in 50 years is 0.84g and the ground motion corresponding to a 10% probability of exceeding in 50 years is 0.43g.

We would recommend that the structural seismic design be evaluated in accordance with the 2012 International Building Code (IBC) as adopted by the Carson City Building Department. The following Site Specific IBC Geotechnical Seismic Design Parameters should be utilized for the on-site soil profile classification of an IBC Site Class D soil. A Seismic Source Type B may be assumed for the site.

IBC SEISMIC DESIGN PARAMETERS

Parameter	Factors	IBC Reference
Site Class	D	2012 IBC
Spectral Acceleration	$S_s = 2.453$ $S_l = 0.912$	Section 1613.3.1
Seismic Coefficient, F_a	$F_a = 1.0$	Table 1613.3.3(1)
Seismic Coefficient, F_v	$F_v = 1.5$	Table 1613.3.3(2)

Spectral Response Acceleration Parameter	Sms=2.453 Sml=1.368	Equation (16-37) Equation (16-38)
Design Special Response Acceleration Parameter	SDs=1.636 SDI=0.912	Equation (16-39) Equation (16-40)

Carson City is located in Seismic Zone 3 as categorized by the Uniform Building Code. This represents a moderately to highly active seismic area. Per the Carson City Quadrangle Geologic Map, the proposed site has been identified as having the potential for moderate severity in regards to liquefaction potential (ground failure) during significant seismic events. Liquefaction occurs during strong dynamic accelerations which causes severe movement of any overlying improvement, including foundation settlement or loss of bearing. The most susceptible soils for liquefaction are saturated loose to medium dense cohesionless (clean) sands and silts, within the upper 30- to 50- feet of the surface. Various subsurface sands encountered at the depths explored are considered to be within gradation parameters of potentially susceptible liquefiable soils.

Extensive liquefaction could occur with projected peak horizontal accelerations of 0.7g or higher, which may be generated by 7- to 7.5- magnitude earthquakes. Probabilistic ground accelerations in the range of 0.4g or less may also produce minor settlements of the overlying structures. Potentially costly remedial measures such as deep piles, dynamic compaction, mat foundations, or gravel piers can be utilized. However, these up-front costs and a comparison of potentially long-range repair costs and assumed liability is a financial decision that can only be assessed by the owner. Project mitigation costs are typically not considered practical for similar apartment complex developments within the vicinity of the proposed site. An in-depth analysis of the liquefaction potential of the subsurface soils was not included within our scope of work. However, based on our geotechnical review we believe that the liquefaction potential for the proposed site is minimal due to the known subsurface soil conditions.

The primary Geologic references for this report were obtained from the Geologic Environments Map Series prepared by the Nevada Bureau of Mines and Geology and Bulletin No. 75 "Geology and Mineral Deposits of Lyon, Douglas, and Ormsby Counties, Nevada," By James G. Moore, 1969 and the Nevada Bureau of Mines and Geology Genoa Quadrangle-Earthquake Hazards Map by Robert C, Pearse, 1979.

The Federal Emergency Management Agency (FEMA) Flood Zone Boundary Panel No. 320001 0092F, Map revised February 19, 2014, indicates that the site is located within Flood Hazard Zone "X". This denotes areas which have been determined to be within 0.2% annual chance flood or areas of 1% annual chance flood with an average depth of less than 1 foot. The area is shown as being protected from the 1% annual chance or greater flood by a levee system in conjunction with the Carson City Highway bypass and the Silver Oak Development which indicates that the major precipitation run-off contributors north of the Silver Oak Development are intercepted and routed within the alignment of the bypass or within existing storm drainage structures and detention facilities within the Silver Oak Boundaries.

Site Field Investigations included excavating five (5) test pits utilizing a backhoe within the boundaries of the proposed residential subdivision to depths of 6.5- to 9.5- feet below the existing grade. A site exploration plan indicating the test pit locations is presented on Plate 2. An additional test pit was also excavated north of College Parkway as a possible structural fill source for the intended Phase 21 Subdivision Improvements. Test pit logs of the encountered subsoils are presented on Plates 3 and 7. Representative subsurface soil samples were obtained in each of the test pits. These were then transported to our laboratory where selected soil samples were subjected to testing to determine physical and engineering properties, which included moisture content, grain size distribution and Atterberg Limit Determinations. Laboratory test results are presented on Plates 8 through 13. An explanation of the soil terminology is presented on Plate 14. Subsequently, the soils were classified in accordance with the Uniform Soil Classification System presented on Plate 15.

The Field Investigation indicated that the overlying surface soils within the perimeter subdivision boundaries of the proposed residential subdivision consist of previously placed granular fill materials which are medium dense and dry to moist for depths of approximately 3- to 5- feet in depth feet below the existing surface. Underlying the upper fill soils are the native silty sands and sandy silts which are medium dense and stiff for depths of 2- to 3- feet, which are in turn underlain by medium dense moist granular silty and clayey sands. The interior of the proposed subdivision, in the vicinity of Test Pit #5, lies in a depressed area and the surface soils encountered consist of native stiff sandy silts, which are considered low- to moderately-expansive. These soils are underlain by native granular soils which consist of medium dense, moist silty and clayey sands with gravels to the depths explored (6.5- to 9.5- feet). No free groundwater was encountered to the depths explored, however depths of approximately 11- feet have previously been reported within the vicinity. The groundwater level can be expected to fluctuate due to factors such as season, temperature, precipitation, influence of adjacent properties and others. Evaluation of these factors was beyond the scope of this report.

Temporary trenches with near vertical sidewalls should be stable to a depth of approximately 3.5 feet. Excavations deeper than 3.5 feet may require shoring or the sidewalls will need to be laid back to maintain adequate stability. Contractor shall follow all regulations presented within Part 1926, Volume 54, Number 209 of the Federal Register as enforced by the State of Nevada Department of Industrial Relation Division of Occupational Safety and Health.

Field observations indicate that the native upper silty sands and sandy silts are considered to be low- to moderately- expansive and have minimally acceptable structural bearing values. It is our opinion that the native silty sands and sandy silts are not considered suitable for the support of the proposed improvements in their present condition. The in-place previously placed medium dense structural fill materials (3- to 5- feet in depth) placed above these silts will allow the proposed single family residences to receive adequate support from conventional spread footings. The native silty sands and sandy silts in the vicinity of Test Pit #5 can remain in-place as long as they are overlain by acceptably densified granular structural fill materials at least 2- feet in thickness and provide at least 2- feet of separation for the structural building components, exterior Portland cement concrete flatwork and the flexible asphaltic concrete pavement section. We are anticipating that the mass grading for the project will be minimal

from the existing ground elevation, except for the depressed area in the center of the proposed development. Therefore we are assuming that no overexcavation of the native silts would be required within the perimeter of the development boundaries. Furthermore, the center portion of the project is to receive structural fill materials overlying the silty soils which should also address the majority of the overexcavation requirement. However, minor in-place silt overexcavation should be anticipated for the structural fill and native soil interface zones surrounding the central depressed area of the development.

Our recommendations intend to minimize potential movement associated with the on-site silty sands and sandy silts. Minor differential movements may occur and should be anticipated with any structural improvement or exterior flatwork, including the asphaltic concrete pavement section, if any of these marginally supportive silty sands and sandy silts remain in-place.

Based on our subsurface investigation we are providing the following site specific geotechnical recommendations:

- 1) All organic material and debris, if present, should be removed from within the proposed building lines of the structures and associated site improvements. Organic (root) laden surface soils should also be removed up to six (6) inches in depth. These strippings cannot be used as structural fill but they may be suitable for use in landscaping areas.
- 2) Subsequently, the upper 6- to 8- inches of the surface soils should be scarified, moisture conditioned and compacted prior to any fill placement to obtain planned foundation and slab-on-grade elevations and the exterior rigid and flexible asphalt subgrade elevations. The exposed soils should be maintained at approximate optimum in-place moisture content and compacted to at least 90 percent (%) relative of the maximum laboratory dry density (as determined by ASTM D-1557). If excessive moisture contents exist within the exposed soils, which prohibit obtaining acceptable in-place relative compaction, these soils may require to be scarified and allowed to dry prior to recompaction.
- 3) All structural fill materials shall be approved by our office and conform to the following gradation and plasticity specifications:

Sieve Size	Percent Passing – By Weight
4-inch	100
¾-inch	70-100
No. 4	45-75
No. 40	15-50
No. 200	5-20
Liquid Limit	12 Maximum
Plasticity Index	6 Maximum

The test pit which was excavated for the possible structural fill source, north of College Parkway, exposed granular subsurface soils approximately 1- foot below the existing surface which meet the intent of the structural fill gradation requirements and can be utilized as such to attain proposed subgrade elevations. Fill excavation should be performed so as to thoroughly mix and moisture condition the encountered granular soil horizons to comply with the specifications and to assist in moisture conditioning the soils prior to and during compactive effort. All native and import fill materials shall be reviewed by our office to verify compliance with the before-mentioned requirements prior to being brought on-site for placement. The above listed gradation requirements are intended to be a guideline of readily available materials.

These guidelines can be adjusted to allow for the use of other proposed structural fill materials pending review of grading contractors intended fill placement methodology and type of compaction equipment. Any adjustments to the structural fill material requirements, must be approved by our office prior to importing or utilizing the proposed fill material.

- 4) Following acceptable preparation of the subsoils, the approved structural fill soils shall be evenly placed in 6- to 8- inch loose lifts. During placement, they should be properly moisture conditioned to within 2% of the approximate optimum moisture content and compacted to not less than 90% relative of the maximum laboratory density (ASTM D-1557 test procedure) up to approximate footing grade, slab-on-grade or pavement subgrade.
- 5) All other structural fill, stemwell or utility trench backfill should be compacted to not less than 90% relative compaction. All proposed backfill soils should be approved prior to placement on-site.
- 6) Concrete slab-on-grade should also be supported by at least six (6) inches of Type 2, Class B Aggregate Base which has been densified to at least 95% relative compaction.
- 7) For the asphaltic concrete pavement we are anticipating light passenger vehicle loads, Traffic Index (T.I.) = 4.0, for the parking areas and the access roads.
- 8) We are also assuming that at least 24- inches of acceptable granular structural fill soils will be placed above the encountered native silts and underly the pavement section at subgrade elevations and that the granular soils will have a minimum R-value of 55. A sealing and maintenance program should also be developed to maintain and increase

the service life to the asphaltic concrete pavement and which adequately addresses preventative repair of any surface distress. We are assuming a Modulus of Subgrade Reaction (K-value) of 250 pounds per cubic inch for the design of the Portland Cement slab-on-grade and dock ramp.

Based on our knowledge of the subgrade soils and our assumptions listed herein, we recommend the following flexible and rigid pavement sections:

Vehicular Type	Asphaltic Concrete Thickness (Inches)	Portland Cement Concrete (Inches)	Type 2 Class B Aggregate Thickness (Inches)
Passenger Vehicle Parking	3.0	~~~~	6.0

- 9) The Asphaltic Concrete should be an approved Type 2 or Type 3 mix that is properly placed in accordance with the Standard Specifications for Public Works Construction (Orange Book) Section 200.02.02, as adopted by Carson City. Type 2, Class B Aggregate Base should also conform to Section 200.01.03 of the Orange Book and densified to at least 95% relative compaction.
- 10) An estimated shrinkage factor of 10- to 20- percent is applicable for the on-site fine soils. There may also be additional material losses due to clearing, grubbing, overexcavation operations, if needed, and shrinkage during excavation and compaction of the on-site in-place soils.
- 11) A moisture barrier should be installed beneath areas, which receive a moisture sensitive floor covering. This barrier may consist of 10ml visqueen covered with two (2) inches of sand or four (4) inches of sub-rounded gravel.

If the above site specific recommendations are utilized, the proposed residence structures can be supported by conventional spread footings designed for a maximum allowable bearing pressure of 1,500 pounds per square foot. A one-third increase in allowable bearing pressure may also be used for short duration loads, such as wind or seismic. The spread footing should also be placed a minimum twenty-four (24) inches below adjacent finished grade for frost depth protection. Total anticipated settlements utilizing the allowable bearing pressures should be on the order of $\frac{3}{4}$ of an inch. Differential settlements between similarly loaded and dimensioned footing should not exceed two-thirds of the total anticipated settlements.

Lateral loads may be resisted by friction between the footing base and supporting soils and lateral bearing pressure against the sides of the footings. For design purposes, a coefficient of friction of 0.40 and active and passive equivalent fluid pressures of 35 and 350 pounds per cubic foot per foot of depth unrestricted and 500 pounds per cubic foot of depth top restricted are applicable. These values do not include any additional surcharge loading due to construction traffic or general loads. If the structural design makes use of passive earth pressures, it is important that representative of this office be present during the placement of any backfill against footings to observe the placement and test the backfill.

The Carson City Region is an arid climate with low relative humidity, and therefore any concrete flatwork is prone to shrinkage and curling. Concrete mix proportions and construction techniques such as the addition of water or improper curing methods can adversely effect the quality of finish concrete and may result in an increase in cracking, spalling or curling of the Portland Cement Concrete slabs. Air content for exterior Portland Cement concrete flatwork should range from 4- to 7- percent (%) to resist spalling during freeze – thaw cycles. Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcement should be provided to minimize any damage from shrinkage or curling.

Due to the potential for relatively shallow groundwater and existing moisture contents of the subsurface soils, precautions should be taken during and after construction to minimize saturation of the foundation structural fill soils. Positive drainage should be established away from all exterior walls of the proposed buildings. Downspouts from roof drains should not discharge into planter areas immediately adjacent to the building unless there is positive drainage away at a minimum slope of 5 percent from the structures.

Also, our firm should be allowed to review finalized construction plans and provide Field Quality Control Services during anticipated construction to confirm that our recommendations are correct. Our office should be immediately notified of variations in soil conditions, such as buried debris or unexpected items, if encountered, during construction of the proposed single family development, so that we may have the opportunity to determine if our recommendations as presented herein are valid or require re-evaluation.

This geotechnical report is not intended for use as a bid document. Any person or firm involved prior to or during the construction of this project should perform all necessary independent investigations to satisfy themselves as to the subsurface conditions, the earth work requirements, or the required procedures to be utilized in successfully completing the proposed single family residential development including de-watering practices, if required.

We trust this provides the information needed at this time. However, if you require additional information or have any further questions, please contact our office at your earliest convenience.

Sincerely,

Gary L. Hopper, P.E.
Principal Engineer

07/28/2021 Planning Commission

Late Material

Item 13D, E, F



Carson City Planning Division

108 E. Proctor Street
 Carson City, Nevada 89701
 (775) 887-2180 – Hearing Impaired: 711
 planning@carson.org
 www.carson.org/planning

MEMORANDUM

Planning Commission Meeting of July 28, 2021

ITEM 13.D

TO: Planning Commission

FROM: Heather Ferris
 Planning Manager

DATE: July 27, 2021

SUBJECT: LU-2021-0218 For Possible Action: Discussion and possible action regarding a request for a Special Use Permit to allow for a 52-unit attached single family residential development on 3.45 acres zoned Neighborhood Business Planned Unit Development (NB-P), located at 1147 W College Parkway, APNs 007-462-16 and 007-462-17.

Since the release of the packet, Public Works staff has reviewed the calculations related to the pro-rata share for upsizing the sewer and propose the following modifications to condition 19. New wording appears bolded and underlined. Proposed deleted language appears with a strikethrough.

19. The developer shall enter into an agreement to pay it's pro-rata share of the cost to improve approximately 1,135 feet of 12 inch sewer main which is currently at capacity in College Parkway between Imperial Way and Granite Way. The pro-rata share for this development is 4-6 ~~2.17~~ percent and is not to exceed ~~\$9,600~~ **\$12,253**.

Staff recommends the following motion:

"I move to recommend approval of Tentative Subdivision Map SUB-2021-0215 to the Board of Supervisors based on the ability to make the required findings and subject to the conditions of approval included in the staff report amended in staff's memo dated July 27, 2021."

Christie Overlay

From: M M <mike.627@hotmail.com>
Sent: Thursday, July 22, 2021 9:03 AM
To: Planning Department
Subject: 2021-0215 For Possible Action 1147 W College Parkway Re-zone

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

To Carson City Planning Commission,

I would like to voice my opposition to placing 52 units at this location. This is not consistent with the Silver Oak Community as the rest of the community is populated with single family stand-alone homes. Based on your provided map and comparing the parcels vs. an area of approximately the same size (Gentile Ct) there should be 11-14 single family homes on these combined parcels not 52. I would not call placing 52 units a responsible growth option for this location. 11-14 homes consistent with the rest of Silver Oak would be a responsible and acceptable option for this location.

The applicant is asking for a setback variance that is one-third what is required. I assume these setback distances were put in place for a reason and reducing the requirement by two thirds seems to be extreme and not in keeping with the intentions of setback distances. It just feels like the applicant is trying to squeeze as many building units into this location as possible. Please prioritize responsible planning over money. Again, this is not responsible growth nor is it in keeping with the design and build out of the rest of the area.

This may just be semantics but calling these units attached single family homes is misleading. These units are much more similar to apartments or condominiums than they are to houses. Again, this does not fit with the rest of the Silver Oak Community and quite frankly does not belong in this development.

Please reject this proposal and ask the applicant to provide a plan that is consistent with all current development within the Silver Oak community.

Respectfully,

Michael E. Moriarty

Christie Overlay

From: Robert Speicher <SPIKR55@msn.com>
Sent: Thursday, July 22, 2021 8:53 AM
To: Heather Ferris; Robert Speicher; Tom Cotton; Jerry and Nicole; Dave Gould; Gary Hunter; Bill Fletcher; Donald & Debbie Audet; Jim Bathgate; Ken & Vicki Pearson
Subject: Townhouses

Follow Up Flag: Follow up
Flag Status: Flagged

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Mrs. Ferris

Writing to object to the High Density Town Houses on Collège Parkway. There is an extreme amount of traffic on this road due to the Collège. The High Density Town Houses do not fit in this location. How about next to your House. This is a lame idea undoubtedly fueled by monetary greed.

Bob Speicher 2581 Fern Mesdow Circle
Get [Outlook for Android](#)

Christie Overlay

From: Scott M <mcmunsons@gmail.com>
Sent: Thursday, July 22, 2021 2:01 PM
To: Planning Department
Subject: Objection to Development At 1147 W College Parkway- APNs 007-462-16 and 007-462-17

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

To Carson City Planning Commission,

I write to you today to relay my strongest objection and opposition to the planned development of 52 homes at the proposed location on the corner of College Parkway West and Oak Ridge. (1147 W College Parkway- APNs 007-462-16 and 007-462-17)

Up to this point there has been a consistent development style within the Silver Oak Community and what many of us felt was an implicit understanding that this would be a higher end neighborhood for single family homes on a golf course.

Had the developer chosen to continue the trend of the smaller size patio style homes consistent with what they just got done building on the south and east side of John Mankins Park there would have been little to no opposition from the neighborhood. Those homes are consistent with what we all expected when investing significant portions of our livelihoods into one of the top 3 developments in Carson City.

This development was not done by Lennar, or KB homes. This community was built on face to face relationships with a small local developer who gave us all an expectation of what kind of area we would be moving into. What we are seeing now is nothing other than a last grasp for cash because the land has dried up and housing prices are at a premium. I understand and appreciate that people want to make money. I understand that the city wants it's tax revenue and more is generally better, however I hope people don't look at short term gain at the expense of long term community health and trust in the city planners and local builders. So much of what happens in this town is based upon relationships and trust. What's being proposed is none other than a betrayal of the type of development that we have all been led to believe we are going to be living in.

There has also been no explanation given to the owners in our community on how this additional traffic flow and huge population influx and density will affect us. There are a few things to consider.

1) When College is in session, the traffic on College Parkway west is very heavy from roughly 4-7 PM when students are going to and from school. You are also talking about adding 52 new homes in there which could bring over a hundred new cars traveling our small 1 lane road during peak hours adding to an already congested area. We haven't even felt the full effect yet on College Parkway West because many of the homes on Red Leaf are still under construction which will further add more traffic.

2) You are putting the heaviest population density which will bring the most traffic right next to a park where kids are oftentimes using the crosswalks, and sometimes riding bikes in the streets etc... There are birthday parties nearly every weekend and the park is already full most all the time on weekends. By adding 52 homes you cannot tell me that adequate parking is going to be available for people who are going to be entertaining. It will invariably overflow to the few parking spots at the park further making it difficult to access for the current residents. Not to mention cars will be putting kids at risk constantly moving in and out of the high density community.

A few other things to consider:

- If the community was appropriately sized for the space, you would not need to apply for a variance in order to build right up against the fences circumventing the 30 foot rule.
- Regardless of the legality of the project, it is totally unethical. The developer is looking to capitalize on the inflated property values that we have all made possible with our investment into this neighborhood and now they are going to be used to springboard into high priced high density living on the last parcels in our neighborhood. The developer is going to damage values in our area by placing a completely inappropriate development based upon the rest of our neighborhood. The Developer doesn't have to care anymore either. They got our money and won't be building anymore near us so there is no longer a need to maintain the facade of developing a high end single family home community or worry about future sales near us or damaged reputation.
- Additionally, it is not really accurate to call the development "single family homes." We have been told this project is most closely aligned with the Mills Landing Project off hwy 50 and that is a style of development that does not belong in Silver Oak. They are loud because they are built vertical. The space is incredibly limited and will spill over into surrounding areas. Lastly the 3 story style of construction is going to be taller than any other home in the silver oak community.
- This is going to be the first residential development people are going to see when heading up College Parkway West. Is this really the first impression we want to give to a neighborhood chock full of near million dollar homes?
- How can the post below from [76332 \(carson.org\)](http://76332.carson.org) not be argued to have a detrimental effect on property values or traffic

2. ***Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity;***

The subject property is surrounded by single family residences, John Mankins Park, a senior living facility, and the golf course to the south. The project proposes a single family attached product, providing a transitional use between the commercial use (senior living facility) and the residential uses. The proposed use is consistent with the existing neighborhood and will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood. While the applicant is also seeking a variance from the 30-foot setback along the common property line with John Mankins Park, the proposed single family residential use is compatible the Park. Moreover, the proposed setback of 10 feet will be in keeping with the setbacks from the park for other homes in the area.

3. ***Will have little or no detrimental effect on vehicular or pedestrian traffic;***

As proposed and conditioned, the project will have little or no detrimental effect on vehicular or pedestrian traffic. The applicant has provided a traffic memo outlining the estimated trips, based on the ITE Trip Generation Manual. The project is anticipated to generate approximately 305 daily trips with an AM peak of 23 trips and a PM peak of 28 trips. This is below the threshold for a full traffic analysis. The project will be required to install a curb ramp, meeting current ADA standards, must be installed at the intersection of College Parkway and Oak Ridge Drive.

In closing, this plan should be summarily rejected and the developers should be advised to remain consistent with the type of developments they have done up to this point.

Thank you for your consideration.

Scott Munson

Heather Ferris

From: David Gould <davidhgould@yahoo.com>
Sent: Thursday, July 22, 2021 12:18 PM
To: Robert Speicher
Cc: Heather Ferris; Tom Cotton; Jerry and Nicole; Gary Hunter; Bill Fletcher; Donald & Debbie Audet; Jim Bathgate; Ken & Vicki Pearson
Subject: Re: Townhouses

Follow Up Flag: Follow up
Flag Status: Flagged

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I concur. Silver Oak has already been compromised by the lack of infrastructure. Relaxed set backs from 30' to 10' and no traffic studies are simply irresponsible and reek of the developers greed.

Sincerely

David H Gould. Homeowner

Cheers

On Jul 22, 2021, at 5:53 AM, Robert Speicher <SPIKR55@msn.com> wrote:

Mrs. Ferris

Writing to object to the High Density Town Houses on Collège Parkway. There is an extreme amount of traffic on this road due to the Collège. The High Density Town Houses do not fit in this location. How about next to your House. This is a lame idea undoubtedly fueled by monetary greed.

Bob Speicher 2581 Fern Mesdow Circle
 Get [Outlook for Android](#)

Christie Overlay

From: Heather Ferris
Sent: Thursday, July 22, 2021 3:27 PM
To: Christie Overlay
Subject: FW: Objection to townhouse development plan called Silver Oak at College Parkway

Please print for late material for 13.D, 13.E, and 13.F. Also please save in the e-file.

From: Ron Savino <rsavino9@gmail.com>
Sent: Thursday, July 22, 2021 3:25 PM
To: Heather Ferris <HFerris@carson.org>
Cc: Lori Bagwell <LBagwell@carson.org>; Nancy Paulson <NPaulson@carson.org>
Subject: Objection to townhouse development plan called Silver Oak at College Parkway

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

July 22, 2021

Heather Ferris, Planning Manager (hferris@carson.org)

Copies:

Lori Bagwell, Mayor (lbagwell@carson.org)
 Stacey Giomi, Supervisor (email via city web site)
 Stan Jones, Supervisor (email via city web site)
 Lisa Schuette, Supervisor (email via city web site)
 Maurice White, Supervisor (email via city web site)
 Nancy Paulson, City Manager (npaulson@carson.org)

VIA EMAIL

I am writing to object to the proposed townhouse development called Silver Oak at College Parkway (File LU-2021 -0218; VAR-2021 -0232; SUB-2021 -0215; AGENDA ITEM: 13.D, 13.E, 13.F for the July 28, 2021 Planning Commission meeting.)

1. Although the proposed development appears to meet current city parking requirements, the following two comments indicate that additional attention to the parking situation would be wise.
2. In reality, there is insufficient parking. The garage depth is 20 feet. Double-cab pickup trucks are longer than 20 feet. (For example, see GMC Sierra and Chevy Silverado as just two examples.) As common experience indicates through observation of any public parking lot, such long vehicles are increasingly common. In the proposed development, the owners of these vehicles will, of necessity, try to park in

the “guest” parking spots or they will attempt to park on Oak Ridge Drive or College Parkway. However, note that the “guest” parking spots have a typical depth of 18.5 feet. This means that even a careful driver of such a vehicle will not be able to get the vehicle completely out of the lane of travel on the interior streets in the development by using a “guest” parking space. Note also that there is no other on-street parking available within the development. Each of these issues is cause for public safety (including fire truck movement) concerns.

3. In any case, the garages will not be able to accommodate two vehicles as a practical matter. The development consists of three bedroom units. Owners in such developments often want to avoid the hassle of exterior home maintenance so that they can enjoy their free time more easily. This means many toys (adult and child toys) are stored in the garage for use, for example, during evenings and weekends. In addition, it would not be unusual for owners to have other possessions that end up being stored in the garage. As a result of these common situations, the owners will again be forced to look for vehicle parking elsewhere, including in the “guest” parking spots, public city streets or even the John Mankins Park visitor parking area.
4. The proposed relief for the setback from John Mankins Park is not *de minimis*. Such a large variance (from a 30 foot setback to a 10 foot setback) should not be granted. While a developer is always permitted to attempt to build in a way to maximize his return, it is unreasonable to expect major variances to the city requirements be approved to accomplish that goal. The planning documents are dismissive of this major change (see items 7b and 7c, among others.) It is a bit disingenuous to compare the setback relief granted to single family homes on Drysdale Court, which backs up to the outfield of the park’s ball field, to the proposed setback of the townhomes, which will be immediately adjacent to the basketball and tennis courts.
5. A solution exists by deleting units 35, 38, 45, and 48 from the development. At a minimum this would permit larger “guest” parking spaces and eliminate the need for a major setback variance from John Mankins Park. It might also permit additional “guest” parking spaces to be provided. No doubt, some clever engineering and architectural work might provide even more ingenious solutions to these concerns.

Thank you for your time and consideration.

Ron Savino
2556 Simons Ct
Carson City 89703

rsavino9@gmail.com

Christie Overlay

From: Gail Scoville <weezerscoville@gmail.com>
Sent: Sunday, July 25, 2021 5:20 PM
To: Planning Department
Subject: Subject 2021-0215

Follow Up Flag: Follow up
Flag Status: Flagged

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

To the Planning Division:

I do hope you'll re-consider approving the variances and setback to the proposed 52 lots/townhomes at Subdivision Map known as Silver Oak @ College Parkway. As a homeowner in the Silver Oak Community and close proximity to the project, our concerns are:

**** Traffic Impact:** No traffic study is proposed and none has been done. This project would significantly add to the already congested College Parkway due to the College Campus and use from the contractors/their employees on a daily basis.

**** Inconsistent Construction:** Townhomes do not blend in with existing single family homes in the Silver Oak Community and could potentially lower property values in the surrounding area.

**** Increased usage of an already crowded John Mankins Park with a 10' setback is WRONG**

**** Will this be a part of the Silver Oak Community HOA? Who will be responsible for the outside maintenance of this TOO large development? We the homeowners at Silver Oak are responsible for our maintenance!!!**

**** Too close to Sierra Place, an assisted living facility (noise, thefts)**

This project does not belong in this neighborhood (NIMBY) Please, again, do not allow this project to go through at this location, and don't approve the variances and setback.

Regards,
Gail Scoville, Resident

Christie Overlay

From: M M <mike.627@hotmail.com>
Sent: Saturday, July 24, 2021 9:33 AM
To: Planning Department
Subject: Questions and comments for proposed Silver Oak Town Homes

Follow Up Flag: Follow up
Flag Status: Flagged

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Hello,

What type of HOA's will be set up if this apartment type complex is built?

The proposed multifamily buildings are required to have a private road and water main so the HOA's certainly should not be folded into the existing HOA for Silver Oak since they are all stand-alone single-family homes. This proposal is not similar to the rest of Silver Oak in any way. A letter sent out by Lanturn Investments signed by Mark Turner stated "This project will have no impact on the Silver Oak HOA as it will have its own property owners association to care for its buildings and grounds. Please contact Silver Oaks HOA manager for further information." My neighbor reached out by email Thursday, July 22 and this was the response- "I don't know that the project on the corner would be part of Silver Oak, it will most likely be a separate association."

The HOA manager has always been very cooperative and responsive whenever we have contacted her about anything so it appears there is nothing in place at this time. So, for those of us that don't do this for a living it is a concern not a formality.

The water system must be private -

What is the requirement for funds being set aside to repair or to improve this water system when issues arise?

What is the time line requirement to make such repairs?

page 540 - "Will be consistent with the objectives of the Master Plan Elements"

So, the city master plan over rides the Silver Oak development that is currently all single family detached homes of medium density?

page 540 - "Will not be detrimental to the use, peaceful enjoyment, economic value, or development of surrounding properties or the general neighborhood; and is compatible with and preserves the character and integrity of adjacent development and neighborhoods or includes improvements or modifications either on-site or within the public right-of-way to mitigate development related to adverse impacts such as noise, vibrations, fumes, odors, dust, glare or physical activity"

I disagree with this statement - apartment/condo type buildings will affect economic value of the surrounding single-family homes. You can call them "luxury town-homes" but just go look at Mills Landing. This is not in line with the rest of the Silver Oak community.

This type of build out does not preserve the character and integrity of adjacent development. Again, Silver Oak is all detached single-family homes. If this project is rubber stamped, then at the very least it should not be called part of Silver Oak. It is not the same foot print as the rest of Silver Oak and the vast majority of people who purchased homes in Silver Oak did so with the understanding that it is a detached single family home development not one that includes multifamily dwellings.

I also take issue with the fact that 60 property owners within 600 feet were notified and at the time of this report no public comments were received.

This affects all Silver Oak homeowners not just those 60 within 600 feet since it is not consistent with the rest of Silver Oak development.

When was the notice received in the mail by the 60 property owners in comparison to when this report was produced?

Obviously, this report was written by people who have given their opinions based on Carson City's pro-growth or some type of other interest financial or otherwise to push this project through. This does not align with the rest of Silver Oak plain and simple.

A letter was left on some Silver Oak residents' door steps on letter head from Lanturn Investments. In response to an anonymous letter from "concerned citizens"

Mark Turner stated that as currently zoned among other things that could be built on these parcels are a gas station, car wash, liquor store etc. Point well taken however since the numerous buildings just a few hundred feet away on the corner of North Carson and West College Parkway have been mostly vacant for years it wouldn't make much sense to build any of these businesses just down the street. He went on to state on the last page of the letter, in part, "opposing this project could give way to some already approved use that would be very incompatible with surroundings." This seems like a scare tactic. Nowhere in this letter did he offer any other options like single family detached homes consistent with Silver Oak.

Mr. Turner also stated he has lived in Silver Oak since 1996 and his interest and concern are long lived and ongoing. I would have to say if this is in fact true Mr. Turner would develop this property consistent with the rest of Silver Oak and build single family detached homes. This is what I would respectfully ask be done with this property. Silver Oak is a wonderful neighborhood/development please don't change its footprint.

Regards,

Michael E. Moriarty

Heather Ferris

From: Heather Ferris
Sent: Thursday, July 22, 2021 3:27 PM
To: Christie Overlay
Subject: FW: Objection to townhouse development plan called Silver Oak at College Parkway

Please print for late material for 13.D, 13.E, and 13.F. Also please save in the e-file.

From: Ron Savino <rsavino9@gmail.com>
Sent: Thursday, July 22, 2021 3:25 PM
To: Heather Ferris <HFerris@carson.org>
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July 22, 2021

Heather Ferris, Planning Manager (hferris@carson.org)

Copies:

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 Stacey Giomi, Supervisor (email via city web site)
 Stan Jones, Supervisor (email via city web site)
 Lisa Schuette, Supervisor (email via city web site)
 Maurice White, Supervisor (email via city web site)
 Nancy Paulson, City Manager (npaulson@carson.org)

VIA EMAIL

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2. In reality, there is insufficient parking. The garage depth is 20 feet. Double-cab pickup trucks are longer than 20 feet. (For example, see GMC Sierra and Chevy Silverado as just two examples.) As common experience indicates through observation of any public parking lot, such long vehicles are increasingly common. In the proposed development, the owners of these vehicles will, of necessity, try to park in

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Thank you for your time and consideration.

Ron Savino
2556 Simons Ct
Carson City 89703
rsavino9@gmail.com

Heather Ferris

From: Henk Keukenkamp <hkeukenkamp@scopeit.com>
Sent: Friday, July 23, 2021 12:37 PM
To: Heather Ferris
Cc: Jolanda Driessen; Henk Keukenkamp
Subject: Questions/Comments for public hearing

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Heather,

have the following question/comments for the 52 unit new town homes public hearing on 7/28. I will be out of town that day and unfortunately not be able to attend the meeting.

- 1) Why are we building 52 units of town homes on a 3 acre lot vs. building homes? What's a normal density for these kinds of properties?
- 2) Has the planner thought about the devaluation of surrounding properties? What will be done to avoid this? For example, dense trees and landscaping to off-set this from the view. Not connecting to Oak Ridge Drive. Building speed bumps, etc.
- 3) While we appreciate that the builder will make a large amount of profit on 52 unit town homes, given the current market building homes on the said property will sell quickly as well. Possibly at slightly less profit, but leaving our neighborhood intact? Is the planner willing to consider this?
- 4) Are the townhomes planned to be rental properties, or are they for sale? What will the average rent be? What will the average price be? This will determine the demographic attracted to the neighborhood.
- 5) Why would a reduction in set back be considered. I recommend we leave the set back since this will be encroaching on the Silver Oak community housing and make the development more visible. Instead consider building less units and using the setback to plant large trees.
- 6) I live on Oak Ridge Drive, how much additional traffic will the development cause? It seems a lot since there are more units on the 3 acres parcel than in the whole Oak Ridge street.
 - Is the builder planning to implement speed bumps on Oak Ridge to slow traffic down?
 - Are there alternate routes that can be developed, instead of connecting to Oak Ridge Drive?

7) What will be done to keep this in line with current Silver Oak HOA rules?

Summary: I'm against the current plans. Town homes are not inline with the neighborhood and surrounding properties. The additional 52 units add likely 100 more vehicles to the area and increase traffic and speeding. There is no reason to allow a reduction in setback, less units would be a better option. I'm in favor of the planner to build single family homes on the property.

Regards,
 Henk Keukenkamp
hkeukenkamp@scopeit.com
 (760) 799-5645

Christie Overlay

From: Heather Ferris
Sent: Monday, July 26, 2021 10:42 AM
To: Doug and Nona Peachey; Planning Department
Subject: RE: Subject: Questions for the Public Hearing Silver Oak, 1147 W College Parkway on 7/28/2021

Your email has been received and will be forwarded to the Planning Commission for consideration.

From: Doug and Nona Peachey <dougandnona@gmail.com>
Sent: Monday, July 26, 2021 9:04 AM
To: Planning Department <planning@carson.org>; Heather Ferris <HFerris@carson.org>
Subject: Subject: Questions for the Public Hearing Silver Oak, 1147 W College Parkway on 7/28/2021

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

My questions are focused on the consequences of the **SETBACK** variance and the **HIGH DENSITY CONSTRUCTION** proposal because this combination is inconsistent with the pre-existing homes in Silver Oak. I hope that the beauty, desirability and quality of life of Silver Oak will continue for decades.

Density of Traffic

1. What assumptions were used in determining the increase in traffic as a result of this proposed project?
2. Were all projects ("approved but unconstructed" and "incomplete construction") throughout the area taken into consideration? (Examples include Red Leaf, Bluebird, White Hawk, Silver Lake, Sienna, etc)
3. When was the last comprehensive traffic analysis conducted? (ie. not based on one small approved project at a time using a chart)
4. Will the attractive, tree lined medians have to be removed to accommodate increased traffic into/out of the project?
5. What occupancy assumptions (for the proposed project) were considered in determining the traffic flow? Due to the college proximity, these units will be ideal for up to 8 college students to occupy one unit with 8 cars among them.

Density of People, Parked Cars, Pets

6. Why is this proposal requesting a variance for the setback on the park borderline? Is it simply to accommodate the maximum number of building units?
7. If the City has setback requirements, why are the variances agreed upon in the Staff Report from the Planning Dept? It appears easy to obtain these variances.
8. How many cars are estimated for each unit? Are the proposed garages wide enough to accommodate two commonly driven SUVs and trucks?
9. How will 35 overflow parking places for residents, guests and large vehicles be sufficient when there is no parking on W. College Parkway or Oak Ridge Drive? What were the assumptions?
10. Will the HOA limit and enforce the number of non-family adults to inhabit each unit? What will that number be?
11. Will the HOA restrict and enforce vacation rentals, long term rentals, academic rentals?
12. Will dogs be allowed? With the lovely park next door, it could become a de facto dog park, making it less desirable for other park activities.
13. What type of barriers will be provided between the proposed development and the John Mankin Park so that the park doesn't become the residents' backyard?

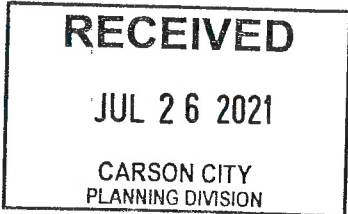
14. Will it be a separate HOA or will it be a part of Silver Oak? If a part of Silver Oak, how will this project's shared exterior and private road expenses be handled? Will the HOA and CCRs be created and available for review prior to a recommendation to the Board of Supervisors?

Possible Solutions without Setback Variance while maintaining the Silver Oak quality

- A. Single family homes with comparable footprints consistent with pre-existing homes
- B. Medium density construction consistent and compatible with pre-existing homes
- C. If High Density construction, reduce the number of buildings and/or occupants/unit, increase parking and green space. Conduct a thorough and independent traffic analysis taking into consideration fully occupied and constructed properties (Red Leaf, White Hawk, Bluebird, Silver Lake, Sienna, etc.) and a realistic estimate of occupancy in the proposed project.

Thank you in advance for your time, effort and consideration,
Nona Peachey

July 25, 2021



Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701
Email to: HFerris@carson.org

Dear Commissioners:

I have reviewed the Roseview Townhouse tentative map layout and wish to voice my support for this infill development in Carson City. This project will preserve the residential nature of Silver Oak and prevent the development of less desirable and less compatible uses allowed under the current Neighborhood Business zoning of this parcel.

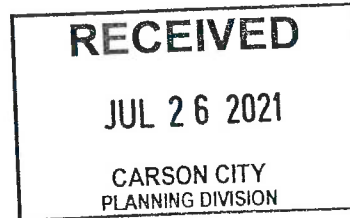
As a Silver Oak resident who lives nearby I am hopeful that you will approve this project as it will also add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park helped to reduce the amount of unwanted conduct at the Park since its construction.

We are hopeful that the construction of residential rather than commercial to the north of the park will further help to reduce incidences of inappropriate conduct in this area of what is a small neighborhood park that appeals to family users.

Regards,

Ted Matuszewski MD
Siena Drive, Silver Oak

July 25, 2021



Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701
Email to: HFerris@carson.org

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Regards,

Wayne and Carol Baker
1600 Silver Oak Drive

July 27, 2021

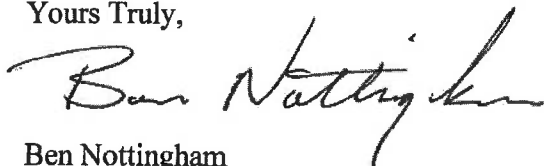
Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commission Members:

My wife and I purchased our new home on Oakridge a few years ago. We recently became aware of the proposed zoning change for the parcel just adjacent to our home. We are in full support of this proposal as we feel it will be a much better fit than what the current zoning allows for. We are confident that the quality of the proposed project will only enhance our neighborhood because the builders are locally invested and take pride in their product.

Any type of business use on that parcel just doesn't fit. Therefore, we strongly encourage you to approve the zoning change before you.

Yours Truly,

A handwritten signature in black ink that reads "Ben Nottingham". The signature is written in a cursive style with a large, sweeping "B" and "N".

Ben Nottingham
2888 Oakridge
Carson City NV, 89703

July 26, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

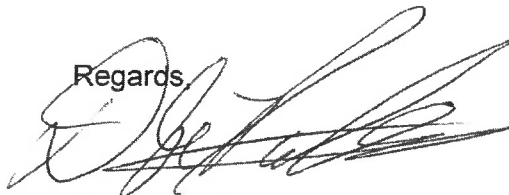
Dear Commissioners:

I have reviewed the proposed townhouse layout and wish to voice my support for this infill development in Carson City. This project will preserve the residential nature of Silver Oak and prevent the development of less desirable and less compatible uses allowed under the current Neighborhood Business zoning of this parcel.

As a Silver Oak resident who lives at 1102 Drysdale Court, directly adjacent to the proposed project, I am hopeful that you will approve this project as it will add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park helped to reduce the amount of unwanted conduct at the Park since its construction.

We are hopeful that the construction of residential rather than commercial to the north of the park will further help to reduce incidences of inappropriate conduct in this area of what is a small neighborhood park that appeals to family users.

Regards,

A handwritten signature in black ink, appearing to read 'Doyle Katafias', written over the word 'Regards,'.

Doyle Katafias
Silver Oak Resident

From: normensminger@aol.com
To: [Heather Ferris](mailto:hferris@carson.org)
Subject: Public Hearing on July 28, 2021 To discuss LU-2021-2018
Date: Tuesday, July 27, 2021 12:44:04 PM

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

To: Heather Ferris
hferris@carson.org

Ref: Public Hearing on July 28, 2021
 12:43 pm
 To discuss LU-2021-2018

July 27, 2021 @

Variance Discussions for 52 Townhomes on 3.45 acres in the Silver Oak Subdivision.

As a resident of the Silver Oak Subdivision and having reviewed the proposed variance changes being proposed, I have the following concerns:

<!--[if !supportLists]-->1. <!--[endif]-->**Congestion:** Currently there is already a high volume of vehicle exposure to the park playground with small children moving around the cars that are parked at an angle. Adding 200 more vehicles having to transit that small area will increase the potential for an accident involving people using the park.

<!--[if !supportLists]-->2. <!--[endif]-->**Setback variance:** Allowing the change from 30 foot to 10 foot setback to the park will create a very narrow path that will entice persons to use it as a secluded area to engage in possible criminal activity and possibly invite trash collecting by the park. This variance change should not be allowed.

<!--[if !supportLists]-->3. <!--[endif]-->**Townhouse appearance:** What are the HOA maintenance rules and costs that are planned for these units? The current Silver Oak HOA Members, will not accept a major increase in fees to manage the maintenance on these townhomes.

Routinely, homeowners of townhomes, eventually covert them to renters, who do not have the same "pride of ownership" as an owner. There are many examples in Reno of townhomes, after a few years, of yards are not kept up. Individual units get painted different colors within the same building. Some add awnings, while others don't. All of this will have a negative impact on surrounding home values. It is different with apartments, because you have on-sight managers to keep the appearance consistent which keeps the complex value high.

<!--[if !supportLists]-->4. <!--[endif]-->**Lot Size:** With a very small lot size of only 1,237 sf (or 0.028 of an acre) and a potential home and garage foot print of approximately 1,034 sf, that would leave only 202 sf of yard space. This will force the children to

move into the street to have room to play. Again not a safe proposal.

As a summary, these variance requests should be denied any the current lot be kept for future commercial use. An additional senior care center would be a better use of this space. Not changes which will decrease Silver Oak homes values, thus decreasing future property taxes.

Norman Ensminger
2041 Shadow Brook Ct (Silver Oak Subdivision)
Carson City, NV 89703

From: [Nelson Neiman](#)
To: [Planning Department](#)
Subject: 2921-2015 For Possible Action
Date: Monday, July 26, 2021 5:25:07 PM

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Kim and Nelson Neiman
3021 Sarratea Drive
Carson City, NV 89703

We reside in the Park Place development in Silver Oak and support the proposed development.

We lived at 3233 Harvard Drive for 25 plus years and watched Silver Oaks being developed from its inception. Thanks to its wise and beautiful development, our home in University Heights had more than doubled in value before we sold it in 2018. Thank you Garth Richards. Mark Turner and Sam Landis.

We were the first purchaser of a lot in Park Place (Silver Oak Phase 21), and did not select one of the properties near the proposed luxury townhome project because it was zoned Neighborhood Business.. We feared the uncertainty of how it could be developed under that zoning and harm the value of our new residence. Our decision was a wise one; and over the sat three years we have watched our home in Park Place increase substantially in value. Our son, who is an officer with the largest home builder in Northern Nevada, has commented on the quality of both our home and all of Silver Oak. I have no doubt the same will be true of the proposed project.

The traffic on both Silver Oak and College Parkway is minimal; and both roads can certainly handle any increased traffic.

Mankin Park will welcome more use. Values here will continue to go up. And the developers, including Garth Richards who still lives here, will make sure this addition is one of which we are all proud.

We were here when Silver Oak was roamed by coyotes, We are proud to be part of it as it is now and look forward to the addition of this development.

Nelson K Neiman
Consultants Network Inc.
Cell: 775.220.2752
nkneiman@cs.com

Heather Ferris

From: Jerry Cinani, M.S. <jcinani@scncounseling.com>
Sent: Monday, July 26, 2021 4:20 PM
To: Heather Ferris
Subject: townhouse proposal for parcel bordered by Oak Ridge Dr.. and College Prkwy, carson city

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Good afternoon,

I am a resident on Oak Ridge Dr. across from the park, and I have some concern about excessive traffic congestion from the above proposal. In the documents submitted to the planning dept., the developers provided a traffic memorandum citing an estimated am and pm trips for the residents of the townhouses. They cited peak trips of 23 AM and 28 PM out of a total of 305. However, the location would have 52 units and considering one working adult per unit would indicate at least 52 trips in AM and a similar PM trip number. This amount of additional traffic seems excessive and would create congestion in this small area. Also, an exit onto Oak Ridge Dr. would extremely detrimental to traffic patterns when the park is busy. The section of street between the park and the intersection is used for parking by people at the park. The park oftentimes is very busy due to the facilities available there, i.e., baseball field, children's play area, skate board park, basketball courts, tennis courts, and barbeque/eating area. In addition, since there was not a need for a second exit/entry point for the development adjacent to the park, it seems unnecessary to have a second such exit on to Oak Ridge Dr..It is apparent that features of this area warrant a full traffic study prior to approval of the developers proposal.

Jerry M. Cinani

Heather Ferris

From: Cbarnett <chas1956@aol.com>
Sent: Monday, July 26, 2021 4:30 PM
To: Heather Ferris
Subject: Oak Ridge Drive development

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

I live at 2832 oak ridge drive.

My concern is parking for the park and in front of my house. As proposed there would be no parking signs from the park up to College Parkway. I am concerned that this will just move their parking to my side of the street. Suggestion to also have no parking signs from College Parkway to the stop sign on my side also to avoid congestion.

Thanks

Charles Barnett
775-721-1268

Sent from my iPhone

**RECEIVED**

JUL 26 2021

CARSON CITY
PLANNING DIVISION

July 25, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701
Email to: HFerris@carson.org

Dear Commissioners:

I have reviewed the Roseview Townhouse tentative map layout and wish to voice my support for this in-fill development in Carson City. This project will preserve the residential nature of Silver Oak and prevent the development of less desirable and less compatible uses allowed under the current Neighborhood Business zoning of this parcel.

As the General Manager of the Silver Oak Golf Course, a nearby business and adjacent property owner, I am hopeful that you will approve this project as it will also add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park has helped to reduce the amount of unwanted conduct at the Park as well as on our golf course property.

Regards,

Terrie McNutt
Silver Oak Golf Course General Manager

Date: July 25, 2021

RE: Silver Oak Construction

Meeting Date July 27, 2021

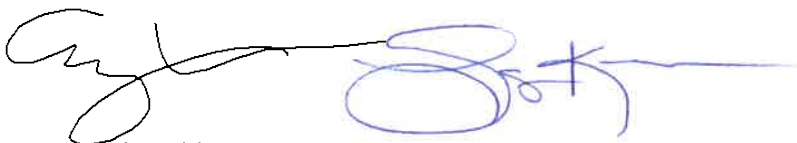
Carson City Board of Supervisors,

My husband, Logan Kuhlman, and myself, Emily Kuhlman, have grown up in Carson City. My husband has lived in Silver Oak since 2003 and in 2020 we purchased our own home within Silver Oak. We were lucky to have gotten into the thriving Carson City market when we did and we are even luckier to have ultimately settled within the Silver Oak community. Not all individuals are able to do so in today's market.

The Silver Oak community and continued construction that the area has, has and will, continue to increase our property value. That is great for us as homeowners, however, the homes being built in the area thus far do not always allow first-time home buyers, or individuals who do not want the yard maintenance, higher bills, etc. that come with the larger homes currently in construction. A new townhome community will give those individuals an opportunity to purchase a home within the Silver Oak community. It will not decrease my property value, it will only diversify the individuals that are able to live in the neighborhood. This in turn allows for additional housing for families who want to be in, what I consider, one of the best Carson City neighborhoods. It will allow new townhome owners to be near a park they might frequently visit, it will allow them to be in a neighborhood with walkability, it will allow them access to great schools for children, and it will allow them to have great access to local healthcare.

Overall, I ask that the Board not only consider the interests of "current homeowners within Silver Oak" but that you also give consideration the future of this community and the diversity that these townhomes would offer to individuals who cannot afford, cannot maintain, or just have different home interests than those of the single-family home currently available. Please let me know if you have any questions.

Thank you,



Emily Kuhlman
775-720-6502
etolda@me.com

Logan Kuhlman
775-722-2847
hondaryder90@aol.com

July 25, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

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As a Silver Oak resident who lives nearby I am hopeful that you will approve this project as it will also add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park helped to reduce the amount of unwanted conduct at the Park since its construction.

We are hopeful that the construction of residential rather than commercial to the north of the park will further help to reduce incidences of inappropriate conduct in this area of what is a small neighborhood park that appeals to family users.

Regards,



Dale A. Brown

Silver Oak Resident

July 27, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commission Members:

I am a long-time Silver Oak resident who recently became aware of the proposed zoning change for the parcel on the corner of College Parkway and Oakridge Drive. I am in full support of this proposal as I feel it will be a much better fit than what the current zoning allows for. A neighborhood business just doesn't fit. I am confident that the quality of the Roseview Townhomes will only enhance our neighborhood because the builders are locally invested and take pride in their product.

The open fields and common areas along College Parkway are a fire hazard. I believe that if you approve this project and once it is finished, will be a welcomed addition to our community. Therefore, I strongly encourage you to approve the zoning change before you.

Yours Truly,



Kim Kuhlman
Silver Oak Resident

July 26, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

I am a writing in support of the Roseview Townhouse projected being presented to this Commission. I believe the addition to an upscale townhome development is a much better use of the land than that of a retail business.

It clearly remains in the best interest of Silver Oak community to re-zone this parcel to allow for the construction of the Roseview Townhomes. Please accept this letter as notice of my full support.

Thank you,

A handwritten signature in cursive script that reads "Pat Areias".

Pat Areias
3939 Siena Drive
Carson City NV, 89703

July 25, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701
Email to: HFerris@carson.org

Dear Commissioners:

I have reviewed the Roseview Townhouse tentative map layout and wish to voice my support for this in-fill development in Carson City. This project will preserve the residential nature of Silver Oak and prevent the development of less desirable and less compatible uses allowed under the current Neighborhood Business zoning of this parcel.

As a Carson City resident who lives nearby on Nye Lane, I am hopeful that you will approve this project as it will also add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park helped to reduce the amount of unwanted conduct at the Park since its construction.

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Regards,

A handwritten signature in black ink that reads "Thomas W. Preston". The signature is written in a cursive style with a horizontal line underlining the name.

Thomas Preston

July 27, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

I was born and raised in Carson City and live adjacent to the park located on Oakridge Drive. I am completely supportive of the proposed townhome project being presented to you tomorrow. If the builder for these townhomes are the same builder that developed Park Place, they build an incredible product and I think Carson City would be fortunate to have them develop that corner lot. I can't imagine having a neighborhood business on that parcel. I have young children that play at the park and I don't want to have to worry about the type of people frequenting the type of business that it is currently zoned for.

I humbly offer my absolute support for the Townhouse project being proposed.

Regards,



Shelby Preston
Lifetime Carson City Resident

July 26, 2021


Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

I am a resident of the Silver Oak Neighborhood and would like to offer my full support of the proposed Roseview Townhouse project being presented to you later this week. Having town homes on that parcel is a much more fitting use for the land as opposed to a retail business. The developers for the town homes take pride in their work and put great thought into their surroundings so that the end product compliments the existing homes.

By changing the zoning for this parcel from Business to Residential, you will not be disappointed with the end result. I offer my unconditional support for the Townhouse project.

Regards,

A handwritten signature in black ink that reads "Sandra Lea". The signature is written in a cursive style with a large initial "S" and a long, sweeping underline.

Sandra Lea
3951 Siena Drive
Carson City, NV 89703
Silver Oak Resident

Date: July 25, 2021

RE: Silver Oak Construction

Meeting Date July 27, 2021

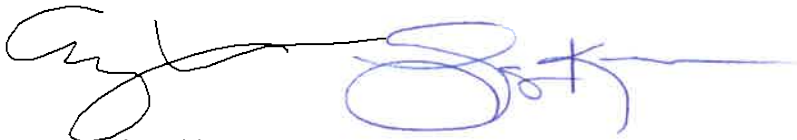
Carson City Board of Supervisors,

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The Silver Oak community and continued construction that the area has, has and will, continue to increase our property value. That is great for us as homeowners, however, the homes being built in the area thus far do not always allow first-time home buyers, or individuals who do not want the yard maintenance, higher bills, etc. that come with the larger homes currently in construction. A new townhome community will give those individuals an opportunity to purchase a home within the Silver Oak community. It will not decrease my property value, it will only diversify the individuals that are able to live in the neighborhood. This in turn allows for additional housing for families who want to be in, what I consider, one of the best Carson City neighborhoods. It will allow new townhome owners to be near a park they might frequently visit, it will allow them to be in a neighborhood with walkability, it will allow them access to great schools for children, and it will allow them to have great access to local healthcare.

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Thank you,



Emily Kuhlman
775-720-6502
etolda@me.com

Logan Kuhlman
775-722-2847
hondaryder90@aol.com

July 25, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

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Regards,



Dale A. Brown

Silver Oak Resident

July 27, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

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Yours Truly,



Kim Kuhlman
Silver Oak Resident

July 26, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

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Pat Areias
3939 Siena Drive
Carson City NV, 89703

July 25, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701
Email to: HFerris@carson.org

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Thomas Preston

July 27, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

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Lifetime Carson City Resident

July 26, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

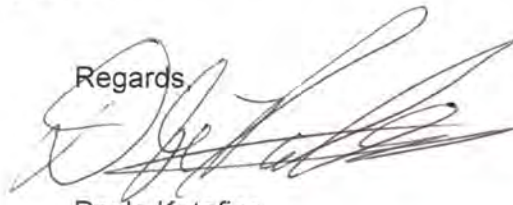
Dear Commissioners:

I have reviewed the proposed townhouse layout and wish to voice my support for this infill development in Carson City. This project will preserve the residential nature of Silver Oak and prevent the development of less desirable and less compatible uses allowed under the current Neighborhood Business zoning of this parcel.

As a Silver Oak resident who lives at 1102 Drysdale Court, directly adjacent to the proposed project, I am hopeful that you will approve this project as it will add to the number of watchful eyes that are trained on Mankins Park and its users. The development of Silver Oak Phase 21 on the south and east sides of the park helped to reduce the amount of unwanted conduct at the Park since its construction.

We are hopeful that the construction of residential rather than commercial to the north of the park will further help to reduce incidences of inappropriate conduct in this area of what is a small neighborhood park that appeals to family users.

Regards,

A handwritten signature in black ink, appearing to read 'Doyle Katafias', written over a horizontal line.

Doyle Katafias
Silver Oak Resident

July 27, 2021

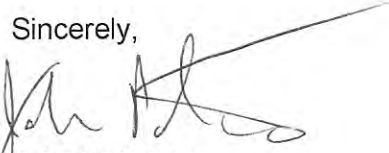
Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

I recently moved to the area in search of a new home. I've had the opportunity to view the model home in Redleaf as well as a home built in Park Place. I am so impressed with the quality of product that this developer builds, I purchased a home on Oak Ridge Drive while I wait for a Red Leaf home to possibly come available.

I fully support a townhome complex on that parcel as opposed to any type of business, much less the type that the current zoning allows for. A business simply does not make sense in a residential neighborhood.

Sincerely,



John Petersen
2734 Oak Ridge Drive

From: [Heather Ferris](#)
To: [Christie Overlay](#)
Subject: FW: ROSEVIEW TOWNHOMES
Date: Tuesday, July 27, 2021 4:23:01 PM
Importance: High

For items 13 D, E, and F

From: Heidi McFadden Broker NV1001464 <heidimcfadden@outlook.com>
Sent: Tuesday, July 27, 2021 4:22 PM
To: Heather Ferris <HFerris@carson.org>
Subject: ROSEVIEW TOWNHOMES
Importance: High

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

Please consider this letter of support for the Roseview Townhomes in Silver Oak. Based on the quality of the applicant's prior projects, it will complement the look of and enhance values as a residential project in Silver Oak. We need developments that attract and keep young families living here and I believe that's what this project offers. Residential use near a park, shopping, dining, and easy access to Reno and Lake Tahoe would do just that.

As a nearby resident, I have concerns if this location is used for commercial space and would hate to see it as anything other than residential. This area is used by many for running, dog walks, and children riding to the park. I can't imagine having a business built in this location that would bring non-resident traffic and unwanted conduct to the park. Having more residences here would only bring more watchful eyes to the area, especially near a park.

I strongly support the Roseview Townhome project and am hopeful that you will approve this project.

Sincerely,

Heidi McFadden
1751 Vineyard Way

Carson City, NV 89703

From: [Heather Ferris](#)
To: [Christie Overlay](#)
Subject: FW: Roseview Townhomes
Date: Wednesday, July 28, 2021 9:54:08 AM
Attachments: [image001.png](#)

From: Christina Rice <christina@rcmnevada.com>
Sent: Wednesday, July 28, 2021 9:53 AM
To: Heather Ferris <HFerris@carson.org>
Subject: Roseview Townhomes

This message originated outside of Carson City's email system. Use caution if this message contains attachments, links, or requests for information.

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

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I strongly support the Roseview Townhome project and am hopeful that you will approve this project.

Sincerely,

Christina Rice
1749 Pinoak Lane
Carson City, NV 89703



July 26, 2021

Carson City Planning Commission
108 East Proctor Street
Carson City, NV 89701

Dear Commissioners:

I am a resident of the Silver Oak Neighborhood and would like to offer my full support of the proposed Roseview Townhouse project being presented to you later this week. Having town homes on that parcel is a much more fitting use for the land as opposed to a retail business. The developers for the town homes take pride in their work and put great thought into their surroundings so that the end product compliments the existing homes.

By changing the zoning for this parcel from Business to Residential, you will not be disappointed with the end result. I offer my unconditional support for the Townhouse project.

Regards,

A handwritten signature in black ink that reads "Sandra Lea". The signature is written in a cursive style with a large initial "S" and a long, sweeping underline.

Sandra Lea
3951 Siena Drive
Carson City, NV 89703
Silver Oak Resident