NOTICE AND AGENDA
SANTA CLARA CITY COUNCIL MEETING
Wednesday, August 26, 2020
Time: 5:00 p.m.

AGENDA

NOTICE is hereby given that the Santa Clara City Council will hold a Regular Meeting on the 26th Day of August 2020 which meeting will begin at 5:00 PM.
The Meeting will be available to view live steam on the YouTube link: https://www.youtube.com/channel/UCxLBLm30-XLqM1AEmhpcMA

1. **Call to Order:**

2. **Opening Ceremony:**
   - Pledge of Allegiance: Jarett Waite
   - Opening Comments: Jarett Waite

3. **Communications and Appearances:**

4. **Conflicts and Disclosures:**

5. **Working Agenda:**

A. Public Hearing(s) 5:00 p.m.

B. Consent Agenda:

1. Approval of Claims and Minutes
   - August 12, 2020 Regular City Council Meeting Minutes
   - Claims through August 26, 2020.

2. Calendar of Events
   - Sept. 2, 2020 City Council Work Meeting
   - Sept.9, 2020 Regular City Council Meeting
   - Sept. 23, 2020 Regular City Council Meeting

C. General Business:

1. Consider approval of a Proclamation setting Sept. 17-23, 2020 as Constitution Week.

2. Consider approval of amendment to Title 12, Section 12.24.090 "Burial Hours" and approve Ordinance 2020-09. Presented by Brad Hays, Parks & Trails Director.

3. Consider approval of building location for Buck's Ace Hardware, applicant request to locate the building in the southwest corner of his lot. Buck Hurst, Applicant. Presented by Bob Nicholson, City Planner/Corey Bundy, Building & Zoning Official.

4. Consider approval of Landscape strip width of 10' along both street frontages, i.e., Pioneer Parkway and Rachel Drive for Buck's Ace Hardware. Presented by Bob Nicholson, City Planner/Corey Bundy, Building & Zoning Official.

5. Consider approval for parking reduction to 74 spaces based on the projected parking demand and experience relayed by the applicant for other stores in St. George and Hurricane for Buck's Ace Hardware located on the southwest corner of the intersection of Rachel Drive and Pioneer Parkway. Presented by Bob Nicholson, City Planner/Corey Bundy, Building & Zoning Official.

6. Consider an amendment on the Final Plat for Ocotillo Springs Phase 1, located south of North Town Rd. and east of 400 East Street. Presented by Bob Nicholson, City Planner/Corey Bundy, Building & Zoning Official.

7. Consider approval of a Final Plat for Sycamores at Santa Clara Phase 1C, located south of the Santa Clara River and east of Gates Lane. Presented by Bob Nicholson, City Planner/Corey Bundy, Building & Zoning Official.

8. Consider approval of amendment to the Santa Clara City Code, Title 13, Section 13.24 Storm Water Low Impact Development Standards (LID) and approve Ordinance 2020-11. Presented by Jack Taylor, Public Works Director.

9. Consider approval for adoption of Dixie Storm Water Coalition Low-Impact Development (LID) Application Guidance for Santa Clara City. Presented by Jack Taylor, Public Works Director.

6. **Reports:**
   - **a.** Mayor / Council Reports

7. **Executive Session**

8. **Adjournment**

Note: In compliance with the Americans with Disabilities Act, individuals needing special accommodation during this meeting should notify the city no later than 24 hours in advance of the meeting by calling 435-673-6712. In accordance with State Statute and Council Policy, one or more Council Members may be connected via speakerphone or may by two-thirds vote to go into a closed meeting.

The undersigned, duly appointed City Recorder does hereby certify that the above notice and agenda was posted within the Santa Clara City limits on this 20th day of August 2020 at Santa Clara City Hall, on the City Hall Notice Board, at the Santa Clara Post Office, on the Utah State Public Notice Website, and on the City Website at http://www.sccity.org. The 2020 meeting schedule was also provided to the Spectrum on January 1, 2020.

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Chris Shelley – City Recorder

SANTA CLARA CITY COUNCIL MEETING
WEDNESDAY, AUGUST 12, 2020
MINUTES

THE CITY COUNCIL FOR THE CITY OF SANTA CLARA, WASHINGTON COUNTY, UTAH, met for a Regular Meeting on Wednesday, August 12, 2020 at 5:00 p.m. in the City Council Chambers of the Town Hall at 2603 Santa Clara Drive, Santa Clara, Utah. Notice of the time, place and agenda of the meeting was provided to the Spectrum and to each member of the governing body by emailing a copy of the Notice and Agenda to the Spectrum and also, along with any packet information, to the mayor and each council member, at least two days before the meeting. The meeting will be available to view live on the YouTube link: https://www.youtube.com/channel/UCxLLBLm30-XLqM1AEmhpcMA

Present: Mayor Rick Rosenberg
Council Members: Jarett Waite, Ben Shakespeare, Wendell Gubler, Leina Mathis and Denny Drake
City Manager: Brock Jacobsen

Others Present: Jack Taylor, Public Works Director; Corey Bundy, Building Official; Randy Hancey, Fire Chief; Bob Flowers, Police Chief; Selena Nez; Kristelle Hill; Christopher Clifford; Con Fulde; Jessica Harward; Braden Rademacher; Travis Marx; Joseph Holmes; Mark Youngberg; Hollie Reina; Brooke Ence; Lainee Frei

1. **Call to Order**: Mayor Rosenberg called the meeting to order at 5:00 p.m.

2. **Opening Ceremony:**

   - Pledge of Allegiance: Leina Mathis
   - Opening Comments: Leina Mathis

3. **Communications and Appearances: None.**

4. **Conflicts and Disclosures: None.**

5. **Working Agenda:**

   A. Public Hearing(s): None.

   B. Consent Agenda:

   1. Approval of Claims and Minutes:

      - July 22, 2020 Regular City Council Meeting Minutes
      - July 22, 2020 Executive Session Minutes
      - August 5, 2020 City Council Work Meeting Minutes

- Claims through August 12, 2020

2. Calendar of Events

- August 16-19, 2020 UAMPS Virtual Conference
- August 26, 2020 Regular City Council Meeting
- September 2, 2020 City Council Work Meeting
- September 7, 2020 Labor Day (Offices Closed)
- September 9, 2020 Regular City Council Meeting
- September 23, 2020 Regular City Council Meeting

Motion to Approve the Consent Agenda.
Motion by Denny Drake, seconded by Leina Mathis.
Voting Aye: Leina Mathis, Jarett Waite, Denny Drake, Wendell Gubler and Ben Shakespeare.
Voting Nay: None.
Motion Carried.

C. General Business:

1. Introduction of new firefighter recruits. Presented by Randy Hancey, Fire Chief.

- Chief Hancey introduced the firefighter recruits and the instructors. The instructors are Captain Fulde (one of the full-time firefighter captains) and Lieutenant Youngberg (who has been with the department for 15 plus years and is also one of our EMT's). He said these two have put in many hours behind the scenes to train this class. The class started in January with Wild Land Firefighter training. That was about 40 plus hours. Then they started the Fire 1 Academy. They just recently completed the Fire 2 training. That equals 120 plus hours of training that they have put in. These are all volunteer hours. They will be doing the State written and practical testing this Saturday. After that they will move on to HAZMAT training. They have at least 40 hours of HAZMAT training. It takes about a year of training to become fully certified. The recruits will have put in over 200 hours of training to get this certification. He said he wanted to commend them and recognize them for their service to the City. He said that the recruits are, Christopher Clifford, Travis Marx, Braden Rademacher, Jessica Harward and Joe Holmes. Jessica and Joe are advanced EMT's and are on shift right now. Jessica has been with us about 13 years as an advanced EMT. Joe was hired recently as an advanced EMT. He congratulated the recruits for getting this far. They still have some work ahead of them.
- Mayor Rosenberg asked if they have been on any of the fires this year.
- Chief Hancey said that some of them have. They have been on structure fires and on the wild land crew.
- Mayor Rosenberg said the City is happy to have these recruits. He appreciates the service they are giving and taking the time to get their training.

2. Consider approval of Bid for new Council computers. Presented by Brock Jacobsen, City Manager.

- Brock Jacobsen said he brought this to Council's attention a little while ago. He said

initially they were going to do computers and monitors but with our change out of all of our current computers to laptops to help facilitate with work from home in case we have any positive cases of COVID-19 we will use those current towers/computers and will bring them in to the Council Chambers, but we will get new monitors. The bid came from Computech who is our IT company. The bid for $2,747.32. That will include a new monitor for every station in the Council Room plus one for the podium. We are going to install a computer and monitor at the podium for people who come and do presentations so they will be able to control their presentation from there. These are 24" touchscreen and will be able to split so there can be two different things going. We will be able to move our meetings to better, more electronic meetings.
- Jarett Waite asked if there will be cameras on the monitors that will show the Council members.
- Brock Jacobsen said no there won't be. He said we are moving to where there will be just one camera in the Council Chambers that will be in the back of the room.

Motion to Approve the Bid to Computech for $2,747.32 for new Council Chamber monitors.
Motion by Ben Shakespeare, seconded by Jarett Waite.
Voting Aye: Jarett Waite, Leina Mathis, Ben Shakespeare, Wendell Gubler and Denny Drake.
Voting Nay: None.
Motion Carried.

6. **Reports:**

A. Mayor / Council Reports

Jarett Waite:
- Asked for information on the UAMPS Conference.
- Jack Taylor, Public Works Director, told Council that he will send them a link so they can get registered. The Conference will run on Monday and Tuesday. Wednesday will be the project meetings. He asked Council to specifically chime in on the carbon-free project. That would be the best meeting they could listen to.
- Jarett Waite complimented Jack Taylor's crew on the crosswalk paint. It looks amazing.
- The BMX Track Grand Opening is next Friday, August 21. Jarett Waite invited the Council to come. He said the Chamber will be there to have a ribbon cutting at 6:45 p.m.
- Brock Jacobsen said they recently had an event at the track, and it was very well attended.
- Jarett Waite said he and Leina Mathis were there. He told Council that Conner Fields, the Olympic Gold Medalist will be at the Grand Opening. Everyone is very, very grateful for all the help that the City has provided for this track. He invited Jack Taylor's crew specifically.

Ben Shakespeare:
- The Flood Control Authority had a meeting. There were some small projects that were approved.
- He asked Jack Taylor about the crosswalks at Lava Falls and Sandpoint.
- Jack Taylor said that Captain Rodgers got the box up there. He said he was afraid that

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with a crosswalk people will think they can just cross there and with that corner the drivers won't see people on the crosswalk. He said he wouldn't put a crosswalk there.
- Ben Shakespeare said the he agrees. It is a blind crossing. Eventually there will be development to the west where it is a little more straight of way.
- Jack Taylor said he would like direction from Council. Would they like an engineer to investigate it, he feels it would be risky to put a crosswalk there?
- Mayor Rosenberg said that if there are recommendations from Jack Taylor and from Bob Nicholson that this is not the right place for a crosswalk, and the City will respond with that. We'd have to calm the road like we did on Rachel with the safety zone in the middle and the pop outs on the sides and slow the traffic down and provide the pedestrian safety zones. That is quite a bit of work and quite a bit of disturbance to the speed on Pioneer. That would cause more traffic in the Valley. He asked Jack Taylor to send an email reply.

Leina Mathis:
- Heritage Commission has not met.
- The Washington County Fair is over, and our booth has been taken down. Kristelle posted pictures on the City Website. She had some good response from it.

Denny Drake:
- Had a meeting with the Swiss Days Committee. They reviewed some of the issues as far as the Fun Run and breakfast. None of those fit the criteria that we have been given. The only two that possibly could fit the criteria is the fireworks and possibly the parade. The committee has had conversations with people that stated they wouldn't attend a parade. He said the feelings that came out of that meeting is to have a great firework show and dedicate it to the City of Santa Clara and announce that we have postponed Swiss Days for a year due to COVID.
- Mayor Rosenberg asked if the cows and banners were still going to be displayed.
- Brooke Ence & Lainee Frei said they talked about putting a banner up that gave some information so that when the business banners are up people know that it's not Swiss Days and that Swiss Days has been postponed. They want to call the fireworks show the Santa Clara fireworks so that people aren't confused.
- Mayor Rosenberg said he is okay with that.
- Denny Drake said there are a couple of private events such as the Car Show going on that can continue if they follow the guidelines and it's not considered Swiss Days.
- Brock Jacobsen said he will be having a discussion with the people over the Car Show tomorrow about his car show and the fireworks. He is the person that will be doing the fireworks.
- Brooke Ence & Lainee Frei said they will be having a discussion with the Historical Society to see if they want to have the museum open or have a silent auction. If they follow the guidelines and submitted the plan and form. There is parking and they won't need the shuttle.
- Mayor Rosenberg said the museum hasn't been opened yet but they might open for this. The committee needs to talk to them.
- Brock Jacobsen said this would be their event so they would have to fill out the paperwork with the State guidelines and have it on hand for the City.
- Brooke Ence & Lainee Frei said that Canyon Media stated that they would still do some

radio ads to announce the fireworks and tell about the other private events.
- Mayor Rosenberg said we just need to let people know that we are not having Swiss Days.
- Brock Jacobsen said we will get with Kristelle and get information put out on our social media about Swiss Days and that the traditional Swiss Days has been cancelled but we will be doing the fireworks show. We can send this out in the mailing with the utility bills as well.
- Leina Mathis suggested encouraging people to come buy a cow and put it up in their neighborhoods to show their City spirit.
- Brooke Ence said we ordered some cows, but we may need to order more cows.
- Jarett Waite asked about the reverse parade.
- Brooke Ence & Lainee Frei said that they didn't get a lot of interest in it when they asked around. They didn't get a lot of great feedback on that.
- Mayor Rosenberg said we are better off to cancel everything so that it is not confusing. It needs to be clear what we are doing. There won't be any events held at Town Hall unless the Historical Society wants to do something. It would be up to them to advertise if they do.
- Denny Drake commended Brooke and Lainee. They have worried about this and fussed over it.

Wendell Gubler:
- Washington County Solid Waste had a meeting on Monday. They are in the process of changing their Director. They have 70 applicants. They will go down to 15 and then to 5 and then do interviews. They are hoping to have this done by the middle of September. Ruth is running the place right now. She has been behind the scenes running things anyway and doing a good job. They are going to be contacting the cities about the opt-out period for the Blu cans. A company called Ruckus is going to be taking the lead on this. They will contact each of the cities and give out information on what to do. He gave Brock Jacobsen a hard copy of the plan. They will be contacting him.
- Brock Jacobsen said he has been in contact with Faye Reber about the City's policy on Blu can and the policy regarding the opt-out. The residents will have 90 days to opt-out and those who already opted out will be grandfathered in of the opt-out. Part of the policy we had is if a resident moved in, they were automatically opted in. He said St. George had a policy that if a resident opted out in St. George and moved within the city limits, they still could remain opted out. That is a policy we discussed as Staff is making that policy change as well. He said that Faye gave them some scenarios to think about. He told Brock that the policy needed to be an ordinance, so it needs to be brought back to Council.
- Wendell Gubler said the opt-out period is September 1 through November 30. He said that if someone moved to Santa Clara after that time, they are automatically opted in. He said the District hired the County HR Director to help with the hiring process for the Director.

Mayor Rosenberg:
- The MPO and the COG are meeting next week. He said he will be gone so Brock and Jack are going to cover that meeting for the Mayor. That meeting is next Wednesday at noon. He will forward the agenda to Brock and Jack.

- He gave a report on the call with the Mayors concerning COVID. Our number of cases in Southern Utah are well below the State average statistically. School is opening tomorrow as planned. The ICU is busy, but it is basically non-COVID related. There are 13 total people with COVID at the hospital and 3 of those are in the ICU. He said the Superintendent Bergeson is confident in the school openings. They are working closely with the Health Department as well as community leadership. He stated that 85% of the parents support going back to school. The district has 4,000 employees and only 50 of them have requested some type of support regarding their susceptibility so they will be doing online education or other types of activities, but a large percentage of the employees are okay with going back to school as well. They are taking precautions. The next couple of weeks will be a critical period as far as testing to see if something happens. Students must be symptom free for 24 hours to stay in class. If there are 3 or more confirmed cases within a class, the whole class goes to a virtual format. If there are 15 or more confirmed cases the school goes to a virtual format under a quarantine until they bring the numbers down. They are monitoring the mental health. They are really concerned about abuse and mental health with the kids not being in school and with parents as well. They are really monitoring that. Dixie State University is starting as well. They are expecting students to start arriving now. They have all the protocols in place, and they are requiring masks. They don't anticipate any Fall athletics. He said that the St. George Marathon and Iron Man have been cancelled. The County is working with the Park Service to get Kolob Fingers open to try and relieve some of the pressure on the Parks. The numbers are improving, and the Fall reservations look good. It is kind of a tentative time right now. It could all get shut down quickly if we see it spread through the schools.
- Wendell Gubler said his daughter is a teacher and she said that several people have moved here from Nevada and are staying in our vacation rentals and having that address as their address for school so their kids can go to school here.
- Brock Jacobsen said he has heard this from across the County. Some parents aren't even here. They are just renting apartments and putting several kids in the apartments to allow them to play Fall sports.

- Chief Bob Flowers said he got a request to fill out a report on our Police Department. They are doing a report Nationally. We have two officers with master's Degrees, five with Bachelor's Degrees, two with Associates Degrees, two that are going to school right now, three with military experience, one in the active reserve, three that speak foreign languages, three with advanced management course degree. He said the gender makeup is fabulous and way above the National average. They average between 80 to 100 hours of training a year, which is way above the State average and triple then what is required Nationally. He wants the Council to be impressed and realize that they are more than just people in a car. Last night they trained until 1 a.m. He said the challenge as a department is to create opportunities for officers to go to school and trainings. He said none of the officers are looking to go anywhere else. He said that half the department has degrees, that is outstanding. He also talked about the gorge shutting down and how they were caught off guard when that happened. He said they need to figure something out about the fruit stand market. People can't cross right there. It is unsafe. We need to figure out a way to have the parking be better right there.
- Brock Jacobsen asked if it was possible to have an officer up on Pioneer Parkway on

busy weekends to divert traffic.
- Chief Flowers said that if we know that it is happening that would be good to do. He said they can use the speed trailers for that. Officers can be put out there if we need to do that.
- Brock Jacobsen said that last week when the gorge was shut down all the traffic travelled from Sunset Rd. to Bluff Street.
- Chief Flowers said they weren't notified that the freeway was closed. That has been fixed. He said that on Sunday afternoons it is crazy. We need to figure out how to change people from backing out there at the fruit stand.
- Jack Taylor said that one problem with putting the traffic on Pioneer Parkway is that the asphalt is not thick enough to really handle the heavy loads. It is only 3" where Santa Clara Drive is 6".
- Chief Flowers said that he has a meeting with the Highway Patrol. We will get the Highway Patrol out there on those days when the gorge is shut down.
- Jack Taylor said this would just tear our road up.
- Mayor Rosenberg said that at one time we had a Federal Aid project to redo Pioneer Parkway because of the flood when Santa Clara Drive was closed in 2005. He asked Jack Taylor if he has gone to the MPO to let them know we need more asphalt if we are going to be the detour for I15 when it closes to see if there are any Federal funds we can go after.
- Jack Taylor said he could ask them the next meeting.
- Mayor Rosenberg told Jack to do that. He thanked Chief Flowers.

- Fire Chief Hancey gave the Council an update on the Wild Land crew. A couple of crewmembers have been exposed to COVID. They are waiting for their test results. That took two crewmembers out of commission for this week. Another crewmember is active military status, so he is doing some military work, so they are down to one seasonal, who is Marshall Riley, and they have Chief Hansen. They will be going out with our water tender tomorrow on a deployment to the Richfield area. They could be gone up to 14 days. As soon as the two crewmembers get their test results they can go back into service. He said they are kind of shorthanded, but we do have enough to send out.
- Mayor Rosenberg asked if the crewmembers got exposed locally.
- Chief Hancey said yes that there is three that live together and one of the roommates received a positive test so the other two, which are our seasonal guys are waiting their test results. They have been tested and are waiting to find out before they can come back to work.

- Jack Taylor said that we hit a new peak this year. We hit 17.3 megawatts, which is a record for us. We are growing and we've got a lot of development that is coming so that is going to continue to increase. He said they got looking at how much solar we have in Santa Clara City. Kristelle had to put this on the National report that we must turn in every year, and we have just over 1 megawatt of solar. 700 of it is on Harmon's but the rest of it is City residents that have installed it on their homes. That is picking up some of the load there. He also said that a solar project is coming available for UAMPS members. They didn't have quite enough members that prescribed to the project, so they sent out another form asking if there was anyone else who wanted to get in on that. He said we probably ought to see if we can get some of that. He looked at the City's

resources and he thinks we can handle up to a megawatt of solar. It is at a really good price. Right now, it is priced at $35 a megawatt hour, which is $0.035 a kilowatt-hour. He said he put Santa Clara City for a megawatt and that will be coming forward to see if Council is comfortable with that. He will get Council more information on that. With the load growth and what we have going on and with the carbon free project, its kind of keeps pushing out further and further, we need something to help cover those loads in the future. He thinks it will fit the City's portfolio pretty good because we can still ramp up our generators up and down to help cover when the solar goes on and off. He thinks it is a good project for us to be in to at that price. He said it is amazing how cheap solar has become. It keeps going down in price.

He talked about the carbon free project. It is getting down to the serious point. They have approved it to take it to financing and now they want to know who is in and who is not. They have put the numbers out there on what it is going to cost each individual city to be in or get out. Our cost to go to the next phase is about $392,598 to carry it to the next phase. He said the thing that makes people the most nervous is making sure the project has full prescription. Right now, with the members that there are we will all need about 150 megawatts. There are other people that are interested in the northern part of the country that are really looking at the project seriously. We need to get it to just over 700 megawatts to get it to be at full prescription and make the cost at $55 per megawatt hour. He suggests moving forward on the project. He said they meet every month with the PMC and if we see that we are not getting the people to join in then the PMC will just back out of it, and we will stop it. If we don't have the other people in our costs will skyrocket. If other people come in that will lower our costs. This is risky and it is a first of a kind project, but he doesn't know what else there is out there. We can do more solar and more natural gas, but we already have 4 megawatts down at the yard and we've got 2 ½ megawatts up in Payson and if the gas market goes crazy and we get more gas turbines he said that would make him nervous. He thinks that this is a good 24-hour product and it's a project that we will have for 40 years and possibly be relicensed to 80 years. What a nice project to have for the residents of this City to carry that forward at a decent cost. He said even if it went up to $65 at today's cost it would be reasonable to do it. He said the speakers will be talking about this at the UAMPS Conference on Monday and Tuesday. We will maybe know more then, about who is in and who is not. Our prescription was 3 megawatts and with the jump that took it up to 4 megawatts. They are asking members if they want to stay where they are at or reduce that number and he thinks the City is going to need it.

- Mayor Rosenberg asked if Jack got the notice from the Taxpayers Association.
- Jack Taylor said that he did. He has information on that if Council wants him to forward it to them, he can do that.
- Leina Mathis asked if it was realistic to get to 700 if they are only at 105.
- Jack Taylor said that is why we had to make it an official project and commit to move forward so we would know what the costs were and see if we could get other participants to join. If we can't, we will have to drop out. He said a lot of people from the Northwest are interested in the project. He said they want to get it engineered down to a phase 1, so we know where those costs are really going to be before we jump in. Our cost right now would be $392,598 but without the DOE money our cost would be $2,559,000. The government is subsidizing this project to help it. They want it to work. Another risk is if the DOE with the politics and changing people, would they still fund this project. They

must keep approving. So far both sides, Democrat or Republican, are supportive of this project. He said the Storm Water audit just happened. It was a 3-day process. He said within 90 days we will get our final to see if we have any issues. We were a little short on some training. On our detention basins we didn't have documentation on when we have gone up and made sure that they were clean. It was done we just didn't have documentation. We only have 10 and some of those are private. He thinks we went through the audit really well. He said that Corey and Fred have been certified and they were really impressed that our building inspectors are out there inspecting homes every day and are certified and doing a lot of inspections. If the sites aren't cleaned up, they can't get their inspections.
He said they will be bringing the new LID to the next Council Meeting for approval. They had a meeting yesterday in Ivins with all the coalition. They talked about if they are going to fund that. We need to think about if we are going to charge a fee. Is the storm water fee that we are already collecting enough? He would hope on the developments when they come in, we would have one big retention basin and have the City take them over and we would maintain them.
- Mayor Rosenberg said that we would charge a fee. Whatever that additional cost is we would add it in the storm water fee. That is the only way we are going to keep that retention.
- Jack Taylor said that once are bonds are paid off on the storm water things that we put in then we could lower it or leave it the same. The residents have to inspect it every year and we have to inspect it every five years and have the documentation. This is for every city in the State of Utah. He said that someone comes in with a preliminary plat one of the first thing the developers need to do is get right on the LID and get the geotechnical report before they even start to plan their lots so the engineers know what they're going to do before they start putting homes on it.
- Mayor Rosenberg said the Storm Water Ordinance is coming back for revisions at the same time as the LID items.
- Jack Taylor said our MS 4 permit is going to be coming right after that. We have to redo that and send that back into the State. We already have a permit we just have to update it and send it to the State and have Council approve it. He said they have advertised the lineman job and they are not getting a lot of applicants, but they have four that they are going to interview next week. He also talked about that from hours 15-22 we are about 10 megawatts short of resource and we are buying that off the market. That is a lot. The good thing is there is so much solar out there from California. They flooded the market and there is so much resource sitting there, they can't hardly give it away.

- Corey Bundy said we had a request from Clayton Leavitt today and he wants to extend Caymas Lane and put in a flag lot. The City owns a parcel of property down there. He showed the area on the map. It was supposed to be a roadway at one time. It is not on the Road Master Plan. Caymas Lane is scheduled to go straight down all the way to the river on the Master Plan. He said he is requesting that we survey it and maybe ask the property owners if they want to abandon it to them so that we don't have the liability of trees that are there and the property that we are not going to use that we have to maintain.
- Mayor Rosenberg asked about the narrow strip of land that is just north of the subdivision. That is a piece that the City owns as well.
- Jack Taylor said they suggested seeing each property owner and asking to just split it.

- Brock Jacobsen said there is a number of them that run down behind, and we want to clean it up, that property that we are not going to use.
- Mayor Rosenberg said the property owners would have to pay for the survey and the abandonment.
- Denny Drake said the adjacent property owners would get the choice before anyone else.
- Jack Taylor said the Lopez's are going to build on that lot behind Chad. At the bottom of their lot they have a storm drain catch basin and if we break that up it needs to fall more on Clayton's property where it hits that ditch. He doesn't want to take those trees out and keep that ditch there. Then we can require him to keep that clean.
- Mayor Rosenberg asked how big his new lot is.
- Jack Taylor said its ½ acre each. It will be over an acre combined. He will have to do a LID.
- Corey Bundy said this property is only two lots deep. It was subdivided. It is not very deep.
- Jack Taylor said that if the Lopez's take a piece of that they will have to pay for improvements down the rest of the way. If they don't want it is the Council okay if Clayton Leavitt takes it all?
- Denny Drake said he doesn't want to see a problem created by giving ground behind someone's property to someone else. It needs to be run by the property owners and giving them first chance.
- Brock Jacobsen said that we spoke with Lance Rigby today who is a representative for the Lopez family, and he is going to discuss it with them, and we spoke with Clayton as well. If both of them want it, we can split it and they each can take a half. If the Lopez's did not want it, we could offer it all to Clayton if he wanted it.
- Ben Shakespeare said it should be done via a letter so there is documentation.
- Denny Drake said he thinks we need to have our attorney draw up a document.
- Mayor Rosenberg talked about all the homes that front the rim are being surveyed. We are putting the pegs in and then we will see what the impacts are. He has asked for the pegs to be photographed so we can see how much we are talking about and then bring it back to Council. They are staking the whole property line so we can post a "No Trespassing" sign. He would like to zone all that City property as Open Space so there is no land use entitlement.

- Brock Jacobsen said they are working on the Steed property acquisition and we are working on an application for people who want to go through an application they will have to submit and bring it back to Council for approval. It would put more work and the burden on the applicant. There would be a filling fee associated with it. They would have to get the documentation. He said they are also going to bring back to Council for what we want to do for the electronic meetings. We met with Pole Sound today and they are working on some final things and will bring back a number. He also talked about the City Recorder, Chris Shelley. Her brother, Mark Walters passed away last night. She won't be with us for a little bit.

7. **<u>Executive Session:</u> None.**

8. **<u>Adjournment:</u>**

DRAFT

Motion to adjourn by Jarett Waite.
Seconded by Wendell Gubler with all members present voting aye.
Meeting Adjourned at 6:21 p.m.

_____ Date Approved: _____

Chris Shelley – City Recorder

DRAFT

City of Santa Clara
Check Register
Checking 1889 - 08/12/2020 to 08/12/2020

Payee Name	Reference Number	Invoice Number	Invoice Ledger Date	Payment Date	Amount	Description	Ledger Account
BLACKBOARD INC.	68439	80620-BLACKBOARD	08/06/2020	08/12/2020	5,050.00	NEW PARLANT SOFTWARE & SERVICES	104130-370 - PROFESSIONAL SERVICES
					$5,050.00		
C QUALITY CONSTRUCTION LLC	68440	SAC200219016	07/27/2020	08/12/2020	500.00	BLDG MAIN DEP REFUND PERMIT 20-016	102570-000 - BLDG SITE MAINTENANCE DEPOSIT
					$500.00		
CITY OF ST. GEORGE - MISC	68441	05947	08/04/2020	08/12/2020	1,792.50	Inv. #05947 - 1st QTR FY21 QTR POLICE DISPATCH FEES	104230-985 - COUNTY DISPATCH
CITY OF ST. GEORGE - MISC	68441	05952	08/04/2020	08/12/2020	9,106.25	Inv # 05952-1st QTR FY21 SCHOOL RESOURCE OFFICERS	104220-980 - SRO - ST. GEORGE
					$10,898.75		
					$10,898.75		
EMPLOYERS MUTUAL INC.	68442	81120-EMI	08/11/2020	08/12/2020	1,860.49	INSURANCE REFUND	103426-000 - AMBULANCE SERVICE CHARGES
					$1,860.49		
KAYENTA STORAGE, LLC	68443	11852	06/30/2020	08/12/2020	2,432.62	Inv#11852-FIRE DEPT RENTAL UNIT APR-JUN 20	104230-260 - BUILDING MAINTENANCE
					$2,432.62		
MISTY BRENNEMAN	68444	80920-MB	08/09/2020	08/12/2020	11.19	REIMBURSE FOR HAND SANITIZER FOR OFFICE	104130-240 - OFFICE SUPPLIES
					$11.19		
OLSON, BARBARA	68445	73120-B OLSON	07/31/2020	08/12/2020	99.81	INSURANCE REFUND	103426-000 - AMBULANCE SERVICE CHARGES
					$99.81		
SANCHEZ, DAVID & MARIA	68446	81120-REFUND	08/11/2020	08/12/2020	1,140.00	REFUND 4 CEMETERY LOTS/PC	103481-000 - SALE OF CEMETERY BURIAL PLOTS
SANCHEZ, DAVID & MARIA	68446	81120-REFUND	08/11/2020	08/12/2020	1,140.00	REFUND 4 CEMETERY LOTS/PC	103482-000 - PERPETUAL CARE
					$2,280.00		
					$2,280.00		
TAMAYO, JESUS	68447	Refund: 1085005	08/06/2020	08/12/2020	45.84	Refund: 1085005 - TAMAYO, JESUS	531311-000 - ACCOUNTS RECEIVABLE
					$45.84		
WASHINGTON COUNTY SOLID WASTE	68448	94748	07/31/2020	08/12/2020	6,465.06	UNIT BILLING GARBAGE & BLUCAN	103445-000 - RECYCLING INCOME
WASHINGTON COUNTY SOLID WASTE	68448	94748	07/31/2020	08/12/2020	29,380.25	UNIT BILLING GARBAGE & BLUCAN	104130-311 - SOLID WASTE DISPOSAL CONTRACT
					$35,845.31		
					$35,845.31		
					$59,024.01		

City of Santa Clara
Check Register
Checking 1889 - 08/19/2020 to 08/19/2020

Payee Name	Reference Number	Invoice Number	Invoice Ledger Date	Payment Date	Amount	Description	Ledger Account
A PLUS POWER WASHING	68449	1738	08/11/2020	08/19/2020	600.00	INV#1738-POWER WASH PARK	104510-260 - BUILDING
AP WIRELESS INVESTMENTS I,	68450	81920-APW	08/19/2020	08/19/2020	8,160.00	CELL TOWER RENT PD TO INSIGHT	104130-370 - PROFESSIONAL
BURNINGHAM CONSTRUCTION	68451	SAC-200302028	08/14/2020	08/19/2020	500.00	BLDG MAIN DEPOSIT REFUND PERMIT 20-	102570-000 - BLDG SITE
CITY OF ST GEORGE - UTILITIES	68452	81020-SC LINE	08/10/2020	08/19/2020	138.24	SNOW CANYON LINE JUN 2020	515110-275 - SNOW CANYON OP
CITY OF ST GEORGE - UTILITIES	68452	81020-SC WELL	08/10/2020	08/19/2020	6,486.31	SNOW CANYON WELL #6 JUL 2020	515110-271 - WELLS UTILITY
CITY OF ST GEORGE - UTILITIES	68452	81020-SC WELL	08/10/2020	08/19/2020	4,900.79	SNOW CANYON WELL #6 JUL 2020	515110-271 - WELLS UTILITY
CITY OF ST GEORGE - UTILITIES	68452	81020-WTR TANK	08/10/2020	08/19/2020	11,688.58	WATER TANK JUL 2020	515110-275 - SNOW CANYON OP
COMPUTECH CONSULTING	68453	18654	08/10/2020	08/19/2020	2,451.48	INV#18654-SOPHOS CENTRAL INTERCEPT	104130-310 - DATA PROCESSING
COMPUTECH CONSULTING	68453	18655	08/13/2020	08/19/2020	3,140.92	INV#18655-DELL LED MONITOR	104130-310 - DATA PROCESSING
OLSON SHANER	68454	81220-GARNISHMENT	08/12/2020	08/19/2020	283.97	GARNISHMENT CASE 199502102	102595-000 - GARNISMENTS
PCF, INC.	68455	98911	08/11/2020	08/19/2020	116.89	FIRE DEPT-XEROX/C8055 Inv 98911	104230-240 - OFFICE SUPPLIES
ROBERT R. NICHOLSON	68456	AUG 2020	08/18/2020	08/19/2020	1,250.00	CITY PLANNER MONTHLY SERVICES	104240-370 - PROFESSIONAL
THE AWNING COMPANY	68457	SAC-200629108	08/18/2020	08/19/2020	100.00	BLDG MAIN DEP REFUND PERMIT 20-108	102570-000 - BLDG SITE
UTAH LOCAL GOVERNMENTS TRUST	68458	1585198	08/10/2020	08/19/2020	1,299.14	ADD AND LIFE INS PREMIUMS	102235-000 - DISABILITY PAYABLE
UTAH LOCAL GOVERNMENTS TRUST	68458	1585199	08/10/2020	08/19/2020	564.22	PROPERTY POLICY/BUILDINGS AND EQUIPMENT	104130-510 - INSURANCE AND
UTAH LOCAL GOVERNMENTS TRUST	68458	1585200	08/10/2020	08/19/2020	3,674.98	WORKERS COMP MONTHLY FEE	102225-000 - WORKERS' COMPENSATION PAYABLE
WEIDNER FIRE	68459	57585	08/10/2020	08/19/2020	701.85	INV#57585-KEY FIRE HOSE ECO-10	104230-250 - OPERATING SUPPLIES
XEROX FINANCIAL SERVICES	68460	2221427	08/08/2020	08/19/2020	203.50	Inv#2221427 -Xerox Lease Payment 7/28/20-	104230-250 - OPERATING
					$46,260.87		
					$46,260.87		

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
01/28/2020										
11879 ALAN SYPHUS										
012020-SYPHUS	1	Invoice	REFUND UTILITY ACCT 108577 OVERPAYMENT	01/20/2020	32.59	01/28/2020		None	53-3711-000	01/20
11879 ALAN SYPHUS										
012020-SYPHUS	2	Invoice	REFUND UTIL ACCT OVERPAYMENT	01/20/2020	32.59	01/28/2020		None	51-3711-000	01/20
11879 ALAN SYPHUS										
012020-SYPHUS	3	Invoice	REFUND UTIL ACCT OVERPAYMENT	01/20/2020	8.15	01/28/2020		None	52-3720-000	01/20
11879 ALAN SYPHUS										
012020-SYPHUS	4	Invoice	REFUND UTIL ACCT OVERPAYMENT	01/20/2020	4.07	01/28/2020		None	10-3443-000	01/20
11879 ALAN SYPHUS										
012020-SYPHUS	5	Invoice	REFUND UTIL ACCT OVERPAYMENT	01/20/2020	4.06	01/28/2020		None	54-3714-000	01/20
10997 BOWEN COLLINS & ASSOCIATES, INC.										
22860	1	Invoice	Inv#22860-CLAYTON LEAVITT PROPERTY PLAN REVIEW	01/03/2020	159.00	01/28/2020		None	10-4240-370	01/20
10997 BOWEN COLLINS & ASSOCIATES, INC.										
22861	1	Invoice	Inv#22861-HILLS @SC DRAWING/STUDY/REVIEW	01/03/2020	318.00	01/28/2020		None	10-4240-370	01/20
10997 BOWEN COLLINS & ASSOCIATES, INC.										
22862	1	Invoice	Inv#22862-LITTLE LAVA SUBDIV FINAL PLAT	01/03/2020	159.00	01/28/2020		None	10-4240-370	01/20
1646 CENTURYLINK										
011020-ELEVATOR	1	Invoice	ELEVATOR ALARM PHONE LINE	01/10/2020	97.29	01/28/2020		None	10-4240-260	01/20
493 CITY OF ST GEORGE-IMPACT										
OCT-DEC 19 SEWE	1	Invoice	SEWER IMPACT FEES OCT-DEC 19	01/27/2020	19,089.00	01/28/2020		None	52-2411-000	01/20
727 DIXIE STATE UNIVERSITY										
S0314933	1	Invoice	Inv. #S0314933 - CEC Subscriber #s FY19	09/06/2019	7,906.00	12/28/2020		None	10-4130-542	01/20
1075 IVINS CITY										
012720-SCFIRE-M	1	Invoice	SCI FIRE EQUIPMENT MAINTENANCE	01/27/2020	2,593.47	01/28/2020		None	10-4230-253	01/20
11074 LAURA SQUIRES										
55-JAN 20 CC MIN	1	Invoice	Inv#55-CC MINUTES JAN 2020	01/27/2020	200.00	01/28/2020		Nonemploye	10-4130-370	01/20
10821 LIBERTY NATIONAL										
FEB 20-LIFE INS	1	Invoice	LIFE INSURANCE	01/25/2020	501.40	01/28/2020		None	10-2252-000	01/20
2002 STATE OF UTAH / BLDG										
OCT-DEC 19 SCHG	1	Invoice	BUILDING SURCHARGE OCT-DEC 19	01/27/2020	397.09	01/28/2020		None	10-4240-940	01/20
2161 UTAH ASSOC. MUNICIPAL POWER SYSTEMS										
DEC 19-UAMPS PO	1	Invoice	950 - ENERGY	01/24/2020	96,205.20	01/28/2020		None	53-5310-950	01/20
2161 UTAH ASSOC. MUNICIPAL POWER SYSTEMS										
DEC 19-UAMPS PO	2	Invoice	951 - FIXED COST	01/24/2020	103,322.2	01/28/2020		None	53-5310-951	01/20
2161 UTAH ASSOC. MUNICIPAL POWER SYSTEMS										
DEC 19-UAMPS PO	3	Invoice	952 - LINE ITEM COSTS	01/24/2020	8,729.46	01/28/2020		None	53-5310-952	01/20
2332 WASHINGTON COUNTY- HCP										
OCT-DEC 19 HCP	1	Invoice	HCP IMPACT FEES OCT-DEC 19	01/27/2020	12,352.30	01/28/2020		None	10-2260-000	01/20
2341 WASH. CO. FLOOD CONTROL DIST.										
NOV 2019	1	Invoice	FLOOD CONTROL DISTRICT 53-3301000004-NOV 2019	12/01/2019	4,119.00	01/28/2020		None	54-5410-770	01/20

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
2341 WASH. CO. FLOOD CONTROL DIST.										
DEC 2019	1	Invoice	FLOOD CONTROL DISTRICT 53-3301000004-DEC 2019	12/31/2019	4,134.00	01/28/2020		None	54-5410-770	01/20
10997 BOWEN COLLINS & ASSOCIATES, INC.										
21903	1	Invoice	Inv#21903-SPLIT ROCK DEV PRELIM PLAT	08/05/2019	284.00	01/28/2020		None	10-4240-370	01/20
10997 BOWEN COLLINS & ASSOCIATES, INC.										
21906	1	Invoice	Inv#21906-LITTLE LAVA DRAWING/STUDY/REVIEW	08/05/2019	159.00	01/28/2020		None	10-4240-370	01/20
11428 KRISTELLE HILL										
010220-K HILL TUI	1	Invoice	FALL 2019- Tuition Reimbursement	01/02/2020	1,950.00	01/28/2020		None	53-5310-360	01/20
11897 DAVID & GEORGIA SNYDER										
012820-SNYDER	1	Invoice	REFUND UTIL ACCT 975502 OVERPAYMENT	01/28/2020	50.74	01/28/2020		None	53-3711-000	01/20
11897 DAVID & GEORGIA SNYDER										
012820-SNYDER	2	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	50.74	01/28/2020		None	51-3711-000	01/20
11897 DAVID & GEORGIA SNYDER										
012820-SNYDER	3	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	12.68	01/28/2020		None	52-3720-000	01/20
11897 DAVID & GEORGIA SNYDER										
012820-SNYDER	4	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	6.34	01/28/2020		None	10-3443-000	01/20
11897 DAVID & GEORGIA SNYDER										
012820-SNYDER	5	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	6.34	01/28/2020		None	54-3714-000	01/20
11898 TERI WONG										
012820-T WONG	1	Invoice	REFUND UTIL ACCT 1027604 OVERPAYMENT	01/28/2020	19.60	01/28/2020		None	53-3711-000	01/20
11898 TERI WONG										
012820-T WONG	2	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	19.60	01/28/2020		None	51-3711-000	01/20
11898 TERI WONG										
012820-T WONG	3	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	4.90	01/28/2020		None	52-3720-000	01/20
11898 TERI WONG										
012820-T WONG	4	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	2.45	01/28/2020		None	10-3443-000	01/20
11898 TERI WONG										
012820-T WONG	5	Invoice	REFUND UTIL OVERPAYMENT	01/28/2020	2.44	01/28/2020		None	54-3714-000	01/20
1075 IVINS CITY										
OCT-DEC 19 AMBU	1	Invoice	Q2 FY20 AMBULANCE REVENUE OCT-DEC 19	01/28/2020	37,324.42	01/28/2020		None	10-4235-370	01/20
11419 NANETTE GLAUSER										
012820-RESTITUTI	1	Invoice	RESTITUTION PAYMENT FROM DONALD MILLER CASE	01/28/2020	521.61	01/28/2020		None	10-2560-000	01/20
1622 PRESTON'S MOBILE SHREDDING										
687490	1	Invoice	INV# 687490-Bulk Shredding	01/28/2020	25.00	01/28/2020		Nonemploye	10-4130-370	01/20
Total 01/28/2020:					300,803.7					

1/28/2020 GL Period Summary

GL Period	Amount
01/20	300,803.75
Grand Totals:	300,803.75

Grand Totals: 300,803.7

Report GL Period Summary

GL Period	Amount
01/20	300,803.75
Grand Totals:	300,803.75

Vendor number hash:	153216
Vendor number hash - split:	300234
Total number of invoices:	23
Total number of transactions:	37

Terms Description	Invoice Amount	Discount Amount	Net Invoice Amount
Open Terms	300,803.75	.00	300,803.75
Grand Totals:	300,803.75	.00	300,803.75

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
02/04/2020										
11519 ACTION AMBULANCE BILLING, LLC										
1910	1	Invoice	Inv# 1910-AMBULANCE BILLING JAN 2020 (SC-IVINS)	02/01/2020	3,559.00	02/04/2020		Nonemploye	10-4230-370	02/20
193 ALLIED FENCE OF SOUTHERN UTAH, INC										
852	1	Invoice	Inv#852-BMX TRACK CHAIN LINK FENCE AND GATES	01/25/2020	14,500.00	02/04/2020		None	10-4510-730	02/20
451 CHILD SUPPORT SERVICES										
012920-CS692490	1	Invoice	CASEY-C000692490 PAY PERIOD 1/29/2020	01/29/2020	245.46	02/04/2020		None	10-2595-000	02/20
451 CHILD SUPPORT SERVICES										
012920-CS873789	1	Invoice	CASEY-C000873789 PAY PERIOD 1/29/2020	01/29/2020	206.77	02/04/2020		None	10-2595-000	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	1	Invoice	#1 STREETLIGHT/2495	02/03/2020	98.84	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	2	Invoice	#2 STREETLIGHT/2643	02/03/2020	55.68	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	3	Invoice	#3 STREETLIGHT/2721	02/03/2020	37.75	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	4	Invoice	#4 STREETLIGHT/1373 OLD FARM	02/03/2020	77.10	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	5	Invoice	#5 1427 VICTORS	02/03/2020	104.45	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	6	Invoice	#6 STREETLIGHT/3209	02/03/2020	43.16	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	7	Invoice	#7 STREETLIGHT/1445 GATES	02/03/2020	100.02	02/04/2020		None	53-5310-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	8	Invoice	#1 WATER/ST.SCAPE/2990	02/03/2020	32.00	02/04/2020		None	10-4510-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	9	Invoice	#3 WATER/ST.SCAPE/2603	02/03/2020	37.06	02/04/2020		None	10-4510-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	10	Invoice	HWY 91 STREETSCAPE	02/03/2020	32.00	02/04/2020		None	10-4510-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	11	Invoice	HWY 91 STREETSCAPE	02/03/2020	32.74	02/04/2020		None	10-4510-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	12	Invoice	HWY 91 STREETSCAPE	02/03/2020	119.99	02/04/2020		None	10-4510-271	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	13	Invoice	PIONEER PARK	02/03/2020	20.00	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	14	Invoice	TOWN HALL	02/03/2020	2,315.02	02/04/2020		None	10-4240-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	15	Invoice	HERITAGE SQ	02/03/2020	90.01	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	16	Invoice	SWISS MEMORIAL PARK	02/03/2020	9.55	02/04/2020		None	10-4510-270	02/20

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	17	Invoice	ARROWHEAD PARK	02/03/2020	35.48	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	18	Invoice	BLACK ROCK PARK	02/03/2020	60.40	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	19	Invoice	FIRE-CIRCLE	02/03/2020	72.43	02/04/2020		None	10-4230-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	20	Invoice	PLAT "E"	02/03/2020	37.06	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	21	Invoice	CITY PARK	02/03/2020	279.12	02/04/2020		None	10-4515-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	22	Invoice	LITTLE LEAGUE	02/03/2020	60.31	02/04/2020		None	10-4515-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	23	Invoice	CV PARK IRRIGATION METER	02/03/2020	132.91	02/04/2020		None	10-4515-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	24	Invoice	AN. SHELTER	02/03/2020	38.90	02/04/2020		None	10-4410-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	25	Invoice	SHOP	02/03/2020	268.68	02/04/2020		None	10-4410-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	26	Invoice	SHOP 2ND ELECTRIC METER	02/03/2020	23.51	02/04/2020		None	10-4410-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	27	Invoice	GENERATION PLANT	02/03/2020	37.06	02/04/2020		None	53-5310-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	28	Invoice	SEWER BLDG 1/2	02/03/2020	58.88	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	29	Invoice	SEWER BLDG 1/2	02/03/2020	58.87	02/04/2020		None	52-5210-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	30	Invoice	WATER METER-NICHOLAS	02/03/2020	35.31	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	31	Invoice	PIONEER	02/03/2020	37.06	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	32	Invoice	TRAFFIC LIGHT-PIONEER/RACHEL	02/03/2020	23.67	02/04/2020		None	10-4410-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	33	Invoice	CEMETERY	02/03/2020	66.69	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	34	Invoice	ARCHIE GUBLER PARK	02/03/2020	384.19	02/04/2020		None	10-4515-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	35	Invoice	GUBLER/PUMP METER	02/03/2020	119.12	02/04/2020		None	10-4515-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	36	Invoice	ARCHIE GUBLER-SPLASH PAD	02/03/2020	67.31	02/04/2020		None	10-4510-270	02/20

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	37	Invoice	ARCHIE GUBLER PICKLE BALL COURTS	02/03/2020	160.28	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	38	Invoice	FIRE-RACHEL	02/03/2020	304.73	02/04/2020		None	10-4230-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	39	Invoice	FIRE-RACHEL	02/03/2020	37.06	02/04/2020		None	10-4230-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	40	Invoice	RACHEL STREETSCAPE	02/03/2020	32.79	02/04/2020		None	10-4510-270	02/20
484 CITY OF SANTA CLARA-UTILITIES										
JAN 20	41	Invoice	BOOMERS PARK @THE HILLS	02/03/2020	32.35	02/04/2020		None	10-4510-270	02/20
487 CITY OF ST GEORGE - S										
JAN 2020-SEWER	1	Invoice	2644 SEWER CONNECTIONS @ 9.62 JAN 2020	01/27/2020	25,435.28	02/04/2020		None	52-5210-945	02/20
11501 DR. ROBERT R. FOSTER, D.O. P.C.										
FEB 2020	1	Invoice	MEDICAL SERVICES DIRECTOR-FIRE	02/04/2020	600.00	02/04/2020		Nonemploye	10-4230-370	02/20
11501 DR. ROBERT R. FOSTER, D.O. P.C.										
FEB 2020	2	Invoice	MEDICAL SERVICES DIRECTOR-EMS	02/04/2020	600.00	02/04/2020		Nonemploye	10-4235-370	02/20
812 ERIC GENTRY										
JAN 2020	1	Invoice	PROFESSIONAL SERVICES	02/04/2020	1,500.00	02/04/2020		Nonemploye	10-4120-330	02/20
856 FREEDOM MAILING SERVICES, INC.										
37555	1	Invoice	BILLS & NEWSLETTERS FEB 2020	01/28/2020	1,486.00	02/04/2020		None	10-4130-370	02/20
11150 HEWLETT-PACKARD FINANCIAL SERVICES CO.										
600623847	1	Invoice	IVR CUST ID -03309 LEASE PAYMENT 2/12/2020-3/11/2020	01/18/2020	434.14	02/04/2020		None	10-4130-825	02/20
1465 MOUNT OLYMPUS WATERS (1385)										
10221385-012720	1	Invoice	5 gal spring water, coolr rent, fuel schg-admin	01/27/2020	37.02	02/04/2020		None	10-4130-282	02/20
1465 MOUNT OLYMPUS WATERS (1385)										
10221385-012720	2	Invoice	COOLER, WATER, FUEL SURCHG-PARKS	01/27/2020	99.46	02/04/2020		None	10-4510-260	02/20
1465 MOUNT OLYMPUS WATERS (1385)										
10221385-012720	3	Invoice	COOLER RENT, WATER, FUEL SCHG	01/27/2020	59.00	02/04/2020		None	10-4410-282	02/20
1465 MOUNT OLYMPUS WATERS (1385)										
10221385-012720	4	Invoice	COOLER, WATER, FUEL SCHG-2ND FLOOR T HALL	01/27/2020	38.70	02/04/2020		None	10-4240-260	02/20
1465 MOUNT OLYMPUS WATERS (1385)										
10221385-012720	5	Invoice	COOLER RENT, WATER, FUEL SCHG, PAPER INV FEE Ivins Fire	01/27/2020	52.56	02/04/2020		None	10-4230-260	02/20
1754 PACIFICORP ROCKY MOUNTAIN POWER										
012720-RMP	1	Invoice	WATER TANK POWER	01/27/2020	226.05	02/04/2020		None	51-5110-270	02/20
10925 PROTECT YOUTH SPORTS										
778098	1	Invoice	BACKGROUND CHECK-PUBLIC WORKS-KYLER MITCHELL	02/01/2020	21.95	02/04/2020		None	10-4410-370	02/20
1600 PITNEY-BOWES/RENTAL										
1014793374	1	Invoice	RENT FOR POSTAGE METER	01/27/2020	86.85	02/04/2020		Nonemploye	10-4130-282	02/20
1618 PCF, INC.										
96520	1	Invoice	PUBLIC WORKS COPIER RICOH 3045S	02/03/2020	39.00	02/04/2020		None	10-4410-240	02/20

Invoice	Seq	Type	Description	Invoice Date	Total Cost	Due Date	PO Number	1099	GL Account	GL Period
1618 PCF, INC.										
96521	1	Invoice	PUB WORKS COPIER - XEROX 7835	02/03/2020	49.59	02/04/2020		None	51-5110-240	02/20
1738 RICK ROSENBERG										
JAN 2020 CELL	1	Invoice	CELL PHONE	02/04/2020	45.00	02/04/2020		None	10-4130-281	02/20
2188 UPPER CASE PRINTING INK.										
15431	1	Invoice	NEWSLETTERS AND FLYERS FEB 2020	01/27/2020	246.40	02/04/2020		None	10-4130-370	02/20
2380 STAKER PARSON COMPANIES										
191298	1	Invoice	Inv#191298-BMX TRACK ASPHALT TURNS	01/23/2020	37,603.90	02/04/2020		None	10-4510-730	02/20
2287 UTAH STATE TREASURER / FINES										
JAN 2020-COURT	1	Invoice	COURT SURCHARGES	02/03/2020	5,092.10	02/04/2020		None	10-4120-905	02/20
2032 SUNRISE ENGINEERING, INC.										
108019	1	Invoice	Inv#108019-SC SOUTH HILLS WATER IMPROVEMENTS 2019	01/22/2020	231.00	02/04/2020		None	51-5110-730	02/20
11402 UTAH ORDINANCE COMPLIANCE ASSOCIATION										
020420-UOCA CON	1	Invoice	UOCA CONFERENCE REG. March 18-20, 2020	02/04/2020	200.00	02/04/2020		None	10-4120-360	02/20
11402 UTAH ORDINANCE COMPLIANCE ASSOCIATION										
020420-UOCA CON	2	Invoice	UOCA Annual Assoc. Dues	02/04/2020	90.00	02/04/2020		None	10-4120-210	02/20
517 CODALE ELECTRIC SUPPLY INC										
S6952237.001	1	Invoice	Inv#S6952237.001-METER RING FOR AMI PROJECT	01/22/2020	350.00	02/04/2020		None	53-5310-730	02/20
2029 SUMMIT PRINTING										
212416	1	Invoice	Inv#212416-CITY COUNCIL BUSINESS CARDS	01/31/2020	74.50	02/04/2020		Nonemploye	10-4130-240	02/20
2341 WASH. CO. FLOOD CONTROL DIST.										
JAN 2020 FLOOD C	1	Invoice	FLOOD CONTROL DISTRICT 53-3301000004-JAN 2020	02/04/2020	4,134.00	02/04/2020		None	54-5410-770	02/20
2266 UTAH RETIREMENT SYSTEMS										
020420-ADJUSTME	1	Invoice	Kyler Mitchell 401k Shortage adjustment	02/04/2020	5.10	02/04/2020		None	10-2230-000	02/20
Total 02/04/2020:					103,018.3					

2/4/2020 GL Period Summary

GL Period	Amount
02/20	103,018.37
Grand Totals:	103,018.37

Grand Totals: 103,018.3

Report GL Period Summary

GL Period	Amount

GL Period	Amount
02/20	103,018.37
Grand Totals:	103,018.37

Vendor number hash:	86064
Vendor number hash - split:	134187
Total number of invoices:	26
Total number of transactions:	72

Terms Description	Invoice Amount	Discount Amount	Net Invoice Amount
Open Terms	103,018.37	.00	103,018.37
Grand Totals:	103,018.37	.00	103,018.37

City of Santa Clara
Check Register
Checking 1889 - 08/26/2020 to 08/26/2020

Payee Name	Reference Number	Invoice Number	Invoice Ledger Date	Payment Date	Amount	Description	Ledger Account
BONHAM CONSTRUCTION	68461	000160	08/24/2020	08/26/2020	4,275.00	INV#000160-BAL. OFFICE DOOR,	104240-730 - IMPROVEMENTS
BOWEN COLLINS &	68462	24077	08/10/2020	08/26/2020	165.00	Inv#24077-Ocotillo Sprongs Final Plat	104240-370 - PROFESSIONAL
BOWEN COLLINS &	68462	24079	08/10/2020	08/26/2020	155.50	Inv#24079-5 Heritage Point Townhomes	104240-370 - PROFESSIONAL
BOWEN COLLINS &	68462	24082	08/10/2020	08/26/2020	631.50	Inv#24082-Desert Village Townhomes	104240-370 - PROFESSIONAL
BOWEN COLLINS &	68462	24083	08/10/2020	08/26/2020	4,660.50	INV#24083-RETAINING WALL ORDINANCE	104410-320 - ENGINEERING
BOWEN COLLINS &	68462	24085	08/10/2020	08/26/2020	165.00	Inv#24085-Dollar Tree Drawing/Study Review	104240-370 - PROFESSIONAL
BOWEN COLLINS &	68462	24087	08/10/2020	08/26/2020	1,034.50	INV#24087-MS4 PERMIT REVIEW	545410-320 - ENGINEERING
CANON FINANCIAL SERVICES,	68463	21799114	08/13/2020	08/26/2020	163.88	Inv#21799114 Contrct chgs Aug 2020	104130-310 - DATA PROCESSING
COMPUTECH CONSULTING	68464	18618	08/06/2020	08/26/2020	12,645.07	INV#18618-NEW NETWORK EQUIPMENT	104130-740 - CAPITAL
COMPUTECH CONSULTING	68464	18619	08/06/2020	08/26/2020	2,724.10	INV#18619-NEW COMPUTERS DELL	104230-250 - OPERATING
COMPUTECH CONSULTING	68464	18620	08/06/2020	08/26/2020	8,816.66	INV#18620-POWER EDGE R640 SERVER	104130-740 - CAPITAL
DIXIE STATE UNIVERSITY	68465	82420-L	08/24/2020	08/26/2020	500.00	LEXIE LEAVITT-STUDENT 00395108	104620-000 - MISS SANTA CLARA
OCOTILLO LLC	68466	SAC191017150	08/18/2020	08/26/2020	500.00	BLDG MAIN DEP REFUND PERMIT 19-150	102570-000 - BLDG SITE
PCF, INC.	68467	99033	08/19/2020	08/26/2020	45.23	FIRE DEPT OKIDATA/MB760 INV 99033	104230-240 - OFFICE SUPPLIES
ST. GEORGE REFRIGERATION	68468	39677	08/07/2020	08/26/2020	5,700.00	Inv#39677-Heat Pump replaced at 2721 SC	104240-260 - BUILDING
ST. GEORGE REFRIGERATION	68468	39681	08/07/2020	08/26/2020	187.50	Inv#39681 Pub. Works & Parks Office AC	104240-260 - BUILDING
TP COMMUNICATIONS INC.	68469	300211-0820	08/18/2020	08/26/2020	395.95	ANSWERING SERVICE	104130-280 - TELEPHONE
ZIONS FIRST NATIONAL BANK -	68470	81220-5857757	08/12/2020	08/26/2020	20,973.43	5857757-SC Lease Rev Ref 2019	101225-000 - MBA 2019 LEASE
ZIONS FIRST NATIONAL BANK -	68470	81220-7704902	08/12/2020	08/26/2020	5,462.63	7704902-Elec Rev Bonds Series 2008	531231-000 - 2008 Bond Fund -
ZIONS FIRST NATIONAL BANK -	68470	81220-7705004	08/12/2020	08/26/2020	18,654.08	7705004 Water Sewer Storm Rev Ref 2012	511235-000 - 2012 Refunding -
ZIONS FIRST NATIONAL BANK -	68470	81220-7705005	08/12/2020	08/26/2020	7,937.50	7705005 Water Sewer Storm Rev 2012 E	511241-000 - 2012E - 7705005 -
ZIONS FIRST NATIONAL BANK -	68470	81220-7705005A	08/12/2020	08/26/2020	9,750.00	7705005A-Water Sewer Storm Rev 2012F	511246-000 - 2012F - 7705005A
ZIONS FIRST NATIONAL BANK -	68470	81220-7705008	08/12/2020	08/26/2020	28,555.00	7705008 Elec Rev Refunding Bonds 2017	531236-000 - 2017 Bond Fund
					$134,098.03		
					$134,098.03		

Proclamation

Constitution Week
September 17 through September 23, 2020

Whereas, September 17, 2020 marks the two hundred and thirty-third anniversary of the drafting of the Constitution of the United States of America by the Constitution Convention; and

Whereas, it is fitting and proper to accord official recognition to this magnificent document and its memorable anniversary; and to the patriotic celebrations which will commemorate the occasion; and

Whereas, public law 915 guarantees the issuing of a proclamation each year by the President of the United States of America designating September 17th through the 23rd as Constitution Week, and

Now, Therefore, I, Rick Rosenberg, Mayor of the City of Santa Clara, Utah, by virtue of the authority vested in me as Mayor do hereby proclaim the week of September 17th through 23rd, 2020 as Constitution Week,

And ask our citizens to reaffirm the ideals of the framers of the Constitution had in 1787 by vigilantly protecting the freedoms guaranteed to us through this guardian of our liberties,

In Witness Whereof, I have hereunto set my hand and caused the Seal of the City of Santa Clara to be affixed this 26th day of August of the year of our Lord two thousand and twenty.

Dated this 26, day of August 2020.

Mayor: _____

REQUEST FOR COUNCIL ACTION

AGENDA ITEM 2

August 26, 2020

APPLICANT: Parks and Trails

SUBJECT:

City Cemeteries Ordinance change to paragraph 12.24.90 ; Burial Hours: Sundays and Holidays:

BACKGROUND DESCRIPTION:

The change to the ordinance was requested by City Council. These changes are based on July 1, 2020 City Council Work Meeting recommendations. The 48 hour period now official begins after the mortuary notifies the City and Staff verifies the burial rights for the deceased. It also allows for longer notice requirements for the Cemetery Historic section and plots 115 E through 149 D in the Middle grass section. Any exception to the provisions of this section shall be by the approval of the Mayor based on the recommendation of the Parks and Trails Director and will result in the payment of additional fees.

Proposed Recommendation

Approval

Cost

Approval

Approved by Legal Department

Yes

Approved in Budget

Yes

Approved by City Finance Department

Yes

Amount

0

Requested By

Staff

File Upload Attachments

CHAPTER 12.24 CEMETERIES

12.24.070: BURIAL PERMIT:

No body shall be interred, or remains received, unless a burial report is received from a licensed mortician and signed by the Funeral Director, which shall be an acknowledgement of the mortuary's obligation to pay for the burial, or unless the burial charges have been paid in advance to the City Treasurer and receipt therefor is presented to the Cemetery Superintendent as a permit for the burial. The burial report or receipt shall reflect the full name of the deceased, the date and place of birth, the date and place of death, and the name and address of the person responsible for disposal. (Ord. 2018-01)

12.24.090: BURIAL HOURS; SUNDAYS AND HOLIDAYS:

No graveside service or interment will be allowed in the cemetery on Sunday, on any State or Federal holiday, or any other holidays officially observed by the City, including Swiss Days. On all other days, graveside service or interments will be allowed between the hours of ten o'clock (10:00) A.M. and four o'clock (4:00) P.M. All graveside services and interments must be arranged through the Cemetery Superintendent forty-eight (48) hours in advance of time set and verification of burial rights by City staff, not including any intervening Saturday, Sunday and/or holidays. Additional time will be required for opening all plots in the historic and middle sections plots 155E through 149D. Any exception to the provisions of this section shall be by the approval of City Council Mayor based on the recommendation of the Parks and Trails Director and will result in the payment of additional fees. (Ord. 2018-01)

Note:

Red: Deletions

Blue: New Changes

CITY OF SANTA CLARA, UTAH
ORDINANCE NO. 2020-09

AN ORDINANCE TO AMEND THE MUNICIPAL CODE OF THE CITY OF SANTA CLARA UTAH BY AMENDING TITLE 12, SECTION 12.24.090 "BURIAL HOURS; SUNDAYS AND HOLIDAYS" AND ESTABLISHING AN EFFECTIVE DATE.

WHEREAS, it is important to update the City's code from time to time to remain relevant and reflective of the ever-changing operating environment of the City; and

WHEREAS, staff would like to amend Title 12, Section 12.24.090 Burial Hours; Sundays and Holidays:

WHEREAS, the purpose of the amendment is to improve operations and efficiency of the cemetery.

WHEREAS, staff has reviewed and made revisions to the Ordinance and has been reviewed by the City Attorney.

WHEREAS, the legislative body of the City of Santa Clara reviewed the recommendations of the Staff and City Attorney and acted on the proposed amendment to Title 12, Section 12.24.090 "Burial Hours; Sundays and Holidays" and acted on August 26th, 2020; and

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Santa Clara, Utah, that Title 12, Section 12.24.090 "Burial Hours; Sundays and Holidays" be amended as follows.

Section 1. Amendment:

12.24.090: BURIAL HOURS; SUNDAYS AND HOLIDAYS:

No graveside service or interment will be allowed in the cemetery on Sunday, on any State or Federal holiday, or any other holidays officially observed by the City, including Swiss Days. On all other days, graveside service or interments will be allowed between the hours of ten o'clock (10:00) A.M. and four o'clock (4:00) P.M. All graveside services and interments must be arranged through the Cemetery Superintendent forty-eight (48) hours in advance of time set and verification of burial rights by City staff, not including any intervening Saturday, Sunday and/or holidays. Additional time will be required for opening all plots in the historic and middle sections plots 155E through 149D. Any exception to the provisions of this section shall be by the approval of Mayor based on the recommendation of the Parks and Trails Director and will result in the payment of additional fees. (Ord. 2018-01)

Section 2. Effective Date:

This Ordinance shall become effective immediately upon adoption, recording and posting in the manner prescribed by law.

ADOPTED and approved by a duly constituted quorum of the City Council of the City of Santa Clara, Utah this 26th day of August 2020.

IN WITNESS, THERETO:

_____
RICK ROSENBERG, Mayor

ATTEST:

_____
CHRIS SHELLEY, City Recorder

REQUEST FOR COUNCIL ACTION

AGENDA ITEM 3

August 26, 2020

APPLICANT: Buck Hurst

SUBJECT:

consider a Project Plan which consists of a site plan and building elevation drawings for an Ace Hardware store in a Planned Development Commercial zone located on the southeast corner of the intersection of Rachel Drive and Pioneer Parkway.

BACKGROUND DESCRIPTION:

The applicant requests approval of the Project plan which consists of a site plan and building elevation drawings for an Ace Hardware store on the southeast corner of Rachel Drive and Pioneer Parkway. The PD-Commercial zone requires that the PC hold a public hearing on the Project Plan for any new development in PD zone. A public hearing was held on this item on July 9, 2020 and the issue was tabled to allow the applicant to explore other site plan options in building location being moved to corner of Pioneer and Rachel Drive . The applicant decided to move forward without any changes to the original site plan. The PC considered the Project Plan in three parts for purposes of making a recommendation to the City Council; 1. Parking: The PC recommends approval of a requested parking reduction to 74 spaces based on the projected parking demand and experience relayed by the applicant for other stores in St George and Hurricane. 2 Landscape: The PC recommends approval of the proposed 10’ wide landscape strip as submitted. 3.Building location: The applicant requests approval to locate the building in the southeast corner of his lot, 10’ away from the property line adjoining the residential properties. The PC recommends denial of the proposed location, noting that the General Plan and prior precedence with applicants on the three other corners of the intersection is for the building to be located near the front of the lot with parking in the rear and side.

Proposed Recommendation

The PC considered the Project Plan in three parts; 1. Parking: approval. 2 Landscape: approval as submitted. 3 Building location: Denial of the proposed location.

Cost

The PC considered the Project Plan in three parts; 1. Parking: approval. 2 Landscape: approval as submitted. 3 Building location: Denial of the proposed location.

Approved by Legal Department

Yes

Approved in Budget

Yes

Approved by City Finance Department

N/A

Amount

N/A

Requested By

Corey Bundy

File Upload Attachments

https://sccity.org/wp-content/uploads/formidable/41/ace-hardware-exterior-1-80x80.jpg, https://sccity.org/wp-content/uploads/formidable/41/2020-06-03_20024_BuckAceSantaC-ALLtoPC-sm-1.pdf, https://sccity.org/wp-content/uploads/formidable/41/CC-agenda-rpt-8-26-20-Site-Plan-and-Bldg-elev-Ace-Hardware-in-PD-Commercial-zone22251.docx

City Council agenda report for 8/26/20; Consider a Project Plan which consists of a site plan and building elevation drawings for an Ace Hardware store in a Planned Development Commercial zone located on the southeast corner of the intersection of Rachel Drive and Pioneer Parkway.

Zone: PD Commercial
General Plan designation: Main Street Commercial
Acres: 1.72
Applicant: Ace Hardware, Buck Hurst, applicant
Project Designer: MRW Design Associates
Project location: SE corner of Rachel Drive and Pioneer Parkway

PD-Commercial Zone: The applicant requests approval of the Project plan which consists of a site plan and building elevation drawings for an Ace Hardware store on the southeast corner of Rachel Drive and Pioneer Parkway. **The PD-Commercial zone requires that the PC hold a public hearing on the Project Plan for any new development in PD zone.** A public hearing was held on this item on July 9, 2020 and the issue was tabled to allow the applicant to explore other site plan options.

City General Plan: Section 4.6 of the City General Plan sets forth the goals and vision for the "Pioneer Parkway Retail Core". Pages 41 & 42 of the General Plan describes the specific actions (Action 4.8) to implement the goal of creating a "a quality pedestrian-oriented center with a mix of commercial, business, and residential uses". Stated actions are "Building to abut the sidewalks adjacent to the street", "Continuous and transparent facades"," Wide Sidewalks", "Plazas"," Combined curb access", "On street parking", " Interconnected, shared, off street parking", "Curb extensions", "Building articulation" ,"Emphasized pedestrian crossings" ,and "Generous landscaping". A large window-less building placed near the corner will not be aesthetically pleasing as the applicant's study visuals show. Some neighbors will likely appreciate the building being placed further from their residential property, but a mostly window-less building near the corner will not enhance the area's aesthetics.

Site Plan for Applicant's preferred option: (same site plan as previously presented) The proposed 24,780 sq. ft single-level (with flat roof) store is proposed near the back corner of the lot. The applicant said he wants the parking in the front of the store similar to Ace Hardware store on Bluff Street. To meet one of the city's goals the applicant proposes a small plaza with shade covers and benches on the corner of the lot adjacent to the intersection.
The delivery dock is located on the south end of the proposed building about 10-13' from the residential property line. The site plan shows a 10' wide landscape strip plus additional sidewalk width along both Rachel Drive and Pioneer Parkway frontage. The sidewalk width is generally 10', and the adjacent landscape strip 10' wide .

Parking: Based on the code standard of 1 space per 250 sq. ft of retail floor area, and 1 space per 1,000 sq. ft of storage / warehouse space the parking requirement would be 94 spaces. The applicant proposes 74 spaces based on his experience with other hardware stores. Staff supports the parking reduction request for 74 spaces thinking 74 spaces will be ample for normal business days.
Parking Lot Lighting: Parking lot lights are shielded to direct light downward and not into adjacent residential area.

Landscaping: The Zoning code (17.68.100:D.4) requires the area from the curb to the front setback line **(20' from property line**) to be landscaped but may include the sidewalk within that area. The applicant appears to have measured the setback line from the curb rather than the property line and the landscape strip is too narrow along both Rachel Drive (**approx. 5 'too narrow)** and along Pioneer Parkway (**about 10' too narrow**). Rather than a 10' landscape planter area along both streets, the code requires a 15' wide planter along Rachel Drive, and a 20' wide planter along Pioneer Parkway. The difference is due to the location of the property line relative to the existing sidewalks.

Building Elevation Drawings: The north elevation (from Pioneer Parkway) and west elevation (main entrance from parking lot) are building facades visible from the streets. The south and east elevations are windowless and are viewed from the adjacent residential area. The building is proposed at height of 25'. The exterior walls are mostly stucco with some accents similar to the Ace Hardware store near Mall Drive and Riverside Drive (Dinosaur commercial center). See the enclosed elevation drawings for a complete view of the proposed building design.

Issues:

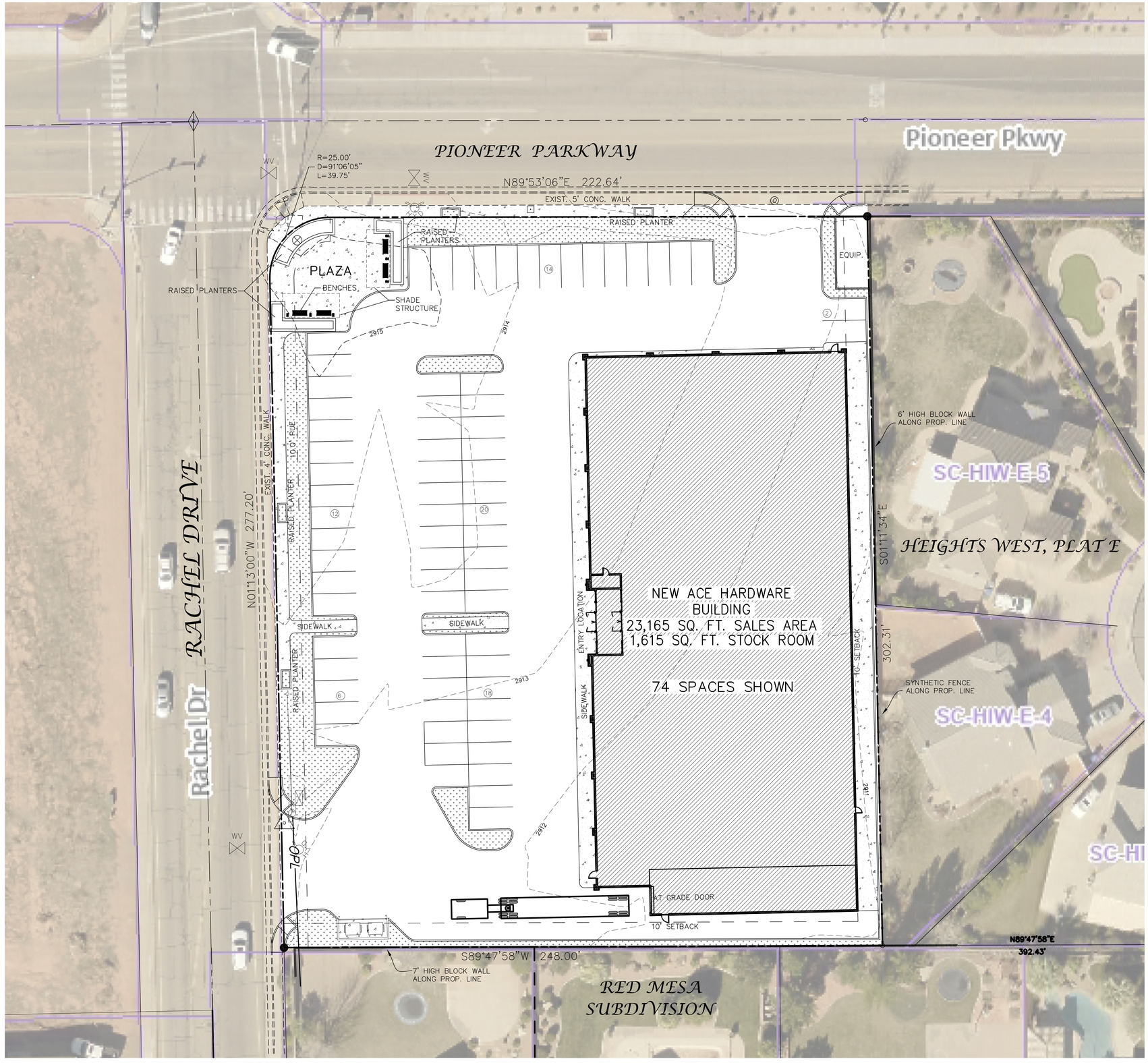
1. Parking area. The PD-Commercial **code recommends** that parking be located in the side and/ or rear of the lot with the building placed toward the front of the property. 17.68.100:F states " strip commercial with front parking is generally not acceptable". Also see 17.68.100:C.3.d "parking should be located to the rear, side & rear, or underground". **Note that the code uses "should" rather than shall, indicating that it is a recommendation rather than a hard requirement**.
2. Parking Reduction: The applicant seeks a parking reduction of 20 spaces (74 rather than 94 spaces). **Staff supports this request and the applicant states 74 will be very adequate based on other hardware stores.**
3. Landscape strip width. As noted above the code (17.68.100:D.4) requires the entire area from the curb to the 20' front setback line consist of landscaping and sidewalk. The 20'setback line is measured from the property line, and not from the curb. Based on this code section, **the proposed landscape strips are too narrow by 5' along Rachel Drive, and by 10' along Pioneer Parkway.** However, **the** proposed layout does not provide much flexibility for increasing the width of the landscape strip without narrowing the building or narrowing the sidewalk width.

4. Open Space and Minimum Landscape Area requirements Under Current Code. The PD Zone (chapter 17.68) has changes recommended by the PC and is pending before the City Council. However the CC has not taken action yet on the proposed changes. Under the present version of the PD – Commercial section there is a requirement for 30% minimum open space, and 25% minimum landscaped area per the "Dimensional Standards" Table at the end of the PD zone chapter. However in the past a parking lot has been considered as open space, and the landscape requirement focused on the 20' front setback area as noted above. The pending changes to the PD chapter eliminates the open space requirement in a non-residential PD and the landscape requirement is the front setback area plus additional landscaping within a parking lot.
5. **Flexibility in a PD zone**. The last paragraph of the PD Zone chapter provides some flexibility to the PC and CC to "approve modifications to the dimensional specifications as they see fit in order to provide harmony within a PD zone and as may be requested by the developer". Items of a life/safety nature may not be modified**. Therefore the PC has some discretion to recommend approval of a Project Plan with modifications to the standards listed and to recommended standards, as in the case of building and parking lot location.**

PC Action: The PC considered the Project Plan in three parts for purposes of making a recommendation to the City Council; those three parts are as follows;

1. **Parking**: The PC recommends approval of a requested parking reduction to 74 spaces based on the projected parking demand and experience relayed by the applicant for other stores in St George and Hurricane. The PC and staff believe that 74 parking stalls is an adequate number to meet their need.
2. **Landscape strip width**: The applicant proposes a landscape strip width of 10' along both street frontages, ie, Pioneer Parkway and Rachel Drive. The code states that the landscape strip width is the "area from the street curb to the setback line (20') " which would result in a 20' wide strip along Pioneer Parkway and 15' wide along Rachel Drive. The PC recommends approval of the proposed 10' wide landscape strip noting that the code allows for discretion by the PC and City Council in approving a Project Plan.
3. **Building location**: The applicant requests approval to locate the building in the southeast corner of his lot, 10' away from the property line adjoining the residential properties. The PC recommends denial of the proposed location, noting that the General Plan and prior precedence with applicants on the three other corners of the intersection is for the building to be located near the front of the lot with parking in the rear and side. Also some of the adjoining lot owners objected to the 25' tall building being located 10' away from their residential properties.

Corey Bundy can provide additional details from the PC discussion about the above issues; and the PC meeting minutes should be available to review the discussion and issues considered. Bob Nicholson was out of town and missed the PC meeting.



PRELIMINARY SITE PLAN
SCALE: 1" = 20'

LEGEND:

- NEW BUILDING
- NEW ASPHALT PAVING
- NEW CONCRETE ON GRADE
- LANDSCAPE AREA
- (11) PARKING SPACES

PROJECT INFORMATION

ZONING – PDC GENERAL PLAN – MSC	
NEW BUILDING HEIGHT: 25'	
OCCUPANCY TYPE: M	
CONSTRUCTION TYPE: V–A	
BUILDING WILL BE FIT W/AUTOMIATIC FIRE SPRINKLER	
BUILDING USE: MERCANTILE	
TOTAL SITE AREA 1.72 ACRES, 74,896 sq. ft.	
MAIN FLOOR BUILDING AREA (FOOTPRINT)	24,780 SQ. FT. 33% OF PARCEL
PARKING/IMPERVIOUS AREA	x SQ. FT. x% OF PARCEL
LANDSCAPE/COMMON AREA	x SQ. FT. x% OF PARCEL
PARKING DATA	SPACES REQUIRED – 94 SPACES PROVIDED – 72
REQUESTING A PARKING VARIANCE BASED ON OWNER'S HISTORICAL PARKING NEEDS AT THEIR OTHER STORES	

NORTH
SCALE 1" = 20'

0 20' 40'
SCALE: 1"=20'

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06/03/2020
DATE:

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JOB NUMBER:

1" = 20'
SCALE:

J.J.M.
DRAWN:

CHECKED:

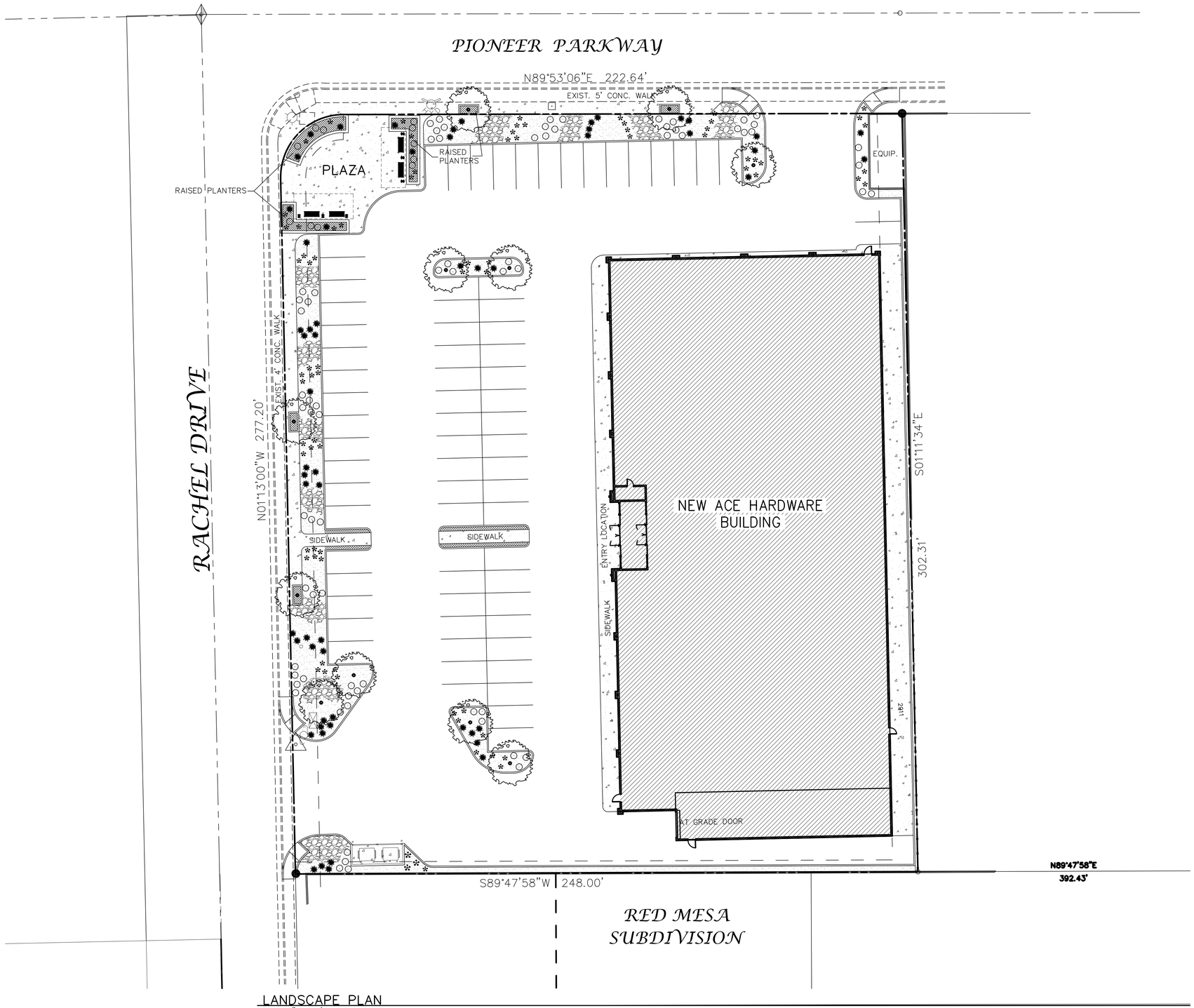
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PRELIMINARY SITE PLAN

BUCK'S ACE HARDWARE
SW CORNER OF RACHEL DR. AND PIONEER PKWY
SANTA CLARA CITY, UTAH

C2.1
OF SHEETS



LANDSCAPE PLAN
SCALE: 1" = 20'

PLANTING NOTES:

1. THE CONTRACTOR SHALL LOCATE AND VERIFY THE EXISTENCE OF ALL UTILITIES PRIOR TO STARTING WORK.
2. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN THE QUANTITIES AND SIZES SUFFICIENT TO COMPLETE THE PLANTING SHOWN ON ALL DRAWINGS.
3. ALL MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE CURRENT AMERICAN STANDARD FOR NURSERY STOCK, PUBLISHED BY THE AMERICAN NURSERY AND LANDSCAPE ASSOCIATION (ANLA).
4. NO PLANT SHALL BE PUT INTO THE GROUND BEFORE ROUGH GRADING HAS BEEN FINISHED AND APPROVED BY PROJECT MANAGER OR LANDSCAPE ARCHITECT.
5. ALL PLANTS SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS THE PLANT'S ORIGINAL GRADE IN ITS CONTAINER.
6. ALL PLANTS SHALL BE BALLED AND WRAPPED OR CONTAINER GROWN AS SPECIFIED. NO CONTAINER GROWN STOCK WILL BE ACCEPTED IF IT IS ROOT BOUND. ALL ROOT WRAPPING MATERIAL MADE OF SYNTHETICS OR PLASTICS SHALL BE REMOVED AT TIME OF PLANTING AND WITH CONTAINER GROWN STOCK, THE CONTAINER SHALL BE REMOVED AND THE CONTAINER BALL SHALL BE CUT THROUGH THE SURFACE IN TWO VERTICAL LOCATIONS.
7. ALL PLANTS SHALL BE INSTALLED AS PER DETAILS AND THE CONTRACT SPECIFICATIONS.
8. ALL PLANTS AND STAKES SHALL BE SET PLUMB UNLESS OTHERWISE SPECIFIED.
9. ALL PLANTS SHALL BE INSTALLED AT LEAST 24" FROM BACK OF CURB OR SIDEWALK EXCEPT FOR SMALLER PLANTS THAT MAY BE INSTALLED AT LEAST 18" FROM BACK OF CURB OR SIDEWALK.
10. THE CONTRACTOR SHALL PROVIDE BACKFILL MIX AS PER THE CONTRACT SPECIFICATIONS.
11. ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24 HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL THEN BE WATERED ON A REGULAR SCHEDULE DURING THE FIRST GROWING SEASON.
12. ALL QUANTITIES SHOWN ON THE DRAWINGS ARE FOR CONVENIENCE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THESE QUANTITIES.
13. THE CONTRACTOR SHALL WARRANTY ALL PLANT MATERIAL FOR ONE-YEAR AFTER INSTALLATION.
14. THE TOP 24" OF BACKFILL MATERIAL SHALL HAVE A MINIMUM OF 20% ORGANIC MATERIAL.
15. FINISH GRADE OF ROCK MULCH WILL BE 1" BELOW TOP OF CURB.

CLEAR SIGHT DISTANCE CORRIDORS:

KEEP OUT ALL OBJECTS THAT MIGHT BLOCK SIGHT DISTANCE CORRIDORS AT INTERSECTIONS AND DRIVEWAYS.

IRRIGATION NOTES:

1. LANDSCAPE/IRRIGATION INSTALLER SHALL HAVE ALL REQUIRED STATE AND LOCAL LICENSES, INSURANCE, AND BONDING REQUIREMENTS.
2. PLANTS WITH SIMILAR WATER NEEDS SHALL BE GROUPED TOGETHER IN "HYDRO ZONES". SPRAY HEADS AND DRIP EMITTERS SHALL NOT BE CONNECTED TO THE SAME IRRIGATION VALVE.
3. RIGHT OF WAY AREAS SHALL BE MAINTAINED WITH PROPERTY.
4. LANDSCAPE/IRRIGATION INSTALLER SHALL INSTALL ALL PLANTS AND IRRIGATION EQUIPMENT TO SUPPLIER AND MANUFACTURER RECOMMENDATIONS.
5. INSTALL SLEEVES AND PIPE IN RETAINING WALLS AND UNDER PAVING PRIOR TO PAVING INSTALLATION. SLEEVE MAINLINES AND LATERALS SEPARATELY WHEN POSSIBLE.

WATER PERFORMANCE AUDIT:
A WATER PERFORMANCE AUDIT SHALL BE CONDUCTED BY A CERTIFIED WATER AUDITOR WITHIN 30 DAYS FOLLOWING THE INSTALLATION OF THE IRRIGATION SYSTEM. A MINIMUM OF 10% OF THE IRRIGATION ZONES SHALL BE AUDITED AT THE DISCRETION OF THE AUDITOR.

TREES AND SHRUBS – USE DRIP SYSTEM, DRIP EMITTER, RAINBIRD TUBE SYSTEM, TREE RING DRIP SYSTEM, OR SIMILAR.

DRIP SYSTEM TO BE DESIGN BY LANDSCAPE CONTRACTOR ONSITE TO VERIFY ADEQUATE FLOW TO EACH PLANT. FLOWS WILL BE ADJUSTED TO THE REQUIREMENTS OF EACH SPECIES.

LANDSCAPE MATERIALS LEGEND

	THORNLESS HONEYLOCUST "SHADE MASTER" Gleditsia triacanthos inermis FOR TREES ALONG STREETS – TRIM AND MAINTAIN MAINTAIN TREE CANOPY TO 8FT ABOVE GROUND TO INSURE SIGHT DISTANCE	24" BOX, SPACING AS PER PLAN
	AREA FOR SEASONAL COLOR/PLANTS PROVIDE FLOWER BED WITH SEASONAL PLANTS SPACED 6" O.C. IN BOTH DIRECTIONS	
	INDIAN HAWTHORN Raphiolepis indica	5 GAL., 4' SPACING
	PENDULAS YUCCA Yucca pendula	5 GAL., 3' SPACING
	BUTTERFLY BUSH Buddleia davidii	5 GAL., 3' SPACING
	LANDSCAPE ROCK 1"–2" Star Nursery Boulder Rose, or equal, 3 INCHES THICK OVER FELT WEED BARRIER	
	LANDSCAPE ROCK – STEEP SLOPE COVER 4"–6" Star Nursery Arizona River Rock, or equal, COMPLETE COVER OVER FELT WEED BARRIER	

NORTH
SCALE 1" = 20'

0 20' 40'
SCALE: 1"=20'

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6-3-20
DATE:

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1" = 20'
SCALE:

J.J.M.
DRAWN:

CHECKED:

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LANDSCAPE PLAN

BUCK'S ACE HARDWARE
SW CORNER OF RACHEL DR. AND PIONEER PKWY
SANTA CLARA CITY, UTAH

L2.1
OF SHEETS

EXTERIOR ELEVATIONS GENERAL NOTES

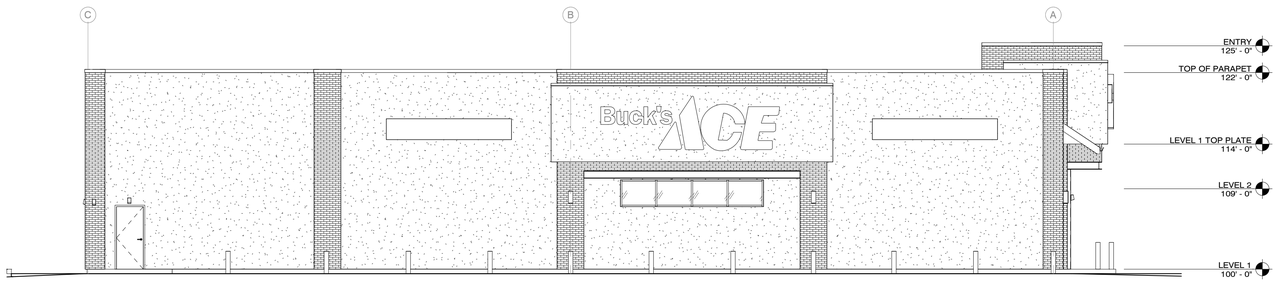
A. EXTERIOR MATERIALS AND COLORS APPROVAL:
THE CONTRACTOR SHALL PROCURE SAMPLES AND/OR A MOCKUP OF ALL EXTERIOR COLORS AND FINISHES AND RECEIVE OWNER APPROVAL OF THESE COLORS AND FINISHES PRIOR TO ORDERING MATERIALS FOR CONSTRUCTION.

B. CONTROL JOINTS IN EXTERIOR MATERIALS SHALL BE PER THE MANUFACTURER'S REQUIREMENTS

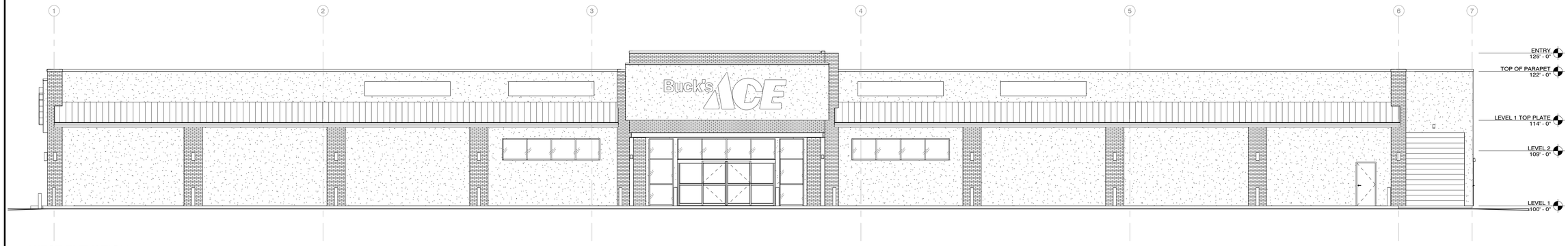
C. CONTINUE FINISH TO INSIDE CORNERS RATHER THAN TRANSITIONING TO A DIFFERENT FINISH AT AN OUTSIDE CORNER.

D. THE BUILDING ENVELOPE SHALL CONTAIN A CONTINUOUS AIR BARRIER THAT IS SEALED IN AN APPROVED MANNER AND EITHER CONSTRUCTED OR TESTED IN AN APPROVED MANNER. AIR BARRIER PENETRATIONS SHALL BE SEALED IN AN APPROVED MANNER.

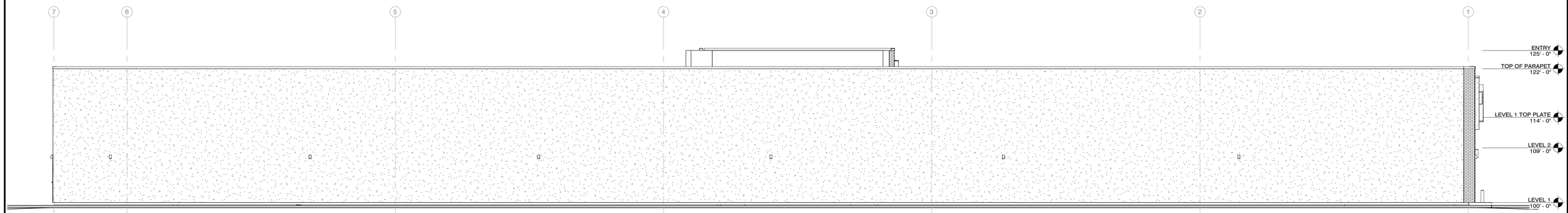
E. PAINT ALL BOLLARDS, HOLLOW METAL DOORS AND FRAMES, TRANSFORMERS, CT CANS, EXPOSED EQUIPMENT PARTS, EXPOSED (UNFINISHED) STEEL AND SHEET METAL ON ROOF, STEEL COLUMNS, DECORATIVE ARCHITECTURAL METALS, HANDRAILS AND GUARDRAILS, ACCESS PANELS, GRILLES & REGISTERS ON EXTERIOR WALLS. COORDINATE OTHER ITEMS WITH CONSTRUCTION DRAWINGS.



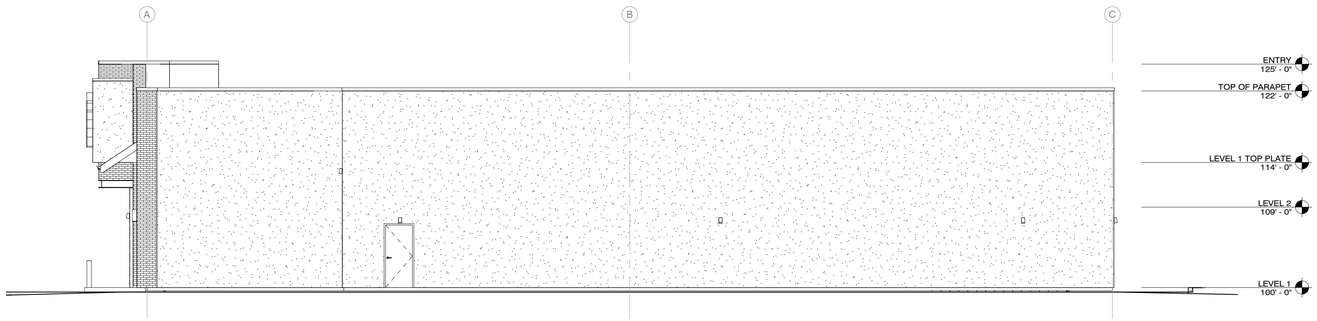
NORTH ELEVATION
1/8" = 1'-0"



WEST ELEVATION
1/8" = 1'-0"



EAST ELEVATION
1/8" = 1'-0"



SOUTH ELEVATION
1/8" = 1'-0"

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06/03/2020
DATE:

20024
JOB NUMBER:

1/8" = 1'-0"
SCALE:

BEH
DRAWN:

JJM
CHECKED:

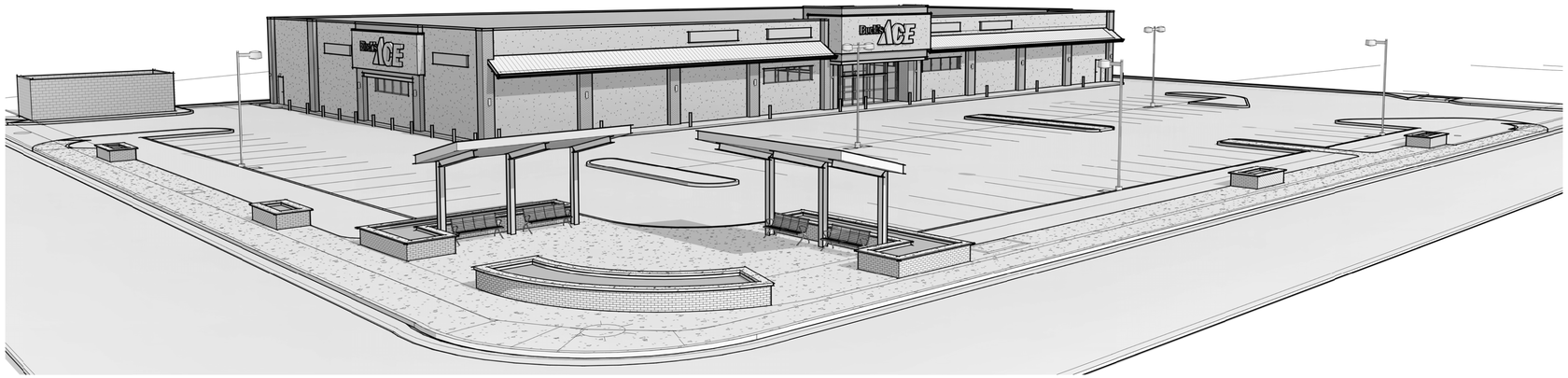
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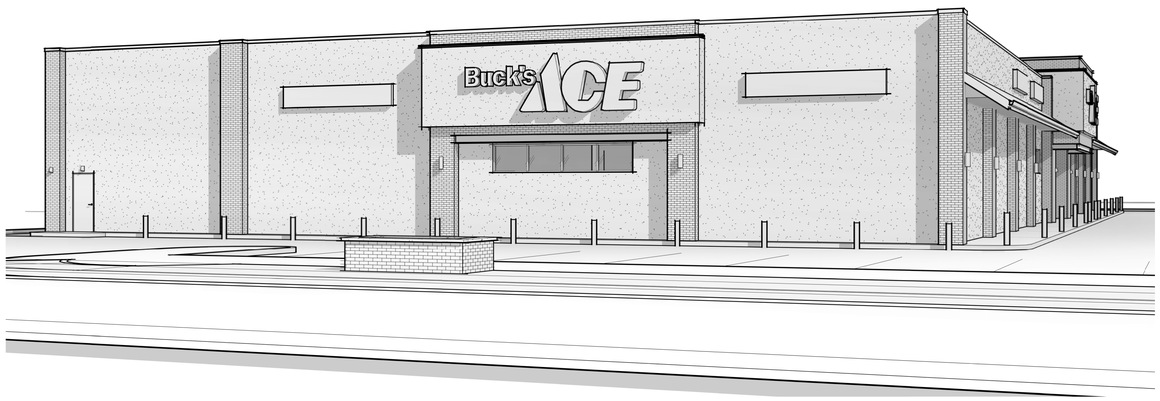
EXTERIOR ELEVATIONS

BUCK'S ACE SANTA CLARA
SW CORNER OF RACHEL DR. & PIONEER PKWY
SANTA CLARA CITY, UT

A4.1
OF SHEETS



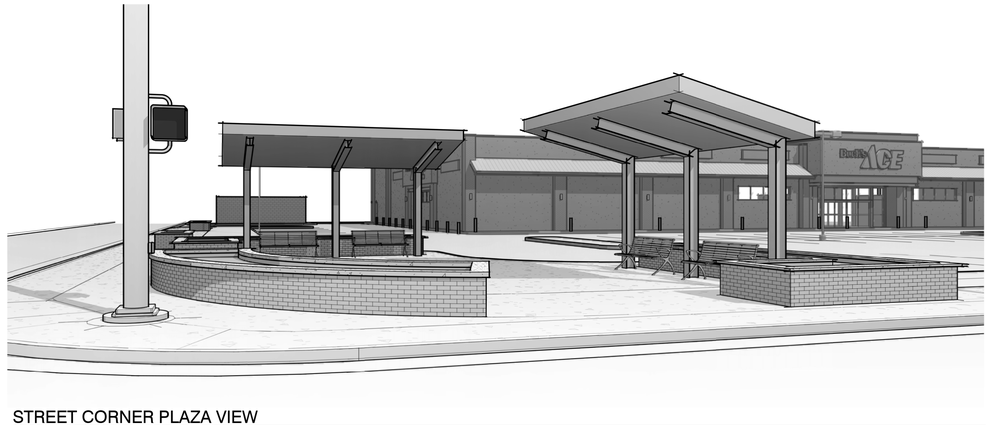
OVERALL 3D VIEW



NORTH SIDE VIEW



FRONT ENTRANCE VIEW



STREET CORNER PLAZA VIEW

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06/03/2020
DATE:

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3D REPRESENTATIONS

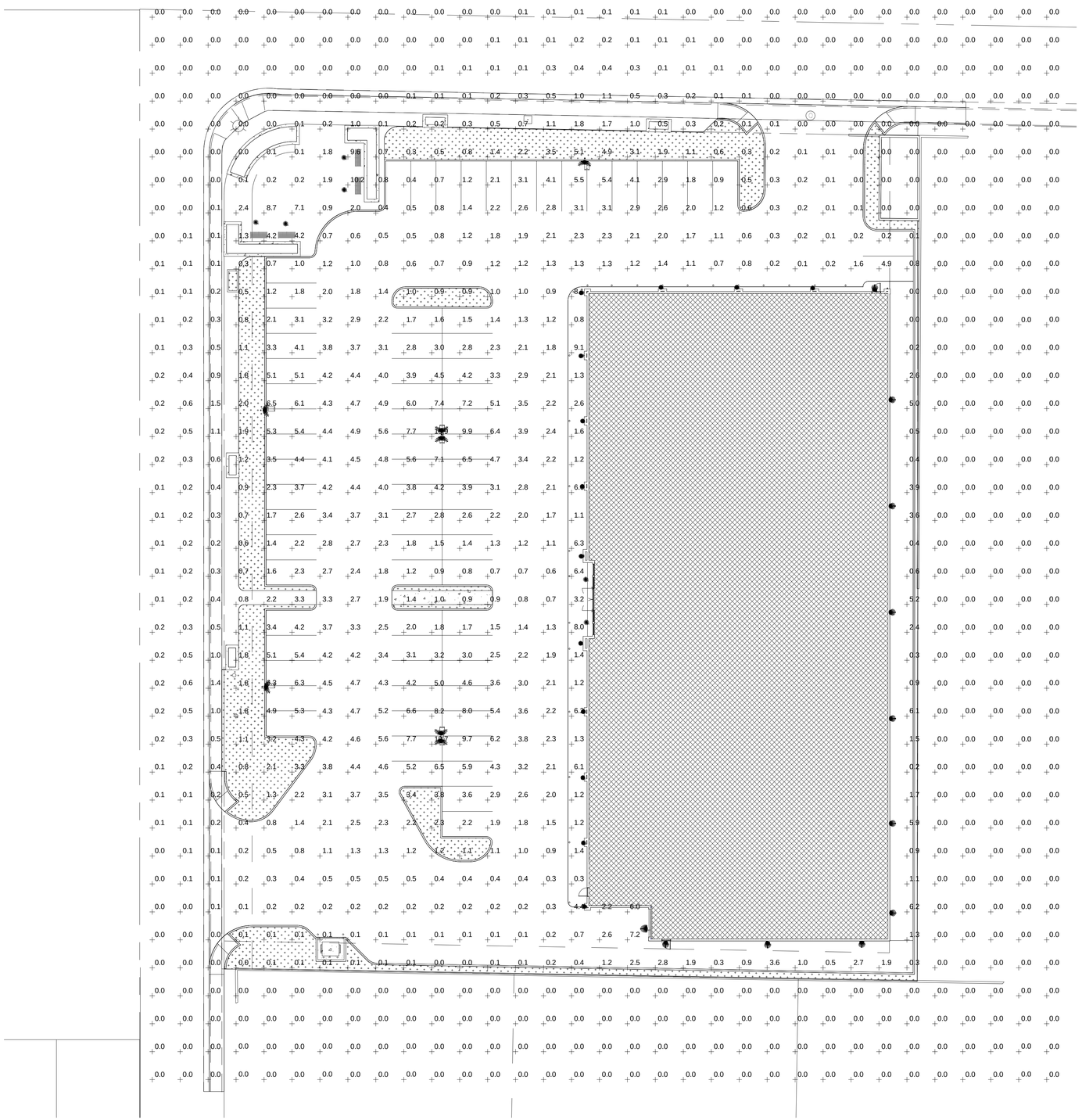
BUCK'S ACE SANTA CLARA
SW CORNER OF RACHEL DR. & PIONEER PKWY
SANTA CLARA CITY, UT

A9.1
OF SHEETS

SITE PHOTOMETRIC GENERAL NOTES

A. SITE PHOTOMETRIC CALUCLATIONS PROVIDED BY "VISUAL LIGHTING" SOFWARE BY ACUITY BRANDS. FOOTCANDLE MEASUREMENTS SHOWN ARE CALCULATED ESTIMATES BASED ON THE SPECIFIED LIGHT FIXTURE AND MOUNTING POSITION/LOCATION. IF LIGHT SPECIFICATIONS OR OTHER CONDITIONS CHANGE THE PHOTOMETRIC CALCULATIONS SHOULD BE RE-EVALUATED.

B. "DARK SKY" TYPE FIXTURES SHALL BE USED.



Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
Calc Zone #1	+	1.2 fc	10.9 fc	0.0 fc	N/A	N/A

Schedule

Symbol	Label	Image	QTY	Manufacturer	Catalog Number	Description	Lamp	Number Lamps	Filename	Lumens per Lamp	Lumen Multiplier	LLF	Wattage	Efficiency	Vertical Iso Dist	Polar Plot	Notes
	P1		3	Lithonia Lighting	RSX1 LED P4 40K R3	RSX Area Fixture Size 1 P4 Lumen Package 4000K CCT Type R3 Distribution		1	RSX1_LED_P4_40K_R3.ies	16359	1	0.9	133.14	100%	TYPE III, SHORT, BUG RATING: B3 - U0 - G3	Max: 117958	
	P2		2	Lithonia Lighting	RSX1 LED P4 40K R3	RSX Area Fixture Size 1 P4 Lumen Package 4000K CCT Type R3 Distribution		1	RSX1_LED_P4_40K_R3.ies	16359	1	0.9	266.28	100%	TYPE III, SHORT, BUG RATING: B3 - U0 - G3	Max: 117958	
	W1		10	Lithonia Lighting	WDGE2 LED P1 40K 80CRI VW	WDGE2 LED WITH P1 PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT WIDE OPTIC		1	WDGE2_LED_P1_40K_80CRI_VW.ies	1289	1	0.9	9.81	100%	TYPE III, VERY SHORT, BUG RATING: B0 - U0 - G0	Max: 8824	
	W2		1	Lithonia Lighting	WDGE2 LED P4 40K 80CRI VF	WDGE2 LED WITH P4 PERFORMANCE PACKAGE, 4000K, 80CRI, VISUAL COMFORT FORWARD OPTIC		1	WDGE2_LED_P4_40K_80CRI_VF.ies	4412	1	0.9	34.96	100%	TYPE III, VERY SHORT, BUG RATING: B0 - U0 - G1	Max: 32910	
	D1		6	Lithonia Lighting	LDN6 40/15 L06AR LO3	6IN LDN, 4000K, 1500LM, CLEAR, SEMI-SPECULAR REFLECTOR, CRI80		1	LDN6_40_15_L06AR_LO3.ies	1516	1	0.9	17.52	100%	DIRECT, SC: 0+1.02, SC: 90+1.03	Max: 8734	
	S2		13	v2 Lighting Group, Inc. www.v2Lighting Group.com		AQUA 405, 60 degree reflector	Xicato XTM 19mm LES, 1000lm, 80CRI	1	AQUA 400 1000lm 60 degree 190513.IES	1000	1	0.9	8.3	87%			

TRUE NORTH

SITE PHOTOMETRIC PLAN
1" = 20'-0"

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06/03/2020
DATE:

20024
JOB NUMBER:

1" = 20'-0"
SCALE:

AL@JRC
DRAWN:

JJM
CHECKED:

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SITE PHOTOMETRIC PLAN

BUCK'S ACE SANTA CLARA
SW CORNER OF RACHEL DR. & PIONEER PKWY
SANTA CLARA CITY, UT

E9.0
OF SHEETS

SANTA CLARA CITY PLANNING COMMISSION
MEETING MINUTES
2603 Santa Clara Drive
Thursday, July 9, 2020

Present: Chair Mark Weston (via Zoom)
Ryan Anderson
James Call (via Zoom)
Shelly Harris
Mark Hendrickson
Marv Wilson
Curtis Whitehead

Staff: Bob Nicholson, City Planner
Devin Snow, City Attorney (via Zoom)
Selena Nez, Planning Commission Secretary

1. Call to Order.

Chair Mark Weston called the meeting to order at 5:30 p.m.

2. Opening Ceremony.

Commissioner Mark Hendrickson led the Pledge of Allegiance and offered the invocation.

3. Communications and Appearances.

A. General Citizen Communication.

There were no citizen comments.

4. Working Agenda:

A. Public Hearings.

1. Public Hearing to Consider a Project Plan which Consists of a Site Plan and Building Elevation Drawings for Buck's Ace Hardware in a Planned Development Commercial Zone on the Southeast Corner of the Intersection of Drive and Pioneer Parkway, Buck Hurst, Applicant.

City Planner, Bob Nicholson presented the staff report. He explained that the ordinance requires the Planning Commission hold a public hearing on the project plan, consisting of the site plan and the building elevation drawings, and make a recommendation to the City Council. He reported that the subject property has been zoned Planned Development Commercial for many years. He summarized the site plan, stating that the 24,780 square-foot building is a single level with a flat roof. It includes both a retail floor area and a storage area. The proposal places the building on the rear corner of the lot. Staff encouraged the applicant to place the store near the front of the lot with the parking on the side and in the rear, similar to the buildings on the other corners, including the

approved Dollar Tree store and the Mountain America Credit Union. The applicant did not want to place the store near the front of the lot; in lieu of that, the plan includes a plaza on the front corner, with shade cover and benches, to be more in keeping with the walkable community sensibility.

Mr. Nicholson stated that based on City Code, 94 parking spaces will be required; however, based on his experience with other hardware stores, the applicant proposes 74 spaces, which staff felt would be adequate. Mr. Nicholson pointed out that Chapter 17.32.050 gives the Planning Commission discretion with non-residential projects to consider all factors (such as experience, type of store, and location) when deciding on parking, and to make a recommendation to the City Council on what is adequate. Mr. Nicholson stated that the delivery dock is located at the south end of the proposed building and the site plan shows a 10-foot wide landscape strip, plus additional sidewalk, along both Rachel Drive and Pioneer Parkway frontage. He noted that the width is generally 10 feet and the adjacent landscape strips are both 10 feet wide.

Mr. Nicholson added that Chapter 17.68.100 Paragraph D.4 of the Code requires the area from curb to front setback line, which is 20 feet from the property line, to be landscaped, but may include the sidewalk within that area. In this case, the applicant measured the setback from the curb instead of the property line, so there is a 10-foot sidewalk and 10 feet of landscaping. Measuring from the property line on Pioneer Parkway, the Code requirement to landscape to the setback line would require a 20-foot width of landscaping. This would result in the project being 10 feet shy on Pioneer Parkway and five feet shy on Rachel Drive. Mr. Nicholson explained, however, that the Code gives the Planning Commission some discretion to approve variations. The Planning Commission can ask the applicant to widen that landscape strip or recommend a modification of that standard to the City Council.

Mr. Nicholson noted that the main issue is that in the current ordinance for the Planned Development Zone, Chapter 17.68.100 Paragraph F, states that a strip commercial building with front parking is generally not acceptable. In another section, the ordinance specifies that parking should be located in the side and rear or underground. Because the ordinance uses the word "should" rather than "shall" it is encouraged but not required, so there is some discretion. Mr. Nicholson noted that the last paragraph of the Planned Development ordinance gives the Planning Commission the ability to recommend modifications to the height and setback standards to the City Council, so there is flexibility there, as well.

The applicant, Buck Hurst reported that he and his family have a long history in Utah, beginning with the Hurst Variety Store. They have received a lot of requests from the community of Santa Clara over the years for this Ace Hardware store and they have worked hard to get permission for this site. His goal is to have the store open in the Fall of 2021. He noted that his Ace Hardware Store in Hurricane has been a Pinnacle store for seven years in a row, which is the highest award for Ace Stores. The store on Mall Drive achieved Pinnacle status in its first full year. He is certain that this Ace store will be a Pinnacle store as well. Although Ace's traditional stores are about 10,000 square feet, this one is planned to be 23,000 square feet. Mr. Hurst stated that it will have a full line hardware department, and five niches including sporting goods, paint, lawn and garden, home and decor, and toys. It will also have a full line of steel power equipment and a beautiful Christmas assortment every year. The hours will be 8:00 a.m. to 9:00 p.m. Monday through Saturday. Mr. Hurst emphasized that one of the things he is most proud of is hiring youth and this store will provide jobs to between 10 to 15 young men and women.

Mr. Hurst stated that all Ace Hardware stores have their parking lot in front of the store so people can see the store and its signs from the street. He commented that it is part of Ace's marketing strategy. He explained that having the parking lot in front will make community events, such as car washes, easier to see from the road. He indicated that nearly everyone drives to Ace stores. Mr. Hurst stated that they want to make this store large because with two acres, there is room for it, and it is in a good location for it. He stressed that he wants to make this store a blessing and a benefit to the community.

Architect Brandon Hall from MRW Design Associates identified himself as the Project Architect (Jeff Mathis is the architect of record). He stressed that the plaza will enhance pedestrian usability and access and is a way to meet the intent of the Code. The ordinance uses language like "should" or "it is encouraged that" the building be located on the street or the corner, but it is not required. Having a larger building on the corner will block the view of pedestrians and they would have to walk all the way around to reach the front door. He noted that Ace stores only have one entrance for security reasons. There would not be any other windows facing the street, so moving the building to the corner would show a big blank wall in all directions. He added that a façade with faux windows might help aesthetically, but customers will still have to walk around the building to enter. He explained that the plaza is walkable and the design plan addresses the needs of both pedestrians and customers with vehicles.

Commissioner Call stated that walkability is a huge issue and walkability adds value to homes, however, it seemed to have been taken somewhat lightly in the design of this building. He remarked that ideas such as orienting buildings to the street, creating open spaces, and placing the parking behind the building seem to have been brushed aside in this plan.

Chair Weston opened the public hearing.

Frank Dolana, who resides at 3561 Robbin Court, stated that 100% of his property line will be affected because his entire backyard will back up against Ace's 25-foot wall. He expressed concern that the warehouse, storing potentially flammable, explosive, or carcinogenic materials such as paint, paint thinners, pre-mixed two-stroke engine fuel, and Round-Up, will be 10 feet from where his children play. He stated that originally, he was glad to hear that a family-owned business such as Ace Hardware would be developed there until he realized how large and close to his backyard it would be. He commented that moving it to the corner and making it smaller, with entrances on more than one side, would be better.

Martin Tidwell, who resides at 3576 Sagebrush Drive, stated that he would love to have Ace in the community but he did not want a 25-foot wall 10 feet from his back wall. He stated that on a quick internet search, he found an Ace store in a walkable neighborhood with the door facing the street, so they do exist. He urged the Planning Commission to be consistent with what was required for the businesses on the other three corners. He noted that if the City does approve this particular location, it could create issues with Dollar Tree wanting to move their store to where they had originally planned it, back toward the residences. Mr. Tidwell also stated that a buffer zone between residences and the building would be needed as well.

Brian Reid, who resides at 3604 Sagebrush Drive, commented that the plan seems claustrophobic because the building takes up 45% of the land. He stated that he will feel like he is boxed in by this massive store. He thought that Ace should be consistent with the other businesses on those corners

and have the storefront on the street, either on Rachel Drive or Pioneer Parkway. He felt that the store will be too large and there is not enough of an open space feel, although he likes the plan for the plaza. He was not in favor of how the trash bins and delivery areas are in the back corner because the store may not be as motivated to keep it tidy as they would if it were out in the open.

Planning Commission Secretary, Selena Nez read five public comments that were submitted online.

Elaine Lloyd, who resides at 3598 Sagebrush Lane, was concerned with the height and the location of the building since it is only 10 feet from her backyard. She does not think this building's location should be different than the location of the other buildings, which are on the corner of Pioneer Parkway and Rachel Drive.

Lili Liu, who resides at 3561 Robbin Court, did not feel this should even be considered, and stated that the Planning Commission should represent the people, not their "good old' boy interests." She expressed that the Planning Commission should reject this plan as it is completely out of character with the other three businesses at this intersection.

Laurie Banish Perez, who resides at 3568 Robbin Court, stated that the proposed location of the building shows a blatant disregard for the families who will be directly impacted by its placement and size. She stated that her backyard shares the longest stretch with this lot, and she was concerned about the height of the building since it will be just 30 feet from her back door. She did not think that emergency vehicles could fit through the 10-foot gap between her back wall and Ace's wall. If the building was to sit front-facing and against Rachel Drive, it would reduce the feeling of being trapped by a wall she would not be able to see over or around.

Angela Atkinson, who resides at 3555 Robin Court, expressed frustration that regardless of what happens, residents on Robbin Court, Sagebrush, and Rachel Drive will have their current view compromised. She would like the Commission to limit the building height so that it does not tower over her and her neighbors' homes. She also expressed that making allowances for Ace, in disregard of what has been required for Dollar Tree and other stores, would bring contention. She stated that Ace should be required to face Pioneer Parkway. She believes Ace will contribute to the area and the economy but wants the applicants to recognize that she hopes to preserve the peace and beauty in her neighborhood to the extent possible.

Tina Gubler, who resides at 3478 Sagebrush Drive, stated that the proposed store should be placed along Pioneer Parkway and not back up to homes along Sagebrush. She stated that she and her neighbors will stare up at the building from their lower elevation lots. She expressed her desire for uniformity with the other three corner properties. She expressed appreciation for the time and effort the Planning Commission Members put forth to make Santa Clara a better place.

Commissioner Hendrickson stated that this is the Planning Commission and not the City Council and he and his fellow Planning Commission Members are volunteers. He stated that accusations of being a "good old' boy network" and collusion are no factual and not appreciated. He has lived in Santa Clara for 29 years and he sets any relationships with applicants aside during Planning Commission Meetings. Commissioner Hendrickson also stated that the building is totally within the ordinance requirements and 10 feet is an acceptable tolerance for emergency vehicles, according to the ordinances.

Commissioner Hendrickson and other Commission Members agreed that this Ace store will benefit the community but there needs to be consistency with the other businesses at this intersection. Commissioner Harris agreed and stated that this store might be too large for this property and may need to be re-designed.

Commissioner Anderson stated that if the store was moved to the front with an entrance off the street and another entrance off the parking lot, it could be a new model for how other Ace stores are built.

Chair Weston stated that the store should be placed on the outside corner since there will be pushback from the community as well as Dollar Tree and other businesses if the current plan is approved. He added that designed properly, which MRW is capable of doing, this Ace could be an incredible store.

Commissioner Call encouraged the Architects to look at EnvisionUtah.org, which discusses walkability and its importance to Utah. He stated that the neighbors knew that commercial development would eventually go in there but it is also important for the Commission to do its part and require the applicants to follow the same rules as everyone else. Commissioner Whitehead agreed with the majority of the comments and stated that it would be difficult to make an exception for Ace on this corner when the same has not been done for other businesses.

Mr. Nicholson noted that the structure height of 25 feet complies with the ordinance, which specifies a maximum of 35 feet.

Mr. Hurst stated that this pushback was unexpected and explained that the commercial lot was purchased for a store of this size. He desired to take the neighbors' concerns into account. He did not want anyone to be hurt by the store. He noted that there has never been an issue with anything stored in their warehouses. He still felt that the current design would be better than what is being suggested, but he was willing to reexamine the plan. He did, however, express concerns about whether a store could be designed to meet the concerns and still be financially feasible. Nevertheless, he would see if a new design could be created and presented to Ace. He would continue to work with Mr. Nicholson and try to work something out.

Commissioner Hendrickson reiterated that he likes the building and the design. The problem is that it needs to be consistent with the other businesses.

Buck Hurst's son, Jacob Hurst, stated that he would be working at this store and explained that theft is a daily occurrence at Ace's stores. He stated that having multiple entrances will be a security risk.

There were no further public comments. The public hearing was closed.

Bob Nicholson commended the City of Santa Clara for coming up with the vision for a Neighborhood Commercial zone that people can walk to.

City Council Member Denny Drake commented that each plan must be examined individually. He expressed support for tabling the decision on the plan so that it can be examined and possibly

DRAFT

adjusted. He added that the City of Santa Clara needs commercial development for the sales tax revenue. Without it, property taxes will rise.

B. General Business.

1. Recommendation to the City Council to Consider Approval of a Project Plan which Consists of a Site Plan and Building Elevation Drawings for Buck's Ace Hardware in a Planned Development Commercial Zone located on the Southeast Corner of the Intersection of Rachel Drive and Pioneer Parkway, Buck Hurst, Applicant.

Commissioner Hendrickson moved to table the recommendation until the next Planning Commission Meeting on August 13, 2020, to give the applicant time to work with his staff and Architect to consider other options. Commissioner Call seconded the motion. The motion passed with the unanimous consent of the Commission.

2. Consider a Conditional Use Permit Request for an Accessory Dwelling Unit Over a Detached Garage at 2765 Vineyard Drive, also Request for Additional Height for the Detached Garage and Additional Size for the Accessory Dwelling Unit. Chad and Anne Gates, Applicants.

Mr. Nicholson reported that the applicant is requesting a Conditional Use Permit for an Accessory Dwelling Unit over his detached garage, which will be 1,000 square feet in size and an additional height of 28 feet 7 inches. The applicants' desire for the additional height is to match the roof pitch of their home. He added that if there were no objections, staff would recommend approval.

The applicant, Chad Gates stated that the Code specifies 20 feet to the midpoint of the roof, and he needs 22 feet and 10 inches. He stated that only 2 ½ additional feet would be needed to match the front of his home and make it look uniform. He stated that his property is over .75-acre.

Mr. Nicholson clarified that Santa Clara Code measures to the roof peak and Accessory Dwelling Units should be 20 feet high, according to the Code, unless a Conditional Use Permit is granted for it to be higher. He noted, however, that having an Accessory Dwelling Unit over a detached garage almost guarantees that it will exceed 20 feet.

Commissioner Wilson expressed support for the plan and for having the Accessory Dwelling Unit match the applicant's home.

Commissioner Anderson moved to consider a Conditional Use Permit as identified for the applicants, Chad and Anne Gates. Commissioner Hendrickson seconded the motion. The motion passed with the unanimous consent of the Commission.

3. Appoint a New Vice Chairman.

Commissioner Hendrickson moved to appoint Commissioner Wilson as the New Vice Chair of the Planning Commission. Commissioner Curtis Whitehead seconded the motion. The motion passed with the unanimous consent of the Commission.

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4. Consider a Conditional Use Permit for Jim's RV Site Plan Amendment to Request Straight Wire on Fence at 2397 Santa Clara Drive. Doug Rogers, Representing.

Mr. Nicholson reported that the request is technically not under a Conditional Use Permit, as it is under the section of the ordinance that states that unique fence applications come to the Planning Commission for approval. The ordinance, in Section 17.28, generally limits fence height in the City to six feet maximum, unless an unusual circumstance exists, such as enclosing tennis courts and other situations. Mr. Nicholson stated that the chain length fence for Jim's RV is intended to provide security for the RVs in storage while they are awaiting repair or to be picked up. The request is to add one to three strands of smooth wire on top of the existing chain link fence for security purposes.

Mr. Nicholson stated that the issue before the Commission is the aesthetic impact of adding additional strands of wire on top of the existing fence. City Attorney, Devin Snow added that the Commission should consider whether this kind of fence, at that height, should be allowed.

Commissioner Wilson clarified that the fence is currently six feet tall and this plan would add three wires above it.

Representative Doug Rogers stated that the insurance company requires a six-foot security fence around the building with barbed wire being preferred and smooth wire being acceptable. He explained that without adding three smooth wires to the top of the fence, the insurance costs will increase by 30% because the shop would be considered "high risk." He pointed out that RVs and motor homes are valuable and need to be protected.

Mr. Snow shared a voicemail left at his office from one of the neighbors, Roy Phillips. Mr. Phillips stated that he and his neighbors are not in favor of putting wire on top of the fence because it would make the neighborhood look like a prison. He expressed his hope that the City would not consider this request.

Mr. Rogers stated that the yard directly to the west has a barbed wire fence on the street side, even though it is in a Residential Zone. Mr. Nicholson pointed out that was originally a cattle fence, and the ordinance allows barbed wire in an Agricultural Zone.

A question was raised as to whether the applicant could use security cameras instead. Mr. Rogers explained that the wire would be a deterrent to prevent people from climbing over the fence. Security cameras could film people climbing over but it would not physically prevent them from entering the space.

Chair Weston suggested that other insurance agents be contacted because another agent might say something different or suggest other options.

Mr. Snow clarified that issue before the Commission is whether the addition of the wire to the top of the fence would impair the intent and purpose of Santa Clara's Land Use Code and whether it would be in harmony with what the City is trying to accomplish with the General Land Use Code.

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The comment was made that the need for security is understandable, but even if just one wire is added it would still have the same unpleasant appearance. It would also set a precedent that would make it difficult not to approve similar fences in the future.

Commissioner Wilson pointed out that the fence would be industrial and, therefore, match the building, which has an industrial feel.

The comment was made that this area being on the border between a residential and a commercial community makes it a difficult issue. The fence would not look bad from the main road, but it would not look very attractive from the rear.

Commissioner Call pointed out that it would not be possible to build a fence tall enough that no one could ever get over it.

Commissioner Wilson stated that since there does not seem to be a lot of support among the Commission to recommend approval, perhaps Mr. Rogers could come back next month after checking with the insurance company about other options.

Mr. Rogers expressed concern that they only have a Temporary Certificate of Occupancy, which depends on them getting an answer about the fence tonight.

Commissioner Harris asked if the temporary Certificate of Occupancy issued to Mr. Rogers by Community Development Director, Corey Bundy has an expiration date. Mr. Nicholson did not think so because he spoke to Mr. Bundy about this and he never mentioned anything about shutting down the business if a decision is not made at this meeting. Mr. Nicholson assured Mr. Rogers that waiting until the next Planning Commission Meeting will not create any more problems for him and they would not be shut down for not placing the wire on top of the fence now. He suggested to Mr. Rogers that he check with the insurance company as to whether installing security cameras tied to a motion detector or an alarm would provide acceptable security.

Commissioner Call pointed out that the wire on the fence was not part of the original plan, so the burden is on the applicant to convince the Commission that it would be necessary or beneficial to the City. Commissioner Call added that the wire would be of benefit to the landowner in terms of insurance costs, but he did not see the benefit for the City and the Commission would feel obligated to allow it in commercial zones in the future.

Chair Weston moved to deny the request for the straight wire fence extension at 2397 Santa Clara Drive. Commissioner Call seconded the motion. Vote on motion: Ryan Anderson-Aye, James Call-Aye, Shelly Harris-Aye, Mark Hendrickson-Aye, Marv Wilson-Nay, Curtis Whitehead-Aye, Chair Mark Weston-Aye. The motion passed 6-to-1.

5. Discussion Items

There were no discussion items.

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6. Approval of Minutes

A. Request Approval of June 11, 2020, Regular Meeting Minutes.

Commissioner Hendrickson moved to approve the minutes of June 11, 2020. Commissioner Whitehead seconded the motion. The motion passed with the unanimous consent of the Commission.

7. Adjournment.

The Planning Commission Meeting adjourned at 8:07 p.m.

_____
Corey Bundy
Community Development Director

Approved: _____

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REQUEST FOR COUNCIL ACTION AGENDA ITEM 6

August 26, 2020

APPLICANT: Jared Bates/Lance Rigby

SUBJECT:

Request approval of amended Final Plat for Ocotillo Springs Phase 1. The proposed amendment is to reduce the number of units in Building 2 to five units, instead of six.

BACKGROUND DESCRIPTION:

The plat shows 2 buildings in the phase 1 area. Building #2 has 6 units all with attached 2-car garages. The proposed amendment is to reduce the number of units in Building 2 to five units, instead of six. The rest of the plat remains basically the same with only minor changes to the building footprint. All setbacks and other code requirements are met. Even though this is a reduction of one unit to the recorded plat, it requires all current owners within the Phase 1 plat area to provide written consents to the plat change, or a public hearing is required. Staff has received a list of owner with their consent.

Proposed Recommendation

: The proposed AMENDED Final plat is a very minor change from the approved and recorded plat, Staff recommends approval of the AMENDED final plat for phase 1, The PC recommends approval of the amended Final Plat for Ocotillo

Cost

: The proposed AMENDED Final plat is a very minor change from the approved and recorded plat, Staff recommends approval of the AMENDED final plat for phase 1, The PC recommends approval of the amended Final Plat for Ocotillo

Approved by Legal Department

Yes

Approved in Budget

N/A

Approved by City Finance Department

N/A

Amount

N/A

Requested By

Corey Bundy

File Upload Attachments

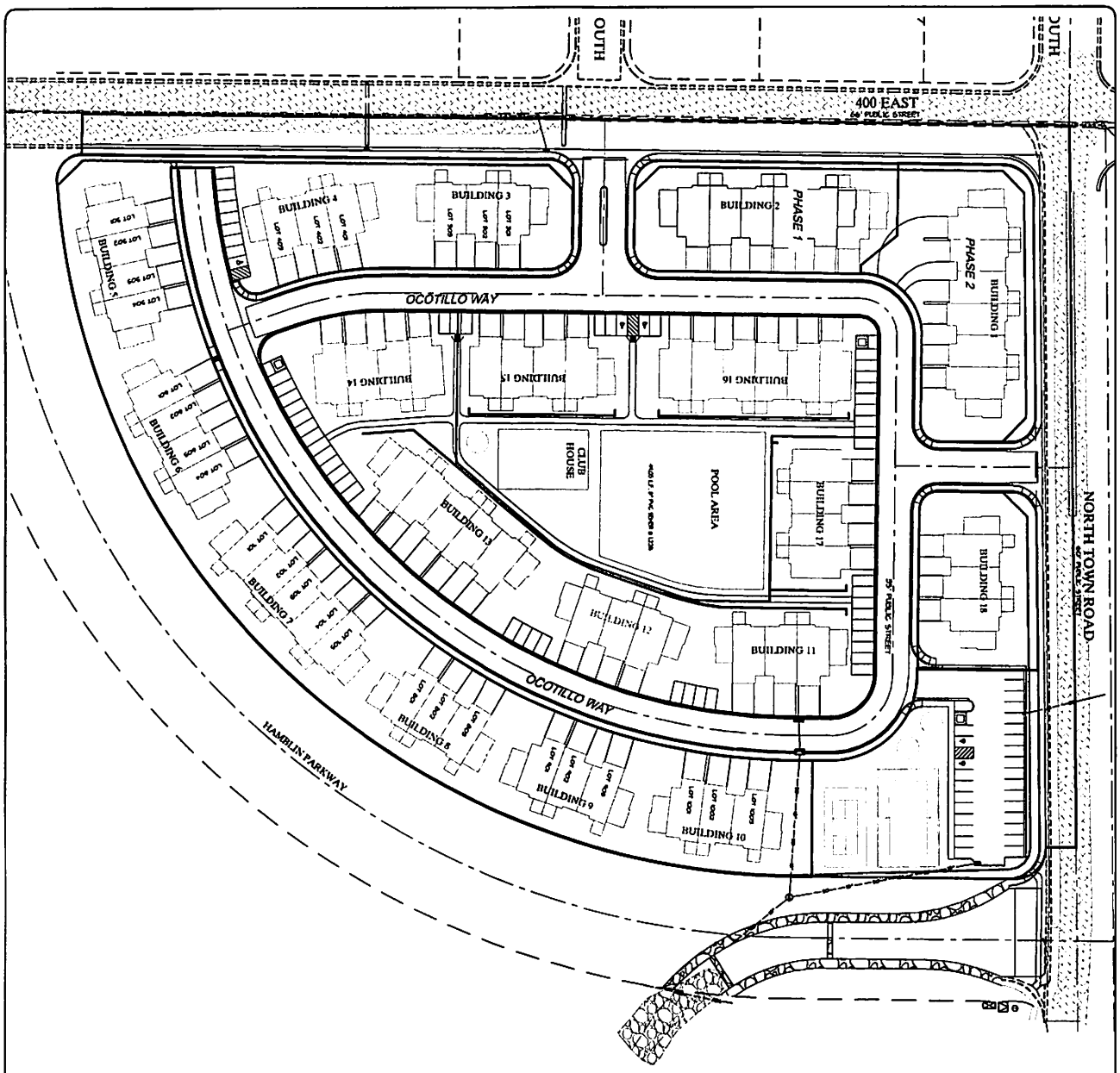
https://sccity.org/wp-content/uploads/formidable/41/CC-agenda-rpt-8-26-20-Ocotillo-Springs-AMENDED-Final-Plat-ph-122250.pdf

City Council agenda report for 8/26/20: AMENDED Final Plat for Ocotillo Springs phase 1 located south of North Town Road and east of 400 East Street.

Zone: PD Residential
General Plan designation: Medium Density Residential (MDR)
Applicant: Scott Group LLC, Lance Rigby, representative.
Project Engineer: Jared Bates, PE with Rosenberg Associates.
Project location: Project borders 400 East Street and North Town Road, and also adjacent to the proposed Hamblin Parkway. Tuscany at Cliffrose is located to the south, and Paradise Village at Zion to the east, along with the Jehovah Witness's Kingdom Hall.

Proposed AMENDED Final Plat: The plat shows 2 buildings in the phase 1 area. Building #2 has 6 units all with attached 2-car garages. The proposed amendment is to reduce the number of units in Building 2 to five units, instead of six. The rest of the plat remains basically the same with only minor changes to the building footprint. All setbacks and other code requirements are met. Even though this is a reduction of one unit to the recorded plat, it requires all current owners within the Phase 1 plat area to provide written consents to the plat change, or a public hearing is required. At this point staff is not certain whether all the consents have been obtained or not. If all written consents have not been obtained, either the PC or CC could hold the required Public Hearing on the plat amendment.

Staff recommendation: The proposed AMENDED Final plat is a very minor change from the approved and recorded plat, reducing the number of units by one (6 units to 5 units in building #2). Staff recommends approval of the AMENDED final plat for phase 1, and if all written consents to the change have not been obtained then a public hearing at the CC meeting will be necessary.
PC Action: The PC recommends approval of the amended Final Plat for Ocotillo Springs phase 1 as presented.



811
Know what's below.
Call before you dig.

REVISED BUILDING LAYOUT
FOR
OCOTILLO SPRINGS TOWNHOMES
SANTA CLARA
UTAH

SHEET 1 OF 2 SHEETS

ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS

REVISIONS | DATE

CITY OF
SANTA CLARA
FOUNDED 1854

Residential Subdivision Final Plat Application Amended

Santa Clara City
2603 Santa Clara Dr
Santa Clara, UT 84765
(435) 656-4690 FAX: (435) 879-5298

Subdivision Name: Ocotillo Springs Phase 1 - Amended

Applicant(s)/Property Owner(s) Information

Name: Lance Rigby
Address: 2351 Leda Lane
City: Santa Clara State: UT Zip: 84765
Phone Number: (435) 229-2324

Name: _____
Address: _____
City: _____ State: _____ Zip: _____
Phone Number: _____

(If additional property owners please add addendum)

Property Description

Section(s): 8 Township(s): 42 South Range: 16 West
Current Zoning Designation: PDR Residential - STR
Parcel Size (acres): 4.93 Acres
Number of Lots: 14
Major Cross Street(s): Northtown Rd., 400 East

Approvals Required By:

- ☐ Technical Review Committee (Staff) - meets every Thursday at 8:00 a.m.
- ☐ Planning Commission - meets every second Thursday of each month at 5:30 p.m.
- ☐ City Council - meets the second and fourth Wednesdays of each month at 5:00 p.m.

Attached checklists serve as a guide for adhering to Santa Clara City's subdivision process/requirements. City Staff will use the checklists for completeness reviews and insuring code compliance for subdivisions. ***For comprehensive information on the subdivision requirements/process, refer to appropriate City Codes and Statutes.***

Office Use Only:

Date plan submitted: _____ Date plan accepted: _____

REQUEST FOR COUNCIL ACTION

AGENDA ITEM 7

August 26, 2020

APPLICANT: Corey Bundy

SUBJECT:

Request approval of a single lot final plat for Sycamores lot 7

BACKGROUND DESCRIPTION:

The proposed one lot is approximately 33,000 sq ft in area with the back half within a Flood Control Easement (lots backs to the Santa Clara River). This lot was lot #7 in the approved preliminary plat, and also was within the phase 2B Final Plat. The applicant will need to amend the Phase 2 Final Plat. Necessary utilities and street improvements, except sidewalk, have been extended along the frontage of the proposed 1-lot.

Proposed Recommendation

: The proposed 1-lot Final plat should be ready for approval with a bond posted for the sidewalk completion.

Cost

: The proposed 1-lot Final plat should be ready for approval with a bond posted for the sidewalk completion.

Approved by Legal Department

Yes

Approved in Budget

Yes

Approved by City Finance Department

Yes

Amount

N/A

Requested By

Corey Bundy

File Upload Attachments

https://sccity.org/wp-content/uploads/formidable/41/CC-agenda-rpt-8-26-20-Sycamores-1-lot-Final-Plat-ph-1C22252.pdf, https://sccity.org/wp-content/uploads/formidable/41/The-Syacamores-Phase-1C-Sketch-for-PC.pdf

City Council agenda report for 8/26/20: Final Plat for 1-lot in Sycamores subdivision, phase 1C, located east of Gates Lane and on the south side of the Santa Clara River.

Zone: R-1-10
Applicant: Kyle Hafen, representative.
Project Engineer: Jared Bates, PE, Rosenberg Associates
Project location: This 1-lot final plat for Phase 1C is the same as lot 7 in the preliminary plat

Proposed 1-lot Final Plat: The proposed one lot is approximately 33,000 sq ft in area with the back half within a Flood Control Easement (lots backs to the Santa Clara River). This lot was lot #7 in the approved preliminary plat, and also was within the phase 2B Final Plat. The applicant will need to amend the Phase 2 Final Plat. Necessary utilities and street improvements, except sidewalk, have been extended along the frontage of the proposed 1-lot.

Staff recommendation: The proposed 1-lot Final plat should be ready for approval with a bond posted for the sidewalk completion.

PC Action: The PC recommends approval of the proposed 1-lot final plat for Sycamores phase 1C.

1/4 COR. SECTIONS 16-17 T.42S., R.16W., S.L.B.&M.
FOUND REBAR 0.9' S. & 0.9' E. OF
CALCULATED HISTORICAL POSITION
RESET WITH 3" POST AND BRASS CAP PER NAD83
BEARING/BEARING INTERSECTION
& VERIFIED WITH RECORD 461.40' TIE TO
CENTERLINE OF SANTA CLARA DRIVE

BASIS OF BEARING

N89°35'38"W 5329.54' (MEASURED)
N89°35'38"W 5328.97' (RECORD WASHINGTON COUNTY HORIZONTAL CONTROL NETWORK
STATE PLANE GRID N.A.D.83 - 1994, UTAH SOUTH ZONE 4303)

1/4 COR. SECTIONS 15-16
T.42S., R.16W., S.L.B.&M.
BRASS CAP IN MONUMENT WELL
ON SANTA CLARA PARKWAY

S0°33'01"W 1326.06' (MEAS. THE 1/4 COR. TO 1/16 COR.)
S0°32'49"W 2653.95' (MEAS. 1/4 COR. TO S.W. COR.)
S0°32'49"W 2651.80' (RECORD NAD83 HCCN. GRID)

SCALE: 1" = 1'-60'

Line Table		
Line #	Length	Direction
L1	24.60'	N10°27'43"W
L2	40.97'	N9°10'25"W
L3	56.99'	N53°19'15"E
L4	56.99'	N29°53'16"W

Curve Table			
Curve #	Length	Radius	Delta
C1	67.48'	42.50'	90°58'40"
C2	62.14'	330.00'	10°47'22"
C3	225.40'	170.04'	75°57'01"
C4	136.29'	360.00'	21°41'30"
C5	100.63'	360.00'	16°00'56"
C6	32.08'	20.00'	91°54'37"
C7	67.98'	133.00'	29°17'02"
C8	94.06'	167.00'	32°16'15"
C9	27.87'	20.00'	79°50'34"
C10	46.09'	360.00'	7°20'10"
C11	294.67'	300.00'	56°16'39"
C12	139.60'	230.00'	34°46'38"
C13	23.15'	20.00'	66°18'56"
C14	148.96'	175.00'	48°46'07"

Curve #	Length	Radius	Delta
C15	181.53'	125.00'	83°12'31"
C16	78.33'	175.00'	25°38'41"
C17	81.33'	125.00'	37°16'37"
C18	36.09'	20.00'	103°23'56"
C19	77.94'	230.00'	19°24'58"
C20	50.84'	270.00'	10°47'22"
C21	85.80'	70.00'	70°13'38"
C22	56.49'	300.00'	10°47'22"
C23	265.19'	200.00'	75°58'14"
C24	324.13'	330.00'	56°16'39"
C25	163.61'	150.00'	62°29'41"
C26	217.84'	150.00'	83°12'31"
C27	96.69'	150.00'	36°56'03"

CLARA LAND, LLC
INSTRUMENT No. 20150042944
(EXHIBIT A-2, PARCEL 4)
PARCEL No.: SC-79-B-4

LOT 6
PHASE 1C
34,480 SQ. FT.
0.792 ACRES
LOT 8
32,818 SQ. FT.
0.753 ACRES
LOT 9
34,335 SQ. FT.
0.788 ACRES
LOT 10
21,265 SQ. FT.
0.488 ACRES
LOT 11
LOT 20
LOT 21
20,212 SQ. FT.
0.464 ACRES
LOT 22
24,070 SQ. FT.
0.553 ACRES
LOT 23
LOT 24
14,400 SQ. FT.
0.331 ACRES
LOT 25
14,400 SQ. FT.
0.331 ACRES
LOT 26
LOT 27
LOT 28
15,235 SQ. FT.
0.349 ACRES
LOT 29
LOT 30
15,692 SQ. FT.
0.360 ACRES
LOT 31
37,438 SQ. FT.
0.859 ACRES
LOT 32
43,918 SQ. FT.
1.008 ACRES
LOT 33
47,526 SQ. FT.
1.091 ACRES
LOT 34
43,581 SQ. FT.
1.000 ACRES
LOT 35
54,394 SQ. FT.
1.249 ACRES
LOT 36
87,388 SQ. FT.
2.006 ACRES

THE SYCAMORES AT SANTA CLARA PHASE 1A
INSTRUMENT No. 20170007350

GATES LANE AMENDED
(INSTRUMENT No. 20120043720)

FOUND CLASS I MONUMENT AT
INTERSECTION OF CLARY HILLS DRIVE
AND BOOMERS LOOP EAST

CLARY HILLS DRIVE
(60' PUBLIC STREET)

10.00' PUBLIC UTILITY & DRAINAGE EASEMENT

14' PUBLIC UTILITY, SIDEWALK & DRAINAGE EASEMENT (TYP.)

16' PUBLIC UTILITY, SIDEWALK & DRAINAGE EASEMENT (TYP.)

FLOOD CONTROL EASEMENT

EROSION HAZARD BOUNDARY
JE FULLER DRAFT STUDY 2005

100 YEAR FLOODPLAIN
MAP No. 49053C0768G
EFFECTIVE: APRIL 2, 2009

FLOODWAY

1/16 LINE

CLARA LAND LLC
INSTRUMENT No. 20150042944
(EXHIBIT A-1, PARCEL 5)
PARCEL No.: SC-206-A-1

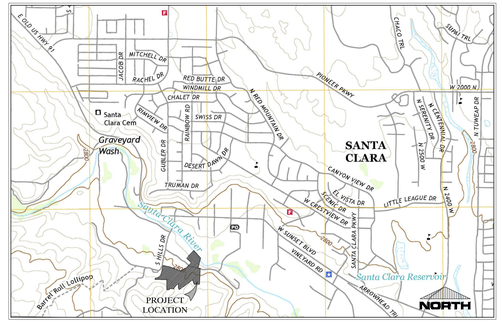
CLARA LAND LLC
INSTRUMENT No. 20150042944
(EXHIBIT A-1, PARCEL 9)
PARCEL No.: SC-6-2-16-330

P.O.B.
1/16 COR. SECTIONS 16-17
T.42S., R.16W., S.L.B.&M.
2006 B.L.M. BRASS CAP

SOUTHWEST COR. SECTION 16
T.42S., R.16W., S.L.B.&M.
1968 B.L.M. BRASS CAP

LEGEND:

- SET CORNER - 5/8" X 20" REBAR & PLASTIC CAP - ROSENBERG ASSOCIATES
- NOTHING SET OR FOUND
- FOUND SECTION MONUMENTATION AS SHOWN AND DESCRIBED
- TO BE SET STANDARD SANTA CITY SURVEY MONUMENT - CLASS I
- TO BE SET STANDARD SANTA CLARA CITY SURVEY MONUMENT - CLASS II ALL MONUMENTS ARE SET ON TANGENT LINES UNLESS OTHERWISE NOTED
- EXISTING STANDARD SANTA CLARA CITY SURVEY MONUMENT - CLASS I
- SET P.K. NAIL IN TOP OF CURB AT APPROXIMATE 0.25' OFFSET TO FRONT PROPERTY CORNER. POSITION IS SET AT AN EXTENSION OF THE LOT LINE UNLESS OTHERWISE NOTED
- ADDITIONAL 4 FOOT EXPANSION OF GATES LANE AMENDED DEDICATED IN CONJUNCTION WITH THIS PLAT
- FLOOD CONTROL EASEMENT



VICINITY MAP - SANTA CLARA, UTAH:
SCALE: 1" = 2000'

THE SYCAMORES AT SANTA CLARA PHASE 1C

LOCATED IN THE SOUTHWEST QUARTER OF SECTION 16 AND THE SOUTHEAST QUARTER OF SECTION 17
TOWNSHIP 42 SOUTH, RANGE 16 WEST, SALT LAKE BASE AND MERIDIAN

SHEET 1 OF 2

ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS
352 East Riverside Drive, Suite A-2,St. George, Utah 84790
Ph (435) 673-8586 Fx (435) 673-8397 - www.RACIVIL.COM

8219-13 FINAL PLAT PH1C FILE NUMBER:	08/12/2020 DATE:	M.R.D. DRAWN:
8219-15-006 JOB NUMBER:	1" = 60' SCALE:	M.R.D. CHECKED:

ENGINEER'S APPROVAL:

The hereon subdivision has been reviewed and is approved in accordance with information on file in this office, this _____ day of _____, 20__.

ENGINEER
SANTA CLARA CITY, UTAH

APPROVAL of the
PLANNING COMMISSION:

On this the _____ day of _____, a.d. 20__ the planning commission of Santa Clara City, having reviewed the above subdivision final plat and having found that it complies with the requirements of Santa Clara City's Planning Ordinances, and by authorization of said commission hereby approve said subdivision for acceptance by Santa Clara City, Utah.

CHAIRMAN OF THE PLANNING COMMISSION
SANTA CLARA CITY, UTAH

CITY SURVEYOR'S CERTIFICATE:

I the Santa Clara City Surveyor, do hereby verify that this office has examined this subdivision plat and have determined that it is correct and in accordance with information on file in this office.

CITY SURVEYOR
SANTA CLARA CITY, UTAH

APPROVAL and ACCEPTANCE
by the CITY OF SANTA CLARA, UTAH:

We the mayor and city council of Santa Clara City, Utah have reviewed the above subdivision final plat and by authorization of said City Council recorded in the minutes of it's meeting of the _____ day of _____, a.d. 20__, hereby accept the said subdivision with all commitments and all obligations pertaining thereto.

CITY RECORDER
SANTA CLARA CITY, UTAH

MAYOR
SANTA CLARA CITY, UTAH

APPROVAL as to FORM:

Approved as to form, this _____ day of _____ A.D. 20__.

CITY ATTORNEY
SANTA CLARA CITY, UTAH

TREASURER APPROVAL:

I, Washington County Treasurer, certify on this ____ day of _____ A.D. 20__ that all taxes, special assessments, and fees due and owing on this subdivision Final Plat have been paid in full.

Washington County Treasurer

RECORDED NO:

FEE:

COUNTY RECORDER
WASHINGTON COUNTY, UTAH

REQUEST FOR COUNCIL ACTION

AGENDA ITEM 8

August 26, 2020

APPLICANT: Santa Clara City Storm Water Department

SUBJECT:

Consider approval of ordinance 2020-11 amending the Santa Clara City Code, Chapter 13.24 Storm Water (Low-Impact Development Standards).

BACKGROUND DESCRIPTION:

Ordinance changes to Santa Clara City Code, Chapter 13.24
Storm Water (Low-Impact Development Standards).

Proposed Recommendation

Recommendation for Approval

Cost

Recommendation for Approval

Approved by Legal Department

Yes

Approved in Budget

Yes

Approved by City Finance Department

Yes

Amount

N/A

Requested By

Jack Taylor

File Upload Attachments

https://sccity.org/wp-content/uploads/formidable/41/santaclaraut-ut-update-8-19-2020.pdf

CHAPTER 13.24
STORMWATER
SECTION:
13.24.010: General Provisions
13.24.020: Definitions
13.24.030: Land Disturbance Permits
13.24.040: Stormwater System Design And Management Standards
13.24.050: Postconstruction
13.24.060: Waivers
13.24.070: Illicit Discharges
13.24.080: Enforcement
13.24.090: Violations And Penalties
13.24.100: Appeals
13.24.110: Fees

13.24.010: GENERAL PROVISIONS:

A. Purpose: The purpose of this chapter is to:

1. Protect, maintain, and enhance the environment of Santa Clara City.

2. Establish responsibilities for controlling and managing stormwater runoff.

3. Protect the public health, safety and the general welfare of the citizens of the city, by controlling discharges of pollutants to the city's stormwater system and to maintain and improve the quality of the receiving waters into which the stormwater outfalls flow, including, without limitation, lakes, rivers, streams, ponds, wetlands, and groundwater of the city.

4. Enable the city to comply with the national pollution discharge elimination system permit (NPDES/UPDES) and applicable regulations, 40 CFR section 122.26 for stormwater discharges.

5. Allow the city to exercise the powers granted by Utah code, which provides that, among other powers municipalities have with respect to stormwater facilities, is the power by ordinance or resolution to:

a. Exercise general regulation over the planning, location, construction, and operation and maintenance of stormwater facilities in the municipality, whether or not owned and operated by the municipality;

b. Adopt any rules and regulations deemed necessary to accomplish the purposes of this chapter, including the adoption of a system of fees for services and permits;

c. Establish standards to regulate the quantity of stormwater discharged and to regulate stormwater contaminants as may be necessary to protect water quality;

d. Review and approve plans and plats for stormwater management in proposed subdivisions or commercial developments;

e. Issue permits for stormwater discharges, or for the construction, alteration, extension, or repair of stormwater facilities;

f. Suspend or revoke permits when it is determined that the permittee has violated any applicable ordinance, resolution, or condition of the permit;

g. Regulate and prohibit discharges into stormwater facilities of sanitary, industrial, or commercial sewage or waters that have otherwise been contaminated; and

h. Expend funds to remediate or mitigate the detrimental effects of contaminated land or other sources of stormwater contamination, whether public or private. The expression of this power does not create an obligation on the part of the city to make any such expenditures.

i. Establish a viable and fair method of financing the construction, operation and maintenance of the stormwater system.

B. Administering Entity: The public services director shall administer the provisions of this chapter. Nothing in this chapter shall relieve any person from responsibility for damage to other persons or property, nor impose upon Santa Clara City, its officers, agents or employees, any liability for damage to other persons or property. (Ord. 2009-06 § 1)

13.24.020: DEFINITIONS:

For the purpose of this chapter, the following definitions shall apply. Words used in the singular shall include the plural, and the plural shall include the singular; words used in the present tense shall include the future tense. The word "shall" is mandatory and not discretionary. The word "may" is permissive. Words not defined in this section shall be construed to have the meaning given by common and ordinary use as defined in the latest edition of "Webster's Dictionary".

AS BUILT PLANS: Drawings depicting conditions as they were actually constructed. Also known as "record drawings".

BEST MANAGEMENT PRACTICES OR BMPs: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water, that have been approved by Santa Clara City and that have been incorporated by reference into this chapter as if fully set out herein. (For purposes of this title, the relevant BMPs are more particularly defined in the Santa Clara City stormwater management program.)

CHANNEL: A natural or artificial watercourse with a definite bed and banks that conducts flowing water continuously or periodically.

CITY STORMWATER SYSTEM: Storm system that receives runoff from public rights of way, natural waterways and systems identified in a city easement.

COMMON PLAN OF DEVELOPMENT OR SALE: One plan for development or sale, separate parts of which are related by any announcement, piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, plat, blueprint, contract, permit application, zoning request, computer design, etc.), physical demarcation (including contracts) that identify the scope of the project. A plan may still be a common plan of development or sale even if it is taking place in separate stages or phases, is planned in combination with other construction activities, or is implemented by different owners or operators.

COMMUNITY WATER: Any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wetlands, wells and other bodies of surface or subsurface

water, natural or artificial, lying within or forming a part of the boundaries of Santa Clara City.

CONTAMINANT: Any physical, chemical, biological, or radiological substance or matter in water.

DESIGN STORM EVENT: A hypothetical storm event, of a given frequency interval and duration, used in the analysis and design of a stormwater facility.

DEVELOPED PARCEL: Any parcel that has construction of improvements and is connected to the city's utility system and receives a monthly utility bill.

DISCHARGE: Dispose, deposit, spill, pour, inject, seep, dump, leak or place by any means, or that which is disposed, deposited, spilled, poured, injected, seeped, dumped, leaked, or placed by any means including any direct or indirect entry of any solid or liquid matter into the municipal separate stormwater system.

EASEMENT: An acquired privilege or right of use or enjoyment that a person, party, firm, corporation, municipality or other legal entity has in the land of another.

EQUIVALENT SERVICE UNIT (ESU): The average amount of impervious surface, expressed in square feet, on developed single-family residential parcels; three thousand five hundred (3,500) square feet of impervious surface.

EROSION: The removal of soil particles by the action of water, wind, ice or other geological agents, whether naturally occurring or acting in conjunction with or promoted by anthropogenic activities or effects (human caused).

EROSION AND SEDIMENT CONTROL PLAN: A written plan (including drawings or other graphic representations) that is designed to minimize the accelerated erosion and sediment runoff at a site during construction activities.

GENERAL CONSTRUCTION STORMWATER PERMIT: Permit required by the Utah department of environmental quality, division of water quality.

HOT SPOT (PRIORITY AREA): An area where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater.

ILLICIT CONNECTIONS: Illegal and/or unauthorized connections to the municipal separate stormwater system whether or not such connections result in discharges into that system.

ILLICIT DISCHARGE: Any discharge to the municipal separate storm sewer system that is not composed entirely of stormwater and not specifically exempted under subsection 13.24.030B of this chapter.

IMPERVIOUS SURFACE: Any hard surface, other than the natural surface, that prevents or retards the absorption of water into the soil, or that causes water to run off the surface in greater quantities or at a greater rate of flow than the natural surface.

IRRIGATION DITCHES: Gravity irrigation ditches used by irrigation shareowners having a right of water passageway by right of way, easement or prescription.

LAND DISTURBANCE PERMIT: Santa Clara City land disturbance permit as adopted by the city. Also known as excavation/grading permit.

LAND DISTURBING ACTIVITY: Any activity on property that results in a change in the existing soil cover (both vegetative and nonvegetative) and/or the existing soil topography.

Land disturbing activities include, but are not limited to, development, redevelopment, demolition, construction, reconstruction, clearing, grading, filling, and excavation.

LOW IMPACT DEVELOPMENT (LID): Refers to engineered systems, either structural or natural, that use or mimic natural processes to promote infiltration, evapotranspiration, and or reuse of storm water as close to its source as possible to protect water quality and aquatic habitat.

MAINTENANCE: Any activity that is necessary to keep a stormwater facility in good working order so as to function as designed. Maintenance shall include complete reconstruction of a stormwater facility if reconstruction is needed in order to restore the facility to its original operational design parameters. Maintenance shall also include the correction of any problem on the site property that may directly impair the functions of the stormwater facility.

MAINTENANCE AGREEMENT: A document recorded in the land records that acts as a property deed restriction, and which provides for long term maintenance of stormwater management practices.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) (MUNICIPAL SEPARATE STORMWATER SYSTEM): The conveyances owned or operated by the municipality for the collection and transportation of stormwater, including the roads and streets and their drainage systems, catch basins, curbs, gutters, ditches, manmade channels, and storm drains.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT OR NPDES PERMIT: The provisions of the federal clean water act for the control of stormwater discharges, also a permit issued pursuant to 33 USC 1342.

NOTICE OF VIOLATION (NOV): Whenever the public services director finds that a person is in noncompliance with this chapter, the public services director will order compliance by written notice of violation to the responsible person. Requirements in this notice are at the discretion of the public services director, and may include monitoring, payment to cover costs relating to the noncompliance, and the implementation of best management practices.

OFF SITE FACILITY: A structural BMP located outside the subject property boundary described in the permit application for land development activity.

ON SITE FACILITY: A structural BMP located within the subject property boundary described in the permit application for land development activity.

PARCEL: A portion into which something is divided, especially a piece of land that was originally part of a larger area, also a parcel of land occupied by one or more buildings, together with parking, open space, yard area and having frontage on a dedicated and improved city street or private street.

PEAK FLOW: The maximum instantaneous rate of flow of water at a particular point resulting from a storm event.

PERSON: Any and all persons, natural or artificial, including any individual, firm or association and any municipal or private corporation organized or existing under the laws of this or any other state or country.

PREEXISTING CONDITIONS: Conditions of property in its native state or changed under approval by the city or changed property that is grandfathered.

PRIORITY AREA: See definition of Hot Spot (Priority Area).

PROPERTY OWNER: Landowner of property within the boundary of Santa Clara City.

PUBLIC SERVICES DIRECTOR: The public services director of Santa Clara City or authorized designee.

RUNOFF: That portion of the precipitation on a drainage area that is discharged from the area into the municipal separate stormwater system. Water produced by storms, surface drainage, snow and ice melt, and other water handled by the storm sewer drainage system.

SEDIMENT: Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

SEDIMENTATION: Soil particles suspended in stormwater that can settle in streambeds and disrupt the natural flow of the stream.

SINGLE-FAMILY RESIDENTIAL PARCEL: A parcel of land occupied or to be occupied by a main building or group of buildings designed to be occupied by one family, together with such yards, open space and having frontage upon a dedicated and improved city street or private street.

SOILS REPORT: A study of soils on a subject property with the primary purpose of characterizing and describing the soils. The soils report shall be prepared by a qualified soils engineer, who shall be directly involved in the soil characterization either by performing the investigation or by directly supervising employees.

STABILIZATION: Providing adequate measures, vegetative and/or structural, that will prevent erosion from occurring.

STORMWATER: Stormwater runoff, snowmelt runoff, surface runoff, street wash waters related to street cleaning or maintenance, infiltration and drainage.

STORMWATER DESIGN STANDARDS AND REGULATIONS: Current Santa Clara City stormwater standards and regulations as adopted by the city.

STORMWATER MANAGEMENT: The programs to maintain quality and quantity of stormwater runoff to predevelopment levels.

STORMWATER MANAGEMENT FACILITIES SYSTEM: The drainage structures, conduits, ditches, combined sewers, sewers, and all device appurtenances by means of which stormwater is collected, transported, pumped, treated or disposed of.

STORMWATER MANAGEMENT PLAN: The set of drawings and other documents that comprise all the information and specifications for the programs, drainage systems, structures, BMPs, concepts and techniques intended to maintain or restore quality and quantity of stormwater runoff to predevelopment levels.

STORMWATER MASTER PLAN: Current "Santa Clara City Storm Water Master Plan" as adopted by the city.

STORMWATER RUNOFF: Flow on the surface of the ground, resulting from precipitation.

STORMWATER UTILITY: The stormwater utility created by ordinance of the city to administer the stormwater management ordinance, and other stormwater rules and regulations adopted by the municipality.

STRUCTURAL BMPs: Devices that are constructed to provide control of stormwater runoff.

SURFACE WATER: Includes waters upon the surface of the earth in bounds created naturally or artificially including, but not limited to, streams, other watercourses, lakes and reservoirs.

UPDES: Utah pollution discharge elimination system.

WATERCOURSE: A permanent or intermittent stream or other body of water, either natural or manmade, which gathers or carries surface water.

WATERSHED: All the land area that contributes runoff to a particular point along a waterway. (Ord. 2010-15: Ord. 2009-06 § 1)

13.24.030: LAND DISTURBANCE PERMITS:

A. When Required: Every person will be required to obtain a land disturbance permit from the public services director in the following cases:

1. Land disturbing activity generally disturbs one or more acres of land;

2. Land disturbing activity of less than one acre of land if such activity is part of a larger common plan of development that affects one or more acres of land;

3. Land disturbing activity of less than one acre of land, if in the discretion of the public services director such activity poses a unique threat to water, or public health or safety;

4. The creation and use of borrow pits;

5. Processing of earthen materials such as topsoil and gravel screening.

B. Exemptions: The following activities are exempt from the permit requirement:

1. Any emergency activity that is immediately necessary for the protection of life, property, or natural resources.

2. Existing nursery and agricultural operations conducted as a permitted main or accessory use.

C. Drainage Channels, Waterways And Sensitive Areas:

1. Property owners shall not alter or restrict natural channels and waterways without proper federal, state and city permits.

2. Modifications of sensitive areas are subject to and governed by the hillside protection overlay zone ordinance (title 17, chapter 17.80 of this code). These actions will require a land disturbance permit and approval from all other governing agencies.

D. Redirect Runoff Outside City Limits: Property owners proposing to redirect runoff, surface and/or pipe flow to properties or facilities outside Santa Clara City boundaries must provide written approval from the state, county or municipality or their agents.

E. Protection Of Canals: Property owners are responsible for the protection of canals per the relevant sections of this chapter.

F. Discharges Or Modifications: Discharges or modifications to the canals require written approval from the canal owners and applicable governing agencies.

G. Building Permit: No building permit shall be issued until the applicant has obtained a land disturbance permit where the same is required by this chapter.

H. Application For A Land Disturbance Permit: Each application shall include the following:

1. Name of applicant;

2. Business or residence address of applicant;

3. Name, address or telephone number of the owner of the property of record;

4. Address and legal description of subject property including the tax reference number and parcel number of the subject property;

5. Name, address and telephone number of the contractor and any subcontractor(s) who shall perform the land disturbing activity and who shall implement the erosion and sediment control plan;

6. A statement indicating the nature, extent and purpose of the land disturbing activity, including the size of the area for which the permit shall be applicable and a schedule for the starting and completion dates of the land disturbing activity.

I. Environmental Permits: The applicant shall obtain from any other state or federal agency any other appropriate environmental permits that pertain to the property. However, the inclusion of those permits in the application shall not foreclose the public services director from imposing additional development requirements and conditions, commensurate with this chapter, on the development of property covered by those permits.

1. Each application shall be accompanied by:

a. A sediment and erosion control plan.

b. A stormwater management plan providing for stormwater management during the land disturbing activity and after the activity has been completed.

2. Each application for a land disturbance permit shall be accompanied by payment of land disturbance permit and other stormwater management fees, as adopted by resolution and found in the city fee schedule.

J. Review And Approval Of Application:

1. The public services director will review each application for a land disturbance permit to determine its conformance with the provisions of this chapter. Within fifteen (15) days after receiving an application, the public services director shall provide one of the following responses in writing:

a. Approval of the permit application;

b. Approval of the permit application, subject to such reasonable conditions as may be necessary to secure substantially the objectives of this chapter, and issue the permit subject to these conditions; or

c. Denial of the permit application, indicating the reason(s) for the denial.

2. If the public services director has granted conditional approval of the permit, the applicant shall submit a revised plan that conforms to the conditions established by the public services director. However, the applicant shall be allowed to proceed with his land disturbing activity so long as it conforms to conditions established by the public services director. No development plans will be released until the land disturbance permit has been approved.

K. Permit Duration: Every land disturbance permit shall expire and become null and void if substantial work authorized by such permit has not commenced within one hundred eighty (180) calendar days of issuance, or is not complete within eighteen (18) months from the date of the commencement of construction or the permit is extended. Permit extensions may be granted by the public services director as per city policy.

L. Notice Of Construction: The applicant must notify the public services director ten (10) working days in advance of the commencement of construction. Regular inspections of the stormwater management system construction shall be conducted by the public services director. All inspections shall be documented and written reports prepared that contain the following information:

1. The date and location of the inspection;
2. Whether construction is in compliance with the approved stormwater management plan;
3. Variations from the approved construction specifications;
4. Any violations that exist.

M. Performance Bonds: The public services director may, at his discretion, require the submittal of a performance security or performance bond prior to issuance of a permit in order to ensure that the stormwater practices are installed by the permit holder as required by the approved stormwater management plan. The amount of the installation performance security or performance bond shall be one hundred twenty percent (120%) of the total estimated construction cost of the structural BMPs approved under the permit plus any reasonably foreseeable additional related costs, e.g., for damages or enforcement. The performance security shall contain forfeiture provisions for failure to complete work specified in the stormwater management plan. The applicant shall provide an itemized construction cost estimate complete with unit prices which shall be subject to acceptance, amendment or rejection by the public services director. Alternatively, the public services director shall have the right to calculate the cost of construction cost estimates. The performance security or performance bond shall be released in full only upon submission of record drawings and a written report sealed by a registered professional engineer licensed to practice in the state of Utah that the structural BMP has been installed in accordance with the approved plan and other applicable provisions of this chapter. The public services director will make a final inspection of the structural BMP to ensure that it is in compliance with the approved plan and the provisions of this chapter. The public services director shall have the discretion to adopt provisions and set policy for a partial pro rata release of the performance security or performance bond on the completion of various stages of development. (Ord. 2010-15: Ord. 2009-06 § 1)

13.24.040: STORMWATER SYSTEM DESIGN AND MANAGEMENT STANDARDS:

A. Irrigation Ditches:

1. Discharges to private ditches require written approval from the ditch owners and design shall comply with the terms of private approvals and the "Santa Clara City Construction Design Standards" and the land disturbance permit.
2. Piping of ditches and modification to the diversion boxes require documented coordination and written approval with ditch owners or representative. Design and coordination requirements shall comply with the "Santa Clara City Construction Design Standards" and the land disturbance permit documents.

B. Stormwater Design And BMP Manuals:

1. Adoption: The municipality adopts as its stormwater design and best management practices (BMPs) manuals the following publications, which are incorporated by reference in this chapter as is fully set out herein:

a. "Santa Clara City Storm Water Management Program And Regulations".

b. "Santa Clara City Storm Water Master Plan".

c. "Santa Clara City Construction Design Standards".

d. "Santa Clara City Construction Design Standards for Low Impact Development".

2. Content And Revision Of Manuals: These manuals include a list of acceptable BMPs and include specific design performance criteria and operation and maintenance requirements for each stormwater practice. The manuals may be updated and expanded from time to time, at the discretion of the governing body of the city, upon the recommendation of the public services director, based on improvements in engineering, science, monitory and local maintenance experience. Stormwater facilities that are designed, constructed and maintained in accordance with these BMP criteria will be presumed to meet the minimum water quality performance standards.

C. General Performance Criteria For Stormwater Management: Unless granted a waiver or judged by the public services director to be exempt, the following postconstruction performance criteria shall be addressed for stormwater management at all sites:

1. Design of storm drain systems in boundaries and discharges into a Santa Clara City storm drain system requires direct supervision of a Utah registered professional engineer, and shall carry the seal of the same supervising professional engineer.

2. All site designs shall control the peak flow rates of stormwater discharge associated with design storms specified in this chapter or other city ordinances and generally reduce the generation of postconstruction stormwater runoff to preconstruction levels.

3. To protect stream channels from degradation, specific channel protection criteria shall be provided as prescribed in the BMP manual.

4. Stormwater discharges to critical areas with sensitive resources (i.e., fisheries, recharge areas, water supply reservoirs) may be subject to additional performance criteria, or may need to utilize or restrict certain stormwater management practices.

5. Stormwater discharges from "hot spots" may require the application of specific structural BMPs and pollution prevention practices.

6. Prior to or during the site design process, applicants for land disturbance permits shall consult with the public services director to determine if they are subject to additional stormwater design requirements.

7. The calculations for determining peak flows as found in the Santa Clara City design standards shall be used for sizing all stormwater facilities.

D. Minimum Control Requirements:

1. Stormwater discharge during all construction activities shall comply with the terms of the land disturbance permit, the Santa Clara City design standards, and the state of Utah UPDES requirements.

2. Stormwater designs shall meet the multistage storm frequency storage requirements as identified in the Santa Clara City design standards unless the public services director has granted the applicant a full or partial waiver for a particular BMP under this section.

3. Runoff rates from one parcel to another may not exceed preexisting conditions or in such a manner that may unreasonably and unnecessarily cause more harm than formerly.

4. If hydrologic or topographic conditions warrant greater control than that provided by the minimum control requirements, the public services director may impose any and all additional requirements deemed necessary to control the volume, timing, and rate of runoff.

E. Stormwater Management Plan Requirements: Property owners are responsible to manage stormwater runoff and sediment whether in conduit systems or on the surface that traverse or originate on their property, unless this responsibility is relinquished through the terms and conditions of an easement. The stormwater management plan shall include sufficient information to allow the public services director to evaluate the environmental characteristics of the project site, the potential impacts of all proposed development of the site, both present and future, on the water resources, and the effectiveness and acceptability of the measures proposed for managing stormwater generated at the project site. To accomplish this goal the stormwater management plan shall include the following:

1. Topographic Base Map: A one inch equals two hundred feet (1" = 200') minimum topographic base map of the site which extends a minimum of five hundred feet (500') beyond the limits of the proposed development and indicates:

a. Existing surface water drainage including streams, ponds, culverts, ditches, sinkholes, wetlands; and the type, size, elevation, etc., of nearest upstream and downstream drainage structures;

b. Current land use including all existing structures, locations of utilities, roads, and easements;

c. All other existing significant natural and artificial features;

d. Proposed land use with tabulation of the percentage of surface area to be adapted to various uses; drainage patterns; locations of utilities, roads and easements; the limits of clearing and grading;

e. Proposed structural BMPs;

f. A written description of the site plan and justification of proposed changes in natural conditions may also be required.

2. Calculations: Hydrologic and hydraulic design calculations for the predevelopment and postdevelopment conditions for the design storms specified in the Santa Clara construction design standards. These calculations must show that the proposed stormwater management measures are capable of controlling runoff from the site in compliance with this chapter and the guidelines of the Santa Clara construction design standards. Such calculations shall include:

a. A description of the design storm frequency, duration, and intensity where applicable;

b. Time of concentration;

c. Soil curve numbers or runoff coefficients including assumed soil moisture conditions;

d. Peak runoff rates and total runoff volumes for each watershed area;

e. Infiltration rates, where applicable;

f. Culvert, stormwater sewer, ditch and/or other stormwater conveyance capacities;

g. Flow velocities;

h. Data on the increase in rate and volume of runoff for the design storms referenced in the Santa Clara construction design standards; and

i. Documentation of sources for all computation methods and field test results.

3. Soils Information: If a stormwater management control measure depends on the hydrologic properties of soils (e.g., infiltration basins), then a soils report shall be submitted. The soils report shall be based on on site boring logs or soil pit profiles and soil survey reports. The number and location of required soil borings or soil pits shall be determined based on what is needed to determine the suitability and distribution of soil types present at the location of the control measure.

4. Maintenance And Repair Plan: The design and planning of all stormwater management facilities shall include detailed maintenance and repair procedures to ensure their continued performance. These plans will identify the parts or components of a stormwater management facility that need to be maintained and the equipment and skills or training necessary. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan. A permanent elevation benchmark shall be identified in the plans to assist in the periodic inspection of the facility.

5. Landscaping Plan: The applicant must present a detailed plan for management of vegetation at the site after construction is finished, including who will be responsible for the maintenance of vegetation at the site and what practices will be employed to ensure that adequate vegetative cover is preserved.

6. Maintenance Easements: The applicant must ensure access to the site for the purpose of inspection and repair by securing all the maintenance easements needed. These easements must be binding on the current property owner and all subsequent owners of the property and must be properly recorded in the land record.

7. Maintenance Agreement: The owner of property to be served by an on site stormwater management facility must execute an inspection and maintenance agreement that shall operate as a deed restriction binding on the current property owner and all subsequent property owners which agreement shall be filed as a covenant to run with the affected land, in the office of the Washington County recorder. The maintenance agreement shall:

a. Assign responsibility for the maintenance and repair of the stormwater facility to the owner of the property upon which the facility is located and be recorded as a deed restriction for the property.

b. Provide for a periodic inspection as required by the Santa Clara City stormwater management program by the property owner for the purpose of documenting maintenance and repair needs and ensure compliance with the purpose and requirements of this chapter. The property owner will arrange for this inspection to be conducted by a registered professional engineer licensed to practice in the state of Utah who will submit a sealed report of the inspection to the public services director. It shall also grant permission to the city to enter the property at reasonable times and to inspect the stormwater facility to ensure that it is being properly maintained.

c. Provide that the minimum maintenance and repair needs include, but are not limited to: the removal of silt, litter and other debris, the cutting of grass, grass cuttings and vegetation removal, and the replacement of landscape vegetation, in detention and retention basins, and inlets and drainage pipes and any other stormwater facilities. It shall also provide that the property owner shall be responsible for additional maintenance and repair needs consistent with the needs and standards outlined in the Santa Clara City stormwater management program.

d. Provide that maintenance needs must be addressed in a timely manner, on a schedule to be determined by the public services director.

e. Provide that if the property is not maintained or repaired within the prescribed schedule, the public services director shall perform the maintenance and repair at its expense, and bill the same to the property owner. The maintenance agreement shall also provide that the public services director's cost of performing the maintenance shall be a lien against the property.

f. The municipality shall have the discretion to accept the dedication of any existing or future stormwater management facility, provided such facility meets the requirements of this chapter, and includes adequate and perpetual access and sufficient areas, by easement or otherwise, for inspection and regular maintenance. Any stormwater facility accepted by the municipality must also meet the municipality's construction standards and any other standards and specifications that apply to the particular stormwater facility in question.

8. Sediment And Erosion Control Plans: The applicant must prepare a sediment and erosion control plan for all construction activities that complies with subsection F of this section.

F. Sediment And Erosion Control Plan Requirements: The sediment and erosion control plan shall accurately describe the potential for soil erosion and sedimentation problems resulting from land disturbing activity and shall explain and illustrate the measures that are to be taken to control these problems. The length and complexity of the plan is to be commensurate with the size of the project, severity of the site condition, and potential for off site damage. The plan shall be sealed by a registered professional engineer licensed in the state of Utah. The plan shall also conform to the requirements found in the Santa Clara City stormwater management program, and shall include at least the following:

1. Brief description of the intended project and proposed land disturbing activity including number of units and structures to be constructed and infrastructure required.

2. A topographic map with contour intervals of two feet (2') or less showing present conditions and proposed contours resulting from land disturbing activity.

3. All existing drainageways, including intermittent and wet weather. Include any designated floodways or floodplains.

4. A general description of existing land cover. Individual trees and shrubs do not need to be identified.

5. Stands of existing trees as they are to be preserved upon project completion, specifying their general location on the property. Differentiation shall be made between existing trees to be preserved, trees to be removed and proposed planted trees. Tree protection measures must be identified, and the diameter of the area involved must also be identified on the plan and shown to scale. Information shall be supplied concerning the

proposed destruction of exceptional and historic trees in setbacks and buffer strips, where they exist. Complete landscape plans may be submitted separately. The plan must include the sequence of implementation for tree protection measures.

6. Approximate limits of proposed clearing, grading and filling.

7. Approximate flows of existing stormwater leaving any portion of the site.

8. A general description of existing soil types and characteristics and any anticipated soil erosion and sedimentation problems resulting from existing characteristics.

9. Location, size and layout of proposed stormwater and sedimentation control improvements.

10. Proposed drainage network.

11. Approximate flows leaving site after construction and incorporating water runoff mitigation measures. The evaluation must include projected effects on property adjoining the site and on existing drainage facilities and systems. The plan must address the adequacy of outfalls from the development: when water is concentrated, what is the capacity of waterways, if any, accepting stormwater off site; and what measures, including infiltration, sheeting into buffers, etc., are going to be used to prevent the scouring of waterways and drainage areas off site, etc.

12. The projected sequence of work represented by the grading, drainage and sedimentation and erosion control plans as related to other major items of construction, beginning with the initiation of excavation and including the construction of any sediment basins or retention facilities or any other structural BMPs.

13. Specific remediation measures to prevent erosion and sedimentation runoff. Plans shall include detailed drawings of all control measures used; stabilization measures including vegetation and nonvegetation measures, both temporary and permanent, will be detailed. Detailed construction notes and a maintenance schedule shall be included for all control measures in the plan.

14. Specific details for the construction of rock pads, wash down pads, and settling basins for controlling erosion; road access points; eliminating or keeping soil, sediment, and debris on streets and public ways at a level acceptable to the public services director. Soil, sediment, and debris brought onto streets and public ways must be removed by the end of the workday by machine, broom or shovel to the satisfaction of the public services director. Failure to remove the sediment, soil or debris shall be deemed a violation of this chapter.

15. Proposed structures; location (to the extent possible) and identification of any proposed additional buildings, structures or development on the site. (Ord. 2009-06 § 1)

13.24.050: POSTCONSTRUCTION:

A. Projects Greater Than Or Equal To One (1) Acre: Newly developed and redeveloped projects that disturb greater than or equal to one (1) acre, including projects less than one (1) acre that are of a larger common plan of development or sale, are required to submit a low impact development (LID) approach to be evaluated by the City of Santa Clara. An LID approach promotes the implementation of BMPs that allow storm water to infiltrate, evapotranspire or harvest and use storm water on

site to reduce runoff from the site and protect water quality. Guidance for implementing LID can be found in State of Utah DWQ's LID controls which are appropriate for use in the State of Utah and can be found in A Guide to Low Impact Development within Utah (the Guide), available on DWQ's website or Green Infrastructure and Low Impact Development Application Guidance for Washington County Utah, available from the City of Santa Clara.

B. Specific Criteria: Newly developed and redeveloped projects must meet the required that best management practices (BMPs) are designed to manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event or a predevelopment hydrologic condition, whichever is less. This objective must be accomplished by the use of practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse rainwater and must be incorporated into the permittee's development plans and long term stormwater management plan which includes the LID approach. If meeting the 80th percentile standard is infeasible an alternative design approach may be used provided that the permittee documents that infiltration, evapotranspiration, and rainwater harvesting have been used to the maximum extent feasible and that full employment of these controls are infeasible due to constraints. For guidance including alternative design approaches see "A Guide to Low Impact Development within Utah" published by the DWQ, and "Green Infrastructure and Low Impact Development Application Guidance for Washington County Utah."

C. Inspections of Storm Water Management Facilities: Owners/operators shall perform necessary maintenance to protect water quality and reduce the discharge of pollutants to the MS4. Owners/operators of newly developed and redeveloped projects shall conduct inspections at least every other year and provide certification that adequate maintenance has been performed and the structural controls are operating as designed to protect water quality. This required inspection shall be conducted by the property owner/operators or qualified third parties. On sites where the property owner/operator is conducting maintenance, the permittee shall allow municipal inspections to conduct inspections at least once every five (5) years, or more frequently as needed to show that adequate maintenance is being performed. The owner shall grant access to the City of Santa Clara to inspect storm water control measures on private properties that discharge to the MS4 to ensure that adequate maintenance is being performed. The findings of each inspection shall be documented in an inspection report, and must contain the following:

- Inspection date;
- Name and signature of inspector;
- Project location;
- Current ownership information;
- A description of the condition of the storm water control measure including the quality of: vegetation and soils; inlet and outlet channels and structures; catch basins; spillways; weirs, and other control structures; and sediment and debris accumulation in storage as well as in and around inlet and outlet structures; and,

• Specific maintenance issues or violations found that need to be corrected by the property owner or operator along with deadlines and re-inspection dates If there is an observed failure of a facility to perform as designed, the failure must be corrected and documented in the inspection report.

D. Record Drawings: All applicants are required to submit actual record drawings for any structures located on site after final construction is completed. The plan must show the final design specifications for all stormwater management facilities and must be sealed by a registered professional engineer licensed to practice in Utah. A final inspection by the public services director is required before any performance security or performance bond will be released. The public services director shall have the discretion to adopt provisions for a partial pro rata release of the performance security or performance bond on the completion of various stages of development. In addition, occupation permits shall not be granted until corrections to all BMPs have been made and accepted by the public services director.

E. Landscaping And Stabilization Requirements: Any area of land from which the natural vegetative cover has been either partially or wholly cleared by development activities shall be revegetated according to a schedule approved by the public services director. The following criteria shall apply to revegetation or stabilization efforts:

1. Reseeding must be done with an annual or perennial cover crop accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until such time as the cover crop is established over ninety percent (90%) of the seeded area or stabilization put in place.

2. Replanting with native woody and herbaceous vegetation must be accompanied by placement of straw mulch or its equivalent of sufficient coverage to control erosion until the plantings are established and are capable of controlling erosion or stabilization put in place.

3. Any area of revegetation must exhibit survival of a minimum of seventy five percent (75%) of the cover crop throughout the year immediately following revegetation. Revegetation must be repeated in successive years until the minimum seventy five percent (75%) survival for one year is achieved.

4. In addition to the above requirements, a landscaping plan must be submitted with the final design describing the vegetative or other stabilization and management techniques to be used at a site after construction is completed. This plan will explain not only how the site will be stabilized after construction, but who will be responsible for the maintenance of vegetation or other stabilization at the site and what practices will be employed to ensure that adequate cover is preserved.

F. Records Of Installation And Maintenance Activities: Parties responsible for the operation and maintenance of a stormwater management facility shall make records of the installation of the stormwater facility, and of all maintenance and repairs to the facility, and shall retain the records for at least three (3) years. These records shall be made available to the public services director during inspection of the facility and at other reasonable times upon request.

G. Failure To Meet Or Maintain Design Or Maintenance Standards: If a responsible party fails or refuses to meet the design or maintenance standards required for stormwater facilities under this chapter, the public services director, after reasonable notice, may correct a violation of the design standards or maintenance needs by performing all necessary work to place the facility in proper working condition. In the event that the stormwater management facility becomes a danger to public safety or public health, the public services director shall notify in writing the party responsible for maintenance of the stormwater management facility. Upon receipt of that notice, the responsible person shall have fifteen (15) days to effect maintenance and repair of the facility in an approved manner. In the event that corrective action is not undertaken within that time, the public services director may take necessary corrective action. The cost of any action by the public services director under this section shall be charged to the responsible party. (Ord. 2009-06 § 1)

13.24.060: WAIVERS:

A. General: Every applicant shall provide for postconstruction stormwater management as required by this chapter, unless a written request is filed to waive this requirement. Requests to waive the stormwater management plan requirements shall be submitted to the public services director for approval.

B. Conditions For Waiver: The minimum requirements for stormwater management may be waived in whole or in part upon written request of the applicant, provided that at least one of the following conditions applies:

1. It can be demonstrated that the proposed development is not likely to impair attainment of the objectives of this chapter.

2. Alternative minimum requirements for on site management of stormwater discharges have been established in a stormwater management plan that has been approved by the public services director.

3. Provisions are made to manage stormwater by an off site facility. The off site facility must be in place and designed to provide the level of stormwater control that is equal to or greater than that which would be afforded by on site practices. Further, the facility must be operated and maintained by an entity that is legally obligated to continue the operation and maintenance of the facility.

C. Downstream Damage: In order to receive a waiver, the applicant must demonstrate to the satisfaction of the public services director that the waiver will not lead to any of the following conditions downstream:

1. Deterioration of existing culverts, bridges, dams, and other structures;
2. Degradation of biological functions or habitat;
3. Accelerated stream bank or streambed erosion or siltation;
4. Increased threat of flood damage to public health, life or property.

D. Land Disturbance Permit: No land disturbance permit shall be issued where a waiver has been requested until the waiver is granted. (Ord. 2009-06 § 1)

13.24.070: ILLICIT DISCHARGES:

A. Scope: This section shall apply to all water generated on developed or undeveloped land entering the municipality's separate storm sewer system.

B. Prohibition Of Illicit Discharges: No person shall introduce or cause to be introduced into the municipal separate storm sewer system any discharge that is not composed entirely of stormwater. The commencement, conduct or continuance of any nonstormwater discharge to the municipal separate storm sewer system is prohibited except as described as follows:

1. Uncontaminated discharges from the following sources:
   a. Water line flushing or other potable water sources,
   b. Landscape irrigation or lawn watering,
   c. Diverted stream flows,
   d. Rising groundwater,
   e. Groundwater infiltration to storm drains,
   f. Uncontaminated pumped groundwater,
   g. Foundation or footing drains,
   h. Crawl space pumps,
   i. Air conditioning condensation,
   j. Springs,
   k. Natural riparian habitat or wetland flows,
   l. Swimming pools (if dechlorinated; typically less than 1 ppm chlorine),
   m. Firefighting activities, and
   n. Any other uncontaminated water source.

2. Discharges specified in writing by the public services director as being necessary to protect public health and safety.

3. Dye testing is an allowable discharge if the public services director has so specified in writing.

4. The prohibition shall not apply to any nonstormwater discharge permitted under a UPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the state of Utah division of water quality, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for any discharge to the storm drain system.

C. Prohibition Of Illicit Connections:

1. The construction, use, maintenance or continued existence of illicit connections to the separate municipal storm sewer system is prohibited.

2. This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices applicable or prevailing at the time of connection.

D. Reduction Of Stormwater Pollutants By The Use Of Best Management Practices: Any person responsible for a property or premises, which is, or may be, the source of an illicit discharge, may be required to implement, at the person's expense, the BMPs necessary to prevent the further discharge of pollutants to the municipal separate storm sewer system. Compliance with all terms and conditions of a valid NPDES permit authorizing the

discharge of stormwater associated with industrial activity, to the extent practicable, shall be deemed in compliance with the provisions of this section.

E. Notification Of Spills: Notwithstanding other requirements of law, as soon as any person responsible for a facility or operation, or responsible for emergency response for a facility or operation has information of any known or suspected release of materials which are resulting in, or may result in, illicit discharges or pollutants discharging into the city stormwater system, the person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release. In the event of such a release of hazardous materials the person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of nonhazardous materials, the person shall notify the public services director in person or by telephone or facsimile no later than the next business day. Notifications in person or by telephone shall be confirmed by written notice addressed and mailed to the public services director within three (3) business days of the telephone notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three (3) years. (Ord. 2009-06 § 1)

13.24.080: ENFORCEMENT:

A. Enforcement Authority: The public services director or his designees shall have the authority to issue notices of violation, stop work orders, and citations, and to impose the civil penalties provided in this section.

1. With the issuance of a land disturbance permit, the public services director shall be permitted to enter and inspect facilities subject to this chapter at all reasonable times and as often as necessary to determine compliance. Failure to comply with the terms of this chapter may result in punitive actions by Santa Clara City ordinance enforcement or by other means identified in permits or terms set forth in development applications.

B. Notification Of Violation:

1. Written Notice: Whenever the public services director finds that any permittee or any other person discharging stormwater has violated or is violating this chapter or a permit or order issued hereunder, the director may serve upon such person written notice of the violation. Within ten (10) days of this notice, an explanation of the violation and a plan for the satisfactory correction and prevention thereof, to include specific required actions, shall be submitted to the public services director. Submission of this plan in no way relieves the discharger of liability for any violations occurring before or after receipt of the notice of violation.

2. Consent Orders: The public services director is empowered to enter into consent orders, assurances of voluntary compliance, or other similar documents establishing an agreement with the person responsible for the noncompliance. Such orders will include specific action to be taken by the person to correct the noncompliance within a time period also specified by the order. Consent orders shall have the same force and effect as administrative orders issued pursuant to subsections B4 and B5 of this section.

3. Show Cause Hearing: The director may order any person who violates this chapter or permit or order issued hereunder, to show cause why a proposed enforcement action should not be taken. Notice shall be served on the person specifying the time and place for the meeting, the proposed enforcement action and the reasons for such action, and a request that the violator show cause why this proposed enforcement action should not be taken. The notice of the meeting shall be served personally or by registered or certified mail (return receipt requested) at least ten (10) days prior to the hearing.

4. Compliance Order: When the director finds that any person has violated or continues to violate this chapter or a permit or order issued hereunder, he may issue an order to the violator directing that, following a specific time period, adequate structures, devices, be installed or procedures implemented and properly operated. Orders may also contain such other requirements as might be reasonably necessary and appropriate to address the noncompliance, including the construction of appropriate structures, installation of devices, self-monitoring, and management practices.

5. Cease And Desist Orders: When the director finds that any person has violated or continues to violate this chapter or any permit or order issued hereunder, the director may issue an order to cease and desist all such violations and direct those persons in noncompliance to:

a. Comply forthwith; or

b. Take such appropriate remedial or preventive action as may be needed to properly address a continuing or threatened violation, including halting operations and terminating the discharge.

C. Conflicting Standards: Whenever there is a conflict between any standard contained in this chapter and in the Santa Clara City stormwater management program adopted by the municipality under this chapter, the strictest standard shall prevail. (Ord. 2009-06 § 1)

13.24.090: VIOLATIONS AND PENALTIES:

A. Violations: Any person who shall commit any act declared unlawful under this chapter, who violates any provision of this chapter, who violates the provisions of any permit issued pursuant to this chapter, or who fails or refuses to comply with any lawful communication or notice to abate or take corrective action by the public services director, shall be guilty of a class B misdemeanor.

B. Penalties: Any person who violates this chapter or any lawful notice or order issued pursuant to this chapter shall be assessed a penalty of not less than fifty dollars ($50.00) and not more than one thousand dollars ($1,000.00) in a civil proceeding, and in a criminal proceeding is guilty of a class B misdemeanor punishable by a fine not to exceed one thousand dollars ($1,000.00). In the case of a continuing violation, each day that the violation continues shall constitute a separate and distinct offense.

C. Measuring Civil Penalties: In assessing a civil penalty, the public services director may consider:

1. The harm done to the public health or the environment;

2. Whether the civil penalty imposed will be a substantial economic deterrent to the illegal activity;

3. The economic benefit gained by the violator;

4. The amount of effort put forth by the violator to remedy this violation;

5. Any unusual or extraordinary enforcement costs incurred by the municipality;

6. The amount of penalty established by ordinance or resolution for specific categories of violations; and

7. Any equities of the situation which outweigh the benefit of imposing any penalty or damage assessment.

D. Recovery Of Damages And Costs: In addition to the civil penalty in subsection B of this section, the municipality may recover:

1. All damages caused by the violator to the municipality, which may include any reasonable expenses incurred in investigating violations of, and enforcing compliance with, this chapter, or any other actual damages caused by the violation.

2. The costs of the municipality's maintenance of stormwater facilities when the user of such facilities fails to maintain them as required by this chapter.

E. Other Remedies: The municipality may bring legal action to enjoin the continuing violation of this chapter, and the existence of any other remedy, at law or equity, shall be no defense to any such actions.

F. Remedies Cumulative: The remedies set forth in this section shall be cumulative, not exclusive, and it shall not be a defense to any action, civil or criminal, that one or more of the remedies set forth herein has been sought or granted. (Ord. 2009-06 § 1)

13.24.100: APPEALS:

Pursuant to Utah code, any person aggrieved by the imposition of a civil penalty or damage assessment as provided by this chapter may appeal said penalty or damage assessment to the municipality's governing body.

A. Appeals To Be In Writing: The appeal shall be in writing and filed with the municipal recorder or clerk within fifteen (15) days after the civil penalty and/or damage assessment is served in any manner authorized by law.

B. Hearing: Upon receipt of an appeal, the municipality's governing body shall hold a hearing within thirty (30) days. Ten (10) days' notice by registered mail shall be provided to the aggrieved party, such notice to be sent to the address provided by the aggrieved party at the time of appeal. The decision of the governing body of the municipality shall be final.

C. Appealing Decisions Of The Municipality's Governing Body: Any alleged violator may appeal a decision of the municipality's governing body pursuant to the provisions of the Utah code. (Ord. 2009-06 § 1)

13.24.110: FEES:

Each developed parcel of real property in Santa Clara City shall be charged a stormwater utility fee.

A. ESU: The fee shall be based on the number of equivalent service units (ESUs) contained in the parcel. The city council finds that the ESU is the most accurate measurement for determining the amount that each parcel contributes to, benefits from and otherwise uses the storm sewer utility.

B. Calculation: Santa Clara City council finds that each single-family residential parcel contributes approximately the same amount of stormwater runoff; therefore each developed single-family residential parcel shall pay a base rate of one ESU. All developed nonsingle-family residential parcels shall pay a multiple of this base rate, expressed in ESUs, according to the measured impervious area on the parcel.

C. Charge Per ESU: The amount charged for each ESU shall be established by resolution of the Santa Clara City council.

D. Exemptions And Credits: Santa Clara City council may establish exemptions and credits to the stormwater utility fee by resolution.

E. Policies: The public services department may adopt policies, consistent with this chapter and any resolution passed by the Santa Clara City council, to assist in the application, administration and interpretation of this chapter and any resolutions related to the stormwater utility.

F. Appeals: Any person or entity that believes that any decision made under the stormwater utility rate resolution was interpreted or applied incorrectly may appeal to the public services director ("director") or the director's designee. The appeal shall be in writing, shall state any facts supporting the appeal and shall be made within ten (10) days of the decision, action, or bill being appealed. The public services director shall decide the appeal within ten (10) days of when the appeal was filed. If the person or entity is not satisfied with the public services director's decision, a further appeal may be made to the city council. The appeal to the city council shall follow the same procedure as the appeal to the public services director. The city council's decision shall be final and binding on all parties. (Ord. 2009-06 § 1)

CITY OF SANTA CLARA, UTAH
ORDINANCE NO. 2020-11

AN ORDINANCE TO AMEND THE MUNICIPAL CODE OF THE CITY OF SANTA CLARA UTAH BY AMENDING TITLE 13, SECTION 13.24, "STORM WATER (LOW IMPACT DEVELOPMENT)" AND ESTABLISHING AN EFFECTIVE DATE.

WHEREAS, it is important to update the City's code from time to time to remain relevant and reflective of the ever-changing operating environment of the City; and

WHEREAS, staff is requesting to amend the Santa Clara City Code, Tittle 13, Section 13.24 by adding the Washington County Dixie Storm Water Coalition Low Impact Development Manual to the City Ordinance; and

WHEREAS, the Washington County Dixie Storm Water Coalition Manual serves as a guidance for the Low-Impact Development Standards for the City; and

WHEREAS, the legislative body of the City of Santa Clara reviewed the recommendation of the City Attorney and staff regarding the proposed changes to Title 13, Section 13.24, "Storm Water (Low Impact Development) "; and

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Santa Clara, Utah that Title 13, Section 13.24" Storm Water (Low Impact Development) "be amended as follows;

Section 1. Amendment:
See Attachment. Exhibit "A"

Section 2. Effective Date:
This Ordinance shall become effective immediately upon adoption, recording and posting in the manner prescribed by law.

ADOPTED and approved by a duly constituted quorum of the City Council of the City of Santa Clara, Utah this 26th day of August 2020.

IN WITNESS THERETO:

_____
RICK ROSENBERG, Mayor

ATTEST:

_____
CHRIS SHELLEY, City Recorder

REQUEST FOR COUNCIL ACTION

AGENDA ITEM 9

August 26, 2020

APPLICANT: Santa Clara City Storm Water Department

SUBJECT:

Consider approval for adoption of Dixie Storm Water Coalition Low-Impact Development Application Guidance for Santa Clara City.

BACKGROUND DESCRIPTION:

On February 26, 2020, the Utah Department of Environmental Quality (DEQ) General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) was modified. This permit (Permit No. UTR090000) establishes the requirements most MS4s in the state of Utah must meet in order to discharge stormwater runoff to downstream surface waters under the Utah Pollutant Discharge Elimination System (UPDES). Section 4.2.5.1.2 of the permit states: Retention Requirement. The Permittee must develop and define a specific hydrologic method or methods for calculating runoff volumes and flow rates to ensure consistent sizing of structural BMPs [Best Management Practices] in their jurisdiction and to facilitate plan review. By July 1, 2020, new development projects that disturb land greater than or equal to one acre, including projects that are part of a larger common plan of development or sale which collectively disturbs land greater than or equal to one acre must manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event or a predevelopment hydrologic condition, whichever is less. This objective must be accomplished by the use of practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse rainwater. The 80th percentile rainfall event is the event whose precipitation total is greater than or equal to 80 percent of all storm events over a given period of record. Washington City, a member of the Dixie Clean Storm Water coalition, asked Bowen Collins and Associates (BC&A) to determine how to quantify the increase in on-site infiltration and reuse of stormwater resulting from decreasing the amount of directly connected impervious area (DCIA) on a site. Specifically, BC&A evaluated the practice of disconnecting residential building rooftop drains (rain gutters) from downstream directly connected impervious areas (driveways, sidewalks, etc). This Technical Memorandum (TM) will provide background on the hydrologic analysis of both directly-connected and unconnected impervious areas, demonstrate how to apply these hydrologic methods to residential development in Washington County, and provide recommendations for implementing the practice of disconnecting directly connected impervious areas as a storm water Best Management Practice (BMP).

Proposed Recommendation

Recommendation for Approval

Cost

Recommendation for Approval

Approved by Legal Department

No

Approved in Budget

Yes

Approved by City Finance Department

Yes

Amount

N/A

Requested By

Jack Taylor

File Upload Attachments

https://sccity.org/wp-content/uploads/formidable/41/Dixie_Storm_Water_Coliation_LID_Guidance_Manual_June_2020-3.pdf

GREEN INFRASTRUCTURE AND LOW-IMPACT DEVELOPMENT APPLICATION GUIDANCE FOR WASHINGTON COUNTY, UTAH

To be used in partial fulfillment of the requirements associated with Small Municipal Separate Storm Sewer System (MS4) General Permit

Updated:
June 12, 2020

Dixie Storm Water Coalition

St. George, Washington, Ivins, Santa Clara

Contributors

Sponsoring Agency: Dixie Storm Water Coalition

Acknowledgments:

This guidance document was prepared for the Dixie Storm Water Coalition by JE Fuller, Hydrology & Geomorphology, Inc. (JE Fuller). The contract was under the Direction of Mr. Lester Dalton, CFM, Washington City Assistant Public Works Director.

JE Fuller would like to extend thanks and appreciation to the Dixie Storm Water Coalition members, agency staff, and local consultants who provided documents, insight, review and direction in the preparation of this Guidance Documents and the Matrix enclosed herein.

Table of Contents

Title ***Page***

Glossary of Acronyms iii

Glossary of Commonly Used Terms iv

Introduction and Background 1

- Code Requirements 1
- Purpose 2
- Urbanized Area - Geographical Limits 2
- Receiving Waters 2

Regional Constraints 2

- Soils & Geology 3
- Climatology 4

Retention Volume 5

Applicability 7

- BMP Selection Tools 7
  - Decision Making Flow Chart 7
  - Region Applicability Matrix 7
- Guidance 10
  - Step 1: Check Acceptable Minimum Vertical Clearances 10
  - Step 2: Check Acceptable Minimum Native/ In-Situ Soil Parameters 10
  - Step 3: Check Acceptable Minimum Horizontal Clearances 11
  - Step 4: Check for Logical Downstream Outfall Conditions 11
- Alternative Approach 12

Costs 12

- Implementation Cost 12
- Inspections & Maintenance 13

Infeasibility 13

- Technical Infeasibility 14
- Cost Infeasibility 14

Example Application 15

References 20

List of Figures

Title		Page
Figure 1	Percentile Rainfall Chart	4
Figure 2	Applicability Matrix Flow Chart	8
Figure 3	Hydrologic Soil Group Map	23
Figure 4	Shallow Bedrock Map	24
Figure 5	High/Shallow Groundwater Map	25
Figure 6	Expansive Soil & Rock Map	26
Figure 7	Collapsible Soil Map	27
Figure 8	Gypsiferous Soils Map	28

List of Attachments

Title

Maps

Attachment 1 – Storm Water Quality Report - Template

Attachment 2 – Bowen Collins Procedure

Glossary of Acronyms

BMP(s)	Best Management Practices
CFR	Code of Federal Regulations
CGP	Construction General Permit
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
GI	Green Infrastructure
GIS	Geographical Information System
IDDE	Illicit Discharge Detection and Elimination
LID	Low Impact Development
MCM	Minimum Control Measures
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer Systems
MSGP	Multi-Sector General Permit (non-mining)
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollution Discharge Elimination System
O&M	Operations and Maintenance Plan
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TMDL	Total Maximum Daily Load
UPDES	Utah Pollution Discharge Elimination System
WQRV	Water Quality Retention Volume

Glossary of Commonly Used Terms

Best Management Practices (BMPs): Methods, measures or practices to prevent or reduce storm water runoff and includes both structural and nonstructural controls and operation and maintenance procedures. These controls and procedures serve to project water resources, minimize fugitive dust, manage waste and mitigate erosion.

Detention: The process of temporarily collecting and storing surface water runoff such that the peak discharge is reduced below a specified threshold. Typically, a predevelopment value.

Disturbance: The result of altering soil from its native or stabilized condition thereby rendering it subject to movement or erosion by water to potentially become or becoming a pollutant in site storm water runoff; also means soil disturbance.

Erosion: The wearing away of land surface by water or wind, which occurs from weather or runoff, but is often intensified by human activity.

Evapotranspiration: The loss of water from the soil both by evaporation from the soil surface and be vegetative transpiration.

Facility: Any "point source" or any land, building, installation, structure, equipment, device, conveyance, area, source, activity or practice from which there is, or with reasonable probability may be, the introduction of storm water to the County MS4 or Storm Drainage Systems connected to the MS4 such that it is subject to regulation under the UPDES/NPDES program.

Green Infrastructure (GI): The range of measures that use plant or soil systems, permeable pavement or other permeable surface or substrates, storm water harvest or reuse, or landscaping to store, infiltrate, or evapotranspirate storm water and reduce flows to the sewer systems or to surface waters.

Low Impact Development (LID): Systems and practices that use or mimic natural processes that result in the infiltration, evapotranspiration or use of storm water in order to protect water quality and associated aquatic habitat.

Multi-Sector General Permit (MSGP): Permit that authorizes the discharge of storm water from facilities associated with any one of twenty-nine (29) industrial activities into a Municipal Separate Storm Sewer System that leads to a surface water or directly into a surface water.

Municipal Operations: Any facility that is owned, operated or maintained by the governing entity.

Municipal Separate Storm Sewer System (MS4s): a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) that are owned and operated by public entity, having jurisdiction to discharge into waters of the United States, and are designed or used for collecting or conveying storm water, but are not part of a combined sewer system and are not part of a publicly-owned treatment works (POTW).

Non-Storm Water Drainage: Any drainage that is not composed entirely of storm water.

Operator: A party or parties that either individually or taken together have operational control over the site specifications, including the ability to make modifications in specifications and they have day-to-day operational control of activities at the site necessary to ensure compliance with plan requirements and permit conditions.

Owner: The person, persons, or entity whose name appears on the title or deed to the subject property or properties.

Outfall: Any location within a project site where storm water runoff or a non-storm water discharge exits the site.

Operation and Maintenance Plan: A legally recorded document or section within a legally recorded document that specifies the processes, procedures and actions that will be implemented to ensure the long-term operation and maintenance of the post-construction storm water BMP's. The plan, which is to be reviewed and accepted by the permitting agency, will delegate to a party or entity that is tied to the property (e.g. Homeowner's Association, Neighborhood Association, Community Association, Property Managing Company or Condominium Association) the responsibilities of implementation of the plan in perpetuity with the understanding that failure to perform the duties specified in the plan can lead to fines and civil penalties to be assessed to the owners of the property.

Point Source: Any discernible, confined, and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collections system, vessel or other floating craft from which pollutants are or maybe discharged, excluding return flows from irrigated agriculture or agriculture storm water runoff.

Pollutant: Sediment, fluids, toxic waste, dredged spoil, solid waste, substances and chemicals, pesticides, herbicides, fertilizers, and other agricultural chemicals, incinerator residue, sewage, garbage, sewage sludge, munitions, petroleum products, equipment, rock, sand cellar dirt (e.g. overburden material) and mining, industrial, municipal and agricultural waste or any other liquid, solid, gaseous or hazardous substance which has the capacity to degrade water quality.

Retention: The process of collecting and indefinitely storing storm water runoff with the sole intent of infiltrating, evaporating, transpiring and/or reusing. For the purposes of this manual, retention systems should be expanded to include systems that temporarily detain storm water, filtering it through a soil medium and discharging through an underdrain and outfall at a rate and quality that does not adversely affect the downstream receiving waters.

Sediment: Small particles of loose, unconsolidated organic and inorganic material that is broken down by processes of decay, weathering or erosion and can be subsequently transported by wind or water.

Storm water: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation and resulting from such precipitation.

Structural Best Management Practices: Any physical means of controlling, capturing, diverting or conveying runoff or a point source for the purpose of reducing, to the maximum extent practicable, pollutants from exiting a site.

Urbanized Area: A portion of the County that has a population density of at least one thousand (1,000) people per square mile and/or meets other criteria set by the U.S. Bureau of Census in the latest Decennial Census. Or a densely settled core of census tracts and/or census blocks that have population of at least 50,000, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. It is a calculation used by the Bureau of the Census to determine the geographic boundaries of the most heavily developed and dense urban areas.

Waters of the U.S.: As defined in 33 CFR 328.3(a) and 40 CFR 230.3(s).

Introduction and Background

In December 2018, the Utah Department of Environmental Quality Division of Water Quality (UT DWQ) prepared a manual intended to serve as a reference and guide for incorporating Low Impact Development (LID) approaches into new development and redevelopment projects in Utah. The manual was intended to provide guidance for planners and designers as well as small Municipal Separate Storm Sewer System (MS4) storm water managers in selecting appropriate practices for their communities.

To meet the requirements of the State Permit, MS4 municipalities require that LID practices be discussed and analyzed at the initial stages of development prior to the approval of the concept plans, development plans or preliminary plats.

UT DWQ guidance was provided to reduce to the maximum extent practicable pollutants transported in untreated storm water to the waters of the United States by using key Low Impact Development (LID) principles such as; mimicking natural processes, promoting infiltration/ evapotranspiration/ harvesting/ reuse, and managing storm water with distributed systems close to the source. Additional LID requirements are expected for permitted MS4's, to develop a LID approach for retention of storm water, from the 80th percentile storm event for all new development and redevelopment projects that are greater than 1 acre or equal to or part of a common plan of development. In so doing, the UT DWQ guidance is designed to increase the use of LID practices and specific applications.

While the UT DWQ manual provided a fairly comprehensive approach to LID applications to storm water management, concerns existed with the applicability, feasibility, and associated costs (long-term) of the LID practices presented within the manual as it related to the Dixie Metropolitan Area within Washington County, Utah.

- ## Code Requirements

  Starting with the enactment of the Federal Clean Water Act in the 1970s and subsequently the initiation of the National Pollution Discharge Elimination System (NPDES), there has been a concerted effort to protect the nations waterways from storm water borne contamination. As recent as the 2010's, it is understood that the EPA began developing new rules to encourage the use of LID practices. In this context, more of an emphasis was placed on low-tech retention-based strategies as a proxy for contaminant reduction. Accordingly, the Utah Department of Water Quality (UT DWQ) has established MS4 permit minimum performance measures and requirements within its permit that, as part of long-term storm water management for new development and re-development, requires the establishment of a retention-based criteria for new and redevelopment. An anticipated update to the permit requirement which became effective March 1, 2020 (based on the December 24, 2019 draft) is summarized below:

  1. New Development (> 1-acre disturbance): Retention of the 80th percentile rainfall event or to limit offsite discharges to a pre-developed hydrologic condition, whichever is less.

2. Redevelopment (> 1 acres): If the redevelopment increases the impervious surfaces by more than 10%, then the site design should prevent the discharge of (retain) the net increase in volume associated with all precipitation events up to the 80th percentile rainfall event.

The guidance further clarifies that these objectives must be accomplished by methods designed, constructed and maintained to infiltrate, evapotranspire and/or harvest and reuse the rainwater (UPDES, 2019). The permit also requires the evaluation of LID retention strategies to meet the storm water quality objectives to the maximum extent feasible. Feasibility or infeasibility as specified in the permit will require the developer to document and quantify how infiltration, evapotranspiration, and rainwater harvesting have been used to the maximum extent possible or provide documentation to explain why implementation of LID measures is not possible.

- ## Purpose

  As part of the requirements associated with operating an MS4, Coalition Member Cities have prepared this Applicability Matrix in order to:

  1. Provide regional context for application of LID based storm water management.
  2. Provide minimum criteria for the regional use of UT DWQ LID practices.
  3. Provide an understanding of relative costs associated with standard LID practice implementation.

  This document addresses the initial screening of recommended practices and will aid as a decision-making-tool for planners, developers and engineers in the Dixie Metropolitan Area. It is not intended to replace or supersede any existing Local, Regional, State or Federal guidance nor is it intended to be used as a prescriptive tool. Each site should be evaluated independently to determine the best LID based storm water management practice.

- ## Urbanized Area - Geographical Limits

  This manual is intended for regulated cities within Washington County, Utah, defined as the Dixie Metropolitan Area which includes the City of St. George, Washington City, Santa Clara City and Ivins City. This area is also referred to as the Dixie Storm Water Coalition Region. Guidance found in this manual could be applied to other arid regions. However, such use is beyond the intent of this document and is therefore cautioned.

- ## Receiving Waters

  The receiving waters, often referred to as waters of the United States and/or navigable waters associated with Dixie Metropolitan Area of Washington County Utah are the Santa Clara River and the Virgin River.

Regional Constraints

Regional soils are known to be problematic for water retention or detention adjacent to infrastructure. While LID practices may have benefits, common concerns exist regarding the applicability of various LID

practices with regard to the long-term maintenance and viability of these features in the Dixie Metropolitan Area. The following sections provide an overview of the geological and soil conditions that exist in the region. Maps that can be used to help determine applicability are provided at the end of this document.

- ## Soils & Geology

  An understanding of the various geology and soils within the project area will aid in informing the user regarding the applicability of various Utah standard LID practices. As an overview, United States Department of Agriculture Natural Resources Conservation Service (NRCS) Soil Survey data was used to evaluate soil data within each of the metropolitan areas. Estimates are expressed as percentages of the total area in Table 1.

Table 1: Prevalence of Regional Soil Parameters

CITY	HYDROLOGIC SOIL GROUP (%)				Bedrock within 5 feet from surface (%)
	A+ B	C	D	Other	
Washington City	43.7	12	27.6	16.7	34.9
Saint George	44.5	20.7	6.8	28	18.9
Santa Clara	29.9	8.7	35.9	25.5	39.8
Ivins City	58.6	12.4	23	6	12.5

Regional data indicates a significant range of infiltration rates from about 0.16 to 4.0 inch/hour. Hydrologic Soil Group (HSG) ratings are somewhat indicative of the infiltration rates and can be useful for selecting LID BMPs. HSG A is characterized by a high infiltration capacity while HSG Type D soils typically shows very low infiltration capacity. Note that HSG type D soils cover approximately 23 percent of the Dixie Storm Water Coalition Region.

Regional data also suggests that near surface soils are predominantly of eolian or alluvial deposits. However, there are also residual soils derived from bedrock weathering/decomposition processes. The eolian deposits are characterized by relatively low plasticity, low density, and relatively high porosity. They exhibit collapse potential upon saturation, which may be as high as 10 percent. The alluvial deposits include a wide range of soils that are both plastic and non-plastic. They may exhibit expansion or collapse potential of slight to moderate magnitude. Properties of the residual soils derived from bedrock (sometimes referred to as “colluvium”) depend on the parent material type. Claystone derived soils, as well as weathered claystone, may exhibit expansion potential with sometimes high-expansive pressures. Additionally, gypsum and gyspsiferous soils are commonly found in the Dixie Storm Water Coalition Region. Hydration of these soils can dissolve the gypsum and cause severe complications for infrastructure. Special attention must be given when these conditions are concealed.

To aid in the planning stages of a proposed project and to inform the user regarding potential hazards that may affect their project several maps are provided. These maps **are not** a replacement for detailed geotechnical evaluation for a specific project but are provided as a guide for planning purposes only.

- ## Climatology

  Utah contains a wide range of climatological variability, Washington County alone contains three distinct climate regions; the Colorado Plateau Region (to the east and northeast), the Great Basin Region (to the northwest), and the Mojave Desert Region (which encompasses the Dixie Storm Water Coalition Region). Located in an arid desert region of southwest Utah, the Dixie Storm Water Coalition Region is characterized by hot summers (average high temperature in June, July and August is near or over 100 degrees Fahrenheit) and infrequent precipitation, generally less than an inch per month. With an annual precipitation of just over 8 inches and with some of the lowest elevations in Washington County there is little permanent vegetal ground cover and high sediment yields indicating an additional consideration for application of selected LID BMPs. Infrequent precipitation and climate variability should be considered in the selection of any LID BMP especially those that depend on the establishment of permanent vegetation. In accordance with UT DWQ gage analysis procedures the 80th percentile depth for the Dixie Storm Water Coalition Region is 0.44-inches.

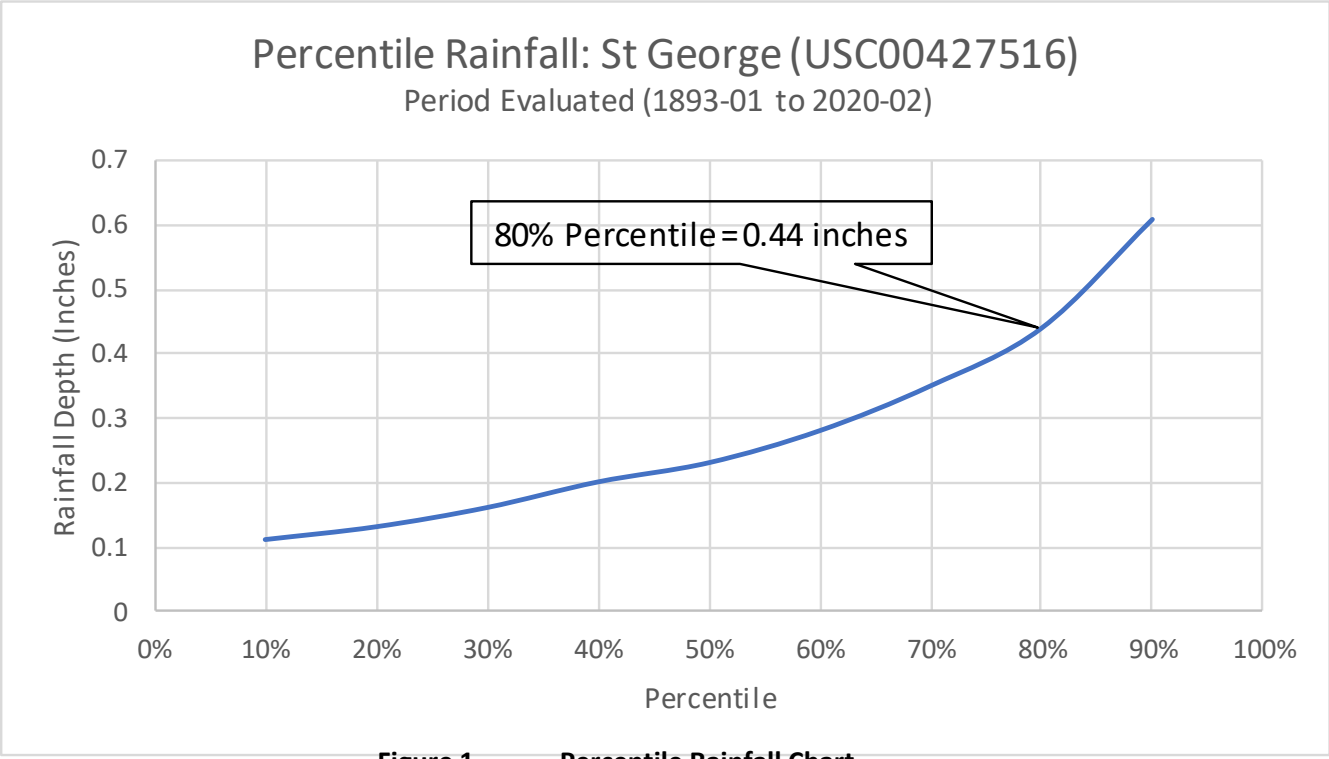


Figure 1 Percentile Rainfall Chart

Retention Volume

The Utah DWQ LID manual provides examples on how to calculate the Water Quality Retention Volume (WQRV) for compliance with the permit. In general, the form of the WQRV equation is as listed below:

$$WQRV = \frac{P_{80\%} * R_{new} * A}{12}, \qquad \text{EQ 1}$$

Where,

WQRV = Water Quality Retention Volume, in ac-ft,
$P_{80\%}$ = 80th percentile precipitation value (excluding snowfall, from gage analysis, in inches),
R_{new} = Storm Water Runoff Coefficient associated with the proposed new development, and
R_{new} = 1.14 (Imp) -0.371 when imp ≥ 55%
R_{new} = .225 (Imp) +-0.05 when imp ≤ 55%
A = Area, in Acres.
Imp = decimal percentage of impervious surface in the contributing watershed

For new development greater than 1-acre, and areas smaller than 1 acre but are part of a common plan of development, the permit specifies prevention of runoff from all events less than the 80th percentile rainfall or a predeveloped hydrologic condition, whichever is less.

For redevelopment greater than 1-acre, the current permit allows the retention from the increases only as shown in the Equation below:

$$WQRV = \frac{P_{80\%} * (R_{new} - R_{pre}) * A}{12}, \qquad \text{EQ 2}$$

Where,

WQRV = Water Quality Retention Volume required to maintain existing conditions, in ac-ft,
$P_{80\%}$ = 80th percentile precipitation value (excluding snowfall, from gage analysis, in inches),
R_{pre} = Storm Water Volumetric Runoff Coefficient for existing conditions
R_{new} = Storm Water Volumetric Runoff Coefficient for proposed conditions
$R_{pre/new}$ = Storm Water Volumetric Runoff Coefficient Equation (UDOT, 2018)
$R_{pre/new}$ = 1.14 (Imp) -0.371 when imp ≥ 55%
$R_{pre/new}$ = .225 (Imp) +-0.05 when imp ≤ 55%
A = Area, in Acres.
Imp = decimal percentage of impervious surface in the contributing watershed

Occasionally, it may be necessary to maintain consistency across differing hydrologic methods such as the SCS Method and the Rational Method. In general, the runoff coefficient is defined as the ratio of runoff to rainfall. Accordingly, Dr. Ron Rossmiller's Equation has historically been used for conversion of SCS Curve Number to a Runoff Coefficient (Rossmiller, 1980). However, special care must be used to understand the slight variance between a traditional Runoff Coefficient and the Utah Storm Water Volumetric Runoff Coefficient ($R_{pre/new}$). The Utah Storm Water Volumetric Runoff Coefficient is generally lower than the traditional runoff coefficient found in table (UDOT, 2018). Therefore, the Rossmiller Equation result should be considered an upper limit.

$$R_{pre/new} = 7.2 * (10)^{-7} * CN^3 * RI^3 * ((0.01 * CN)^{0.6})^{-S^{0.2}} * (0.01 * CN^{1.48})^{0.15-0.1(I)} * \left(\frac{(IMP+1)}{2}\right)^{0.7},$$ EQ 3

Where,

- CN = SCS/NRCS Curve Number,
- RI = Recurrence Interval (years),
- IMP = Impervious coverage (decimal form, i.e. for a 30% impervious, IMP=0.3),
- R_{pre} = Existing Condition Storm Water Runoff Coefficient
- S = Average land slope (whole number percent, i.e. for a 4% slope S=4)
- I = Rainfall Intensity calculated using methodologies consistent with local jurisdiction (inches/hour)

Importantly, the minimum requirement within the Dixie Storm Water Coalition Region is to disconnect impervious areas. The designer may use procedures as proposed by Bowen Collins & Associates (Bowen Collins & Associates, 2020) to establish a credit for disconnected impervious to be applied to the WQRV. Additionally, the Bowen Collins procedure can also be applied to LID BMPs such as Bio-swales (BR-3), Vegetative Strips (BR-4), or Pervious Surfaces (PS-1) where a clear volumetric quantity cannot be determined from BMP geometry. The Bowen Collins procedure is attached to this guidance document.

Due to the operation and maintenance efforts in addition to the need for irrigation water Green Roofs (BR-6) are not recommended within the Dixie Storm Water Coalition Region (arid or semi-arid settings). However, in the rare instance this LID BMP is selected. Green roof WQRV should be provided within the void space of the drainage layer and the growing media. Designer will need to provide evidence that this volume is sufficient to accept the additional runoff. Guidance for this application within the arid and semi-arid west is provided by the US EPA (Tolderlund, 2010).

Applicability

The Utah DWQ LID manual provides standard practices and applications intended for statewide use. As a part of its broad attempt to provide a comprehensive manual, UT DWQ provided three flow charts to be used in the selection of a LID BMPs from a list of twelve that were considered by UT DWQ to be most applicable for the State of Utah (Table 2).

For areas like the Dixie Storm Water Coalition Region, which contain the aforementioned regional constraints, additional criteria needed to be applied to the selection process, to ensure that a region-specific LID BMP can be implemented. The BMPs that the Dixie Storm Water Coalition considers region appropriate are highlighted in the table.

Table 2: Utah DWQ LID BMP

BR-1	Rain Garden
BR-2	Bioretention Cell
BR-3	Bioswale
BR-4	Vegetated Strip
BR-5	Tree Box Filter
BR-6	Green Roof
PS-1	Pervious Surfaces
ID-1	Infiltration Basin
ID-2	Infiltration Trench
ID-3	Dry Well
ID-4	Underground Infiltration Galleries
HR-1	Harvest and reuse

- ## BMP Selection Tools

  To aid the evaluation and selection process to following tools and guidance are provided:

  - ### Decision Making Flow Chart

    In similar fashion to the UTAH DWQ LID Manual, the decision-making process is summarized in a flow chart (Figure 2).

  - ### Region Applicability Matrix

    To further assist in the binary progression through the flowchart, a criteria matrix has been provided that summarizes how the uniqueness of the region effects the applicability of a given BMP (Table 3).

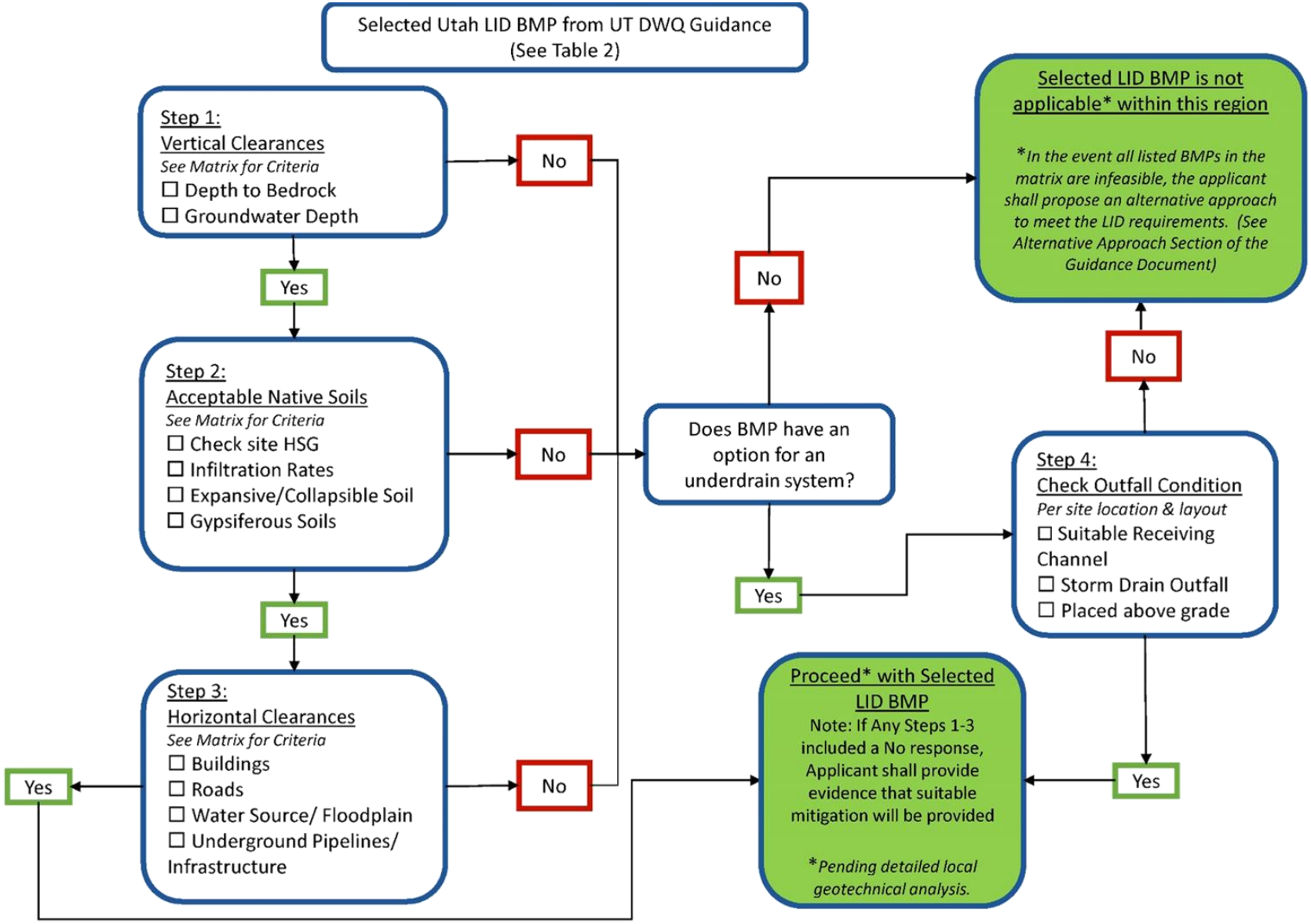


Figure 2 Applicability Matrix Flow Chart

Table 3: Region Applicability Matrix

UPDATED: 6/15/2020

Utah LID BMP		Step 1: Min. Acceptable Vertical Clearances		Step 2: Minimum Acceptable Native/ In-Situ Soil Parameters*					Step 3: Minimum Acceptable Horizontal Clearances***			
		Groundwater	Bedrock	HSG	Infiltration Rates**	Expansive/Collapse Risk	Gypsiferous Soils	Liquefaction Risk	Buildings (w/ basement)	Roads	Floodplains or Water Source	Underground Pipeline Infrastructure
BR-1	Rain Garden	> 10 ft	> 5 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	5 ft	Any	Any
BR-2	Bioretention Cell	Any	Any	Any	NA	Any	< 3%	Any	10 ft. (50 ft)	5 ft	Any	20 ft
BR-3	Bioswale	> 10 ft	> 5 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	5 ft	Any	Any
BR-4	Vegetated Strip	> 10 ft	> 5 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	Any	Any	Any
BR-5	Tree Box Filter	Any	Any	Any	NA	Any	< 3%	Any	Any	Any	Any	Any
BR-6	Green Roof	NA	NA	Any	NA	Any	NA	Any	Any	Any	NA	NA
PS-1	Pervious Surfaces	> 10 ft	> 5 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	Any	Any	20 ft
ID-1	Infiltration Basin	> 10 ft	> 10 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	5 ft	25 ft	20 ft
ID-2	Infiltration Trench	> 10 ft	> 5 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	10 ft. (50 ft)	5 ft	25 ft	20 ft
ID-3	Dry Well	> 10 ft	No Bedrock	A, B or C	NA	Low to Moderate	< 3%	Any	20 ft. (100 ft)	20 ft	100 ft	20 ft
ID-4	Underground Infiltration Galleries	> 10 ft	> 10 ft	A or B	0.5 in/hr.	Low to Moderate	< 3%	Low to Moderate	20 ft. (100 ft)	50 ft	50 ft	20 ft
HR-1	Harvest and reuse	NA	NA	Any	NA	Any	NA	Any	NA	NA	Any	NA

*Native soil values only. Per site specific geotechnical report. Engineered soil fills and liners may be required at additional costs if minimum recommended parameters are not met.
**Minimum State Requirement is 0.25 in/hr. This should be considered after aging.
***Geotechnical Analysis required to document safe horizontal setback per site conditions.
NOTE: This Matrix should be considered a living document. User's shall coordinate with local agency staff to verify most current version.

- ## Guidance

  Both tools along with the information presented below provides additional context for decision makers specific to the Dixie Storm Water Coalition Communities. Both the flowchart and applicability matrix, which has been provided within the appendix of this document, should be consulted during the planning stages of a future project to guide regional limitations and use of LID BMPs. In the event that a proposed retention-based LID Practice is not applicable to the site, the minimum requirement within the Dixie Storm Water Coalition Region is to disconnect impervious areas. If the WQRV is not met by disconnecting impervious areas, an alternative approach to LID that meets the water quality objectives shall be considered.

  - ### Step 1: Check Acceptable Minimum Vertical Clearances

    Minimum vertical clearances are important to the function of the selected LID BMPs in terms of ensuring proper installation and performance. The two most relevant categories for vertical clearances are related to the presence of groundwater and bedrock or impermeable lenses. Per the Matrix, each LID BMP is listed with the corresponding minimum acceptable vertical clearance. If the selected BMP does not meet the criteria, proceed to Step 4. If the selected LID BMP does meet the criteria for vertical clearances, the user shall proceed to Step 2.

  - ### Step 2: Check Acceptable Minimum Native/ In-Situ Soil Parameters

    Step 2 is intended to verify that the surrounding native soils have the capability and capacity to absorb additional storm water without negatively affecting surrounding infrastructure. This includes the Hydrologic Soil Group, Infiltration Rates, Expansive/Collapse Risk Potential, and Presence of Gysiferious Soils. For convenience, a collection of Maps (Figures 3-8) have been provided at the end of this document to aid in planning level efforts. Each of these categories/maps are intended to inform the user of the surrounding soil conditions and may require soil modification which may be cost prohibitive to mitigate. It should also be noted that the presence of a sloping impervious lens or obscured soils may further complicate the use of LID BMPs as it pertains to the risk to downstream properties. It is vital that a comprehensive site analysis be conducted so as to certify that proposed design features do not pose a negative risk to downstream owners.

    Using the Matrix, if the selected LID BMP does not meet the criteria for each of the native soil parameters, proceed to Step 4. If the selected LID BMP does meet the criteria for native soil parameters, the user shall proceed to Step 3.

- **Step 3: Check Acceptable Minimum Horizontal Clearances**

  Step 3 is to check is the horizontal distance or setback from relevant infrastructure such that water that has been infiltrated does not cause an adverse condition. While the guidance within the Matrix has been developed as a guide, the user is ultimately responsible for ensuring that adverse conditions are not created that impact existing adjacent infrastructure. Using the Matrix, the user must determine if adequate horizontal clearances exist. If the selected LID BMP does not meet the criteria, proceed to Step 4. If the selected LID BMP does meet the criteria for minimum horizontal clearances, the user also proceeds to Step 4 with selected LID BMP pending a detailed site-specific geotechnical analysis and cost-benefit analysis.

- **Step 4: Check for Logical Downstream Outfall Conditions**

  Some of the limitations for the use of LID BMPs in the Dixie Storm Water Coalition region can be mitigated with the use of impermeable liners in combination with a connection to an appropriate downstream storm water conveyance outfall system. Therefore, Step 4 in determining if a selected LID BMP or practice is applicable as shown on the matrix is whether the connection to a downstream outfall exists.

  Following the Matrix, if a suitable downstream condition exists, like a storm-drain or downstream channel, the use of a liner and underdrain system to contain, detain, treat and discharge to the acceptable downstream outfall is permissible. This may be used in conjunction with any detention or retention requirements for new or redeveloped parcels.

  If an acceptable downstream outfall does not exist and other limitations cannot be mitigated (pending detailed site-specific geotechnical analysis and design), or is cost infeasible, the selected BMP is not applicable for use within the Dixie Storm Water Coalition Region and an alternative approach may be requested.

- ## Alternative Approach

  If the user identifies that the available LID BMPs that meet the intent of the UT DWQ permit do not meet the criteria presented within the Matrix, a request for Alternative Approach shall be sought. In applying for an Alternative Approach, either for use of a non-regional approach LID BMP or an alternative approach, a site-specific engineering study that demonstrates the ability to meet the intent of the UPDES MS4 general permit will be required. The alternative will be submitted to the local jurisdiction for approval.

  In accordance with the UT DWQ permit, alternate approaches from the retention requirement will only be allowed with a site-specific engineering study that demonstrates infeasibility based on insurmountable constraints and may be permitted on a case-by-case basis. Any alternate approach will require that retention and LID BMPs are incorporated to the maximum extent feasible which includes disconnecting impervious areas, per the permit. This may include a reduction in the required retention volume permitted, as long as verifiable documentation can be provided to adequately show that the proposed plan will "protect water quality and reduce the discharge of pollutants to the MS4" (UT DWQ).

Costs

Costs have historically been a driving factor in the use or exclusion of LID practices from a proposed project. One key factor to consider when evaluating costs or cost-benefits of LID infrastructure is how to monetize social or environmental benefits, especially in arid regions. These social and environmental benefits are not discussed within this document but should be considered by the developer as part of any cost-benefit assessment.

- ## Implementation Cost

  Initial investments or capital costs are often the primary economic considerations for implementation of a specific BMP. Recently greater attention has been provided to understanding both life-cycle costs of specific BMP features as well as environmental or social benefits which can be difficult to monetize. While information in this area is growing, special consideration must be considered in arid regions. Specifically, when it comes to selection of vegetation and various BMP types. Relative initial and operation and maintenance costs for a respective BMP is presented in Table 4.

Table 4: Relative Costs of UT DWQ LID BMPs

Utah LID BMP		Costs[1, 2]	
		Initial	Operation & Maintenance
BR-1	Rain Garden	$	$
BR-2	Bioretention Cell	$$	$
BR-3	Bioswale	$	$
BR-4	Vegetated Strip	$	$
BR-5	Tree Box Filter	$$	$
BR-6	Green Roof	$$$	$$
PS-1	Pervious Surfaces	$$$	$$
ID-1	Infiltration Basin	$$$	$$
ID-2	Infiltration Trench	$$$	$
ID-3	Dry Well	$$	$$
ID-4	Underground Infiltration Galleries	$$$	$$
HR-1	Harvest and reuse	$	$$

[1] as adapted from Impact Infrastructure, LLC. & Stantec, 2014 for arid regions

[2] as adapted from Mateleska, K. 2016

- **Inspections & Maintenance**

  Long-term inspection and maintenance plans are key to ensuring successful implementation of LID Practices. Typical of any storm water management element, LID BMPs will require ongoing inspection and maintenance. As a part of the development approval, it is incumbent upon the developer/engineer to provide an operations and maintenance plan. The plan shall include responsibility for inspecting and maintaining, frequency of inspections and estimated upkeep or replacement costs. The plan should be submitted for approval to the local jurisdiction. If the operations and maintenance is to be provided by the local jurisdiction, a storm water fee may be assessed in accordance with local codes and ordinances.

Infeasibility

The U.S. Environmental Protection Agency (EPA) has documented that implementing well-chosen LID techniques designed to reduce runoff of water and pollutants into rivers and groundwater saves money while protecting and restoring water quality. There is much literature and documentation that is supportive that an overall LID Approach enhances property values by creating aesthetic amenities and improves the overall quality of life within a community.

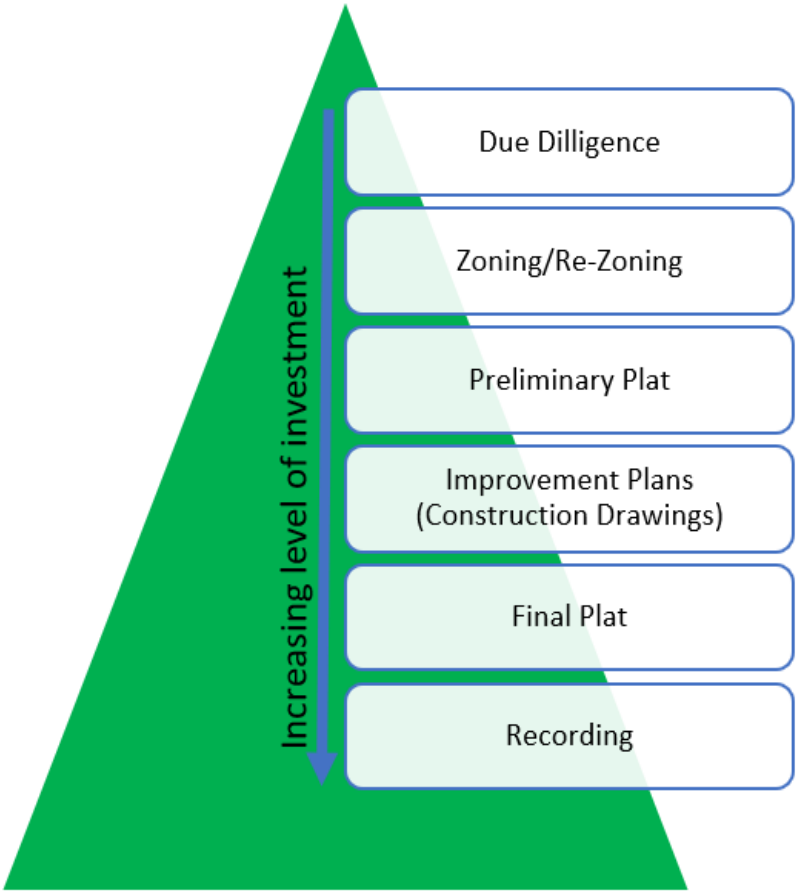
- **Technical Infeasibility**

  This guidance document and matrix are intended to assist the user to work through feasibility of the UT DWQ LID BMPs for use within the Dixie Storm Water Coalition Region. According to the UPDES permit, infeasibility which would be considered technical are listed as:

  - High groundwater,
  - Drinking Water Source protection,
  - Soil Conditions,
  - Slopes, or
  - Others.

- **Cost Infeasibility**

  The Small MS4 General UPDES Permit describes "excessive cost" as a constraint contributing to infeasibility of the retention standards outlined in the General Permit for Discharges from Small Municipal Separate Storm Sewer Systems.



The following factors, not conclusive, would be considered by the entity when determining whether cost could be used as an infeasibility factor in meeting the retention requirement on-site. Other factors could be considered as appropriate:

- Cost infeasibility must be addressed early on in the approval process such as prior to preliminary plat, PD Zone Change, or the conceptual site plan phase of the approval process. Infeasibility due to cost would not be considered valid if only considered late in the approval process such as during final plan preparation.
- Consideration should be given to life-cycle vs initial installation cost.
- Where low maintenance non-structural BMP's incorporate existing landscape features (washes, rock outcrops, steep hillsides, open space, etc.) vs structural BMP's that require on-going long-term maintenance by the owner, HOA, or local agency.

• The cost of non-storm water required elements, such as drainage/flood control improvements, erosion protection, ground stabilization, detention requirements, that would be required regardless of the retention requirement, would generally not be included in the cost infeasibility analysis. However, these improvements may be considered in the overall LID Approach.

• Whether there is an impact and/or cost to downstream rivers and property due to releasing untreated runoff.

The above factors with accompanying documentation will be considered by the permitting agency on a case-by-case basis to determine if the retention requirement could be waived due to cost considerations.

All cost-based analyses, or cost-benefit scenarios are required to provide full considerations of the Social, Environmental, and Economic costs. The approach must provide an objective, defensible and repeatable approach to the cost-benefit of a particular LID BMP.

While there are several online tools to assist with this type of evaluation, it is essential that the selected tool includes cost tables associated with arid regions of the Southwestern United States. The following elements were identified within a recent study for the City of Phoenix and should be considered as a part of any TBL-CBA analysis (Autocase, Watershed Management Group, et. al., 2018).

1. Financial Costs and Benefits;
2. Carbon emissions and air pollution;
3. Heat island impacts;
4. Water quality improvement;
5. Flood risk reduction; and
6. Property value increases.



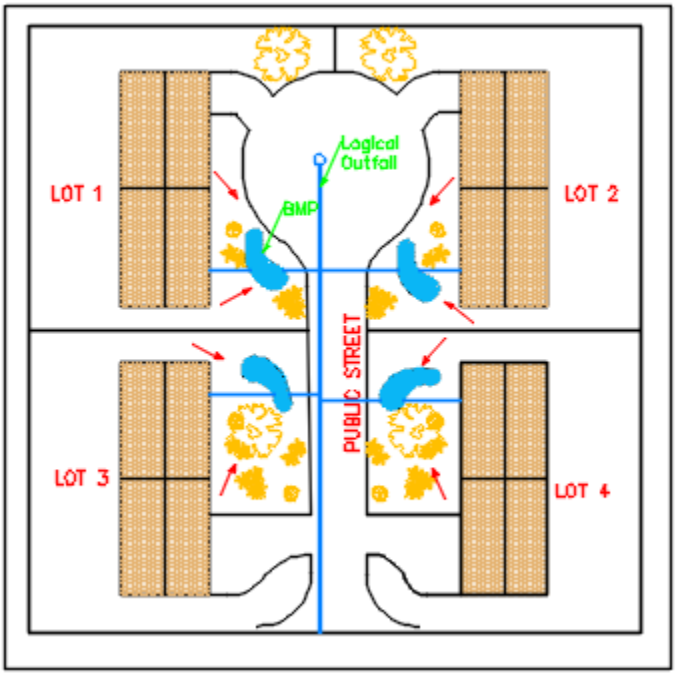
Example Application

Not every LID BMP is appropriate in every situation. The following worked example can serve as a guide for use of this Guidance Matrix and the Utah DWQ Guidance Manual. Note that the objective of this approach is the meet the requirements within the Utah DWQ Storm Water Permit. To the extent that meeting the conditions of that permit are not technically feasible, this manual can be used to support the case for a reduced (feasible) level of storm water retention based on satisfying the other constraints by walking through the Matrix.

Example – Subdivision Development

LID BMP Selection

An investor is considering a new 4-lot-per-acre single-family residential subdivision. During the due diligence phase concept planning efforts consider the potential for Lot Harvest & Reuse to meet the new state WQRV requirements.



Givens:

Logical downstream outfall condition exists.

Preliminary geotechnical engineering percolation test completed indicated infiltration rate of 0.51-inches.

No existing conditions to hinder percolation (P_{80} = 0.44-inches).

Estimate retention volume for each acre of development

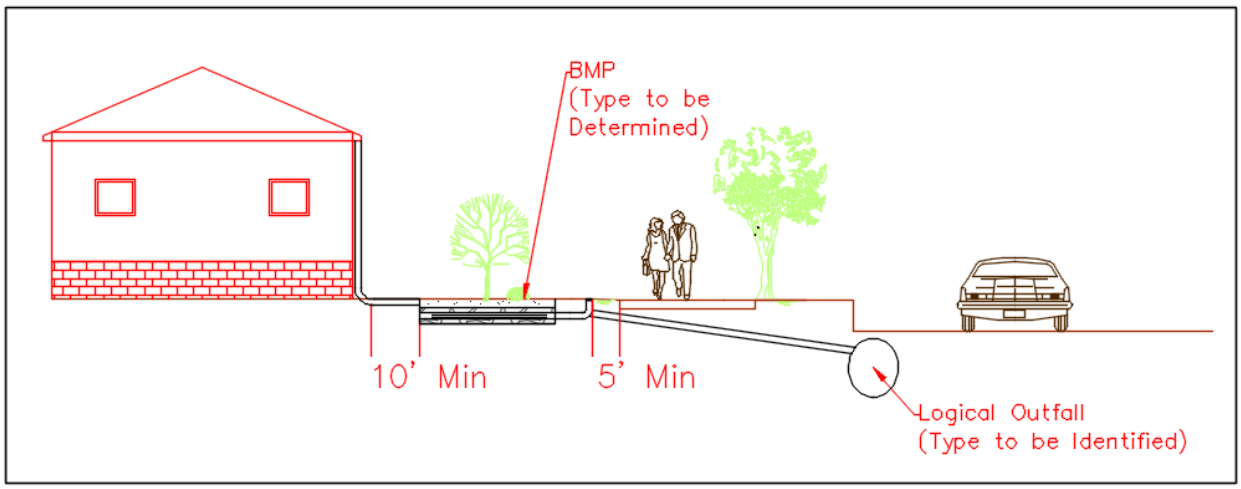
Area = 1 acre

Impervious cover = 35%

Storm Water Volume (Page 5):

R_{new} = 0.225 (Imp)+0.05
= 0.225*0.35+0.05
= 0.129

WQRV = (1)(0.129)(0.44)/(12)*43,560
= 206 cu-ft.



The 206 cu-ft is the amount of runoff that needs to be collected to meet the storm water quality requirements for each acre of development. On a per house basis this equates to 51.5 cu-ft. The total

volume supplied by the selected BMPs must be equal to or greater than exceed that calculated or (Vbmp > WQRV).

Option 1 - Bio Retention Cell (BR-2)

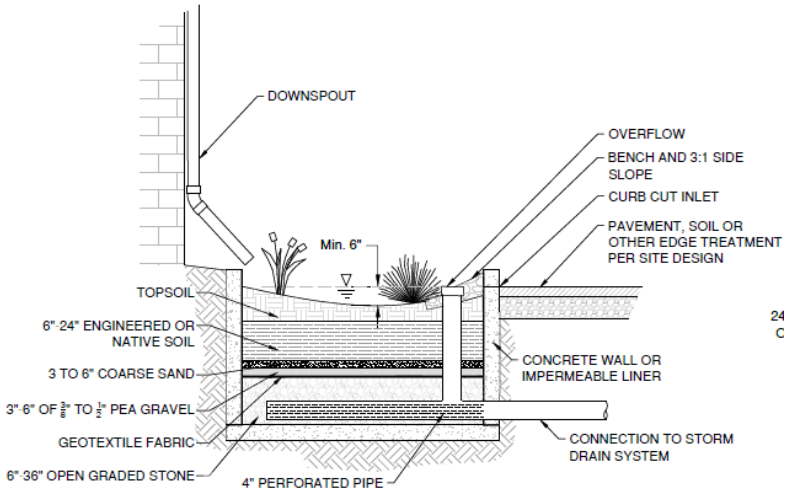
$V_{br} = 1.2(V_{dep} + V_{ts} + V_{es} + V_{cs} + V_{pg} + V_{gl})$

Where,

V_{br} = Volume of Bio Retention Cell (cu-ft)
V_{dep} = Volume of Top Depression (cu-ft)
V_{cs} = Volume of Coarse Sand (cu-ft)
V_{ts} = Volume of Topsoil (cu-ft)
V_{pg} = Volume of pea gravel (cu-ft)
V_{es} = Volume of Engineered Soil (cu-ft)
V_{gl} = Volume of Gravel (cu-ft)

$V = A_{surface} \times T_{Layer} \times V_{Ratio}$.

$A_{surface}$ = Surface Area (ft)
T_{layer} = Thickness of Media (ft)
V_{ratio} = Void Ratio expressed as a decimal



The void ratio will be provided by a geotechnical engineer. No void ratio will be applied to the depression. The depression depth cannot exceed 6".

Option 2 - Tree Box (BR-5)

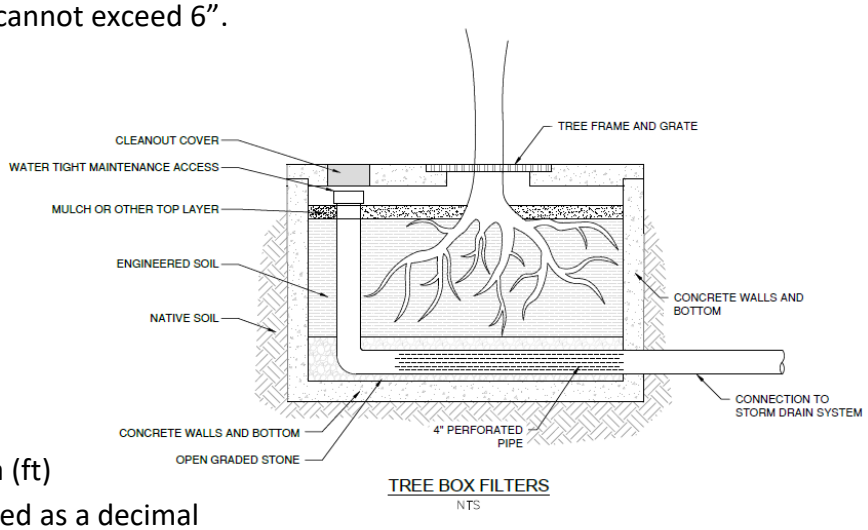
$V_{tb} = 1.2(V_{gl})$

Where,

V_{tb} = Volume of Tree Box
V_{gl} = Volume of Gravel (cu-ft)

$V = A_{surface} \times T_{Layer} \times V_{Ratio}$.

$A_{surface}$ = Surface Area (ft)
T_{layer} = Thickness of Media (ft)
V_{Ratio} = Void Ratio expressed as a decimal

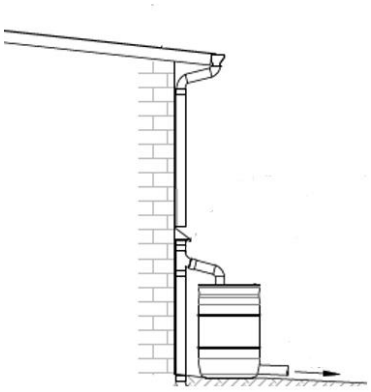


TREE BOX FILTERS
NTS

The void ratio will be provided by a geotechnical engineer. No void ratio will be applied to the depression. The depression depth cannot exceed 6".

Option 3 - Bio Swale[1] (BR-4)

$V_{bs} = 1.2(½(W_{top} + W_{Bottom})DL)$



Option 4 - Roof Cisterns (HR-1)

V_{cs} = will vary by manufacturer.

The size of the cistern cannot exceed the amount allowed be the State of Utah Code section 73-3-1.5. Should the volume of the cistern be less than WQRV then additional measures will be necessary to make up the deficiency.

Region Applicability Matrix

Step 1: Vertical Clearances

Applicability Matrix Step 1 Check:	
Step → / **Options**	**1 - Vertical Clearances**
1- Bio Retention Cell (BR-2)	Fully contained units have no vertical clearance limitations.
2- Tree Box (BR-5)	Fully contained units have no vertical clearance limitations.
3- Bio Swale (BR-4)	BR-4 requires more than 10-ft to groundwater and more than 5-ft to bedrock to be applicable
4- Roof Cisterns (HR-1)	Fully contained units have no vertical clearance limitations.

Step 2: Native/ In-Situ Soil Parameters

Applicability Matrix Step 2 Check:	
Step → / **Options**	**2 - *Native/ In-Situ Soil Parameters***
1- Bio Retention Cell (BR-2)	Fully contained units have engineered soil infill, no native soils.
2- Tree Box (BR-5)	Fully contained units have engineered soil infill, no native soils.
3- Bio Swale (BR-4)	Must have HSG Type A or B soils, infiltration rate of at least 0.5 in/hr., low to moderate risk of expansives/collapse and less than 3% gypsiferous soils.
4- Roof Cisterns (HR-1)	Generally comprised of above ground hollow cells, native materials must support bearing capacity only.

[1] Note: In-situ infiltration rate is equal to at least 0.5 in/hr.

Step 3: Horizontal Clearances

Applicability Matrix Step 3 Check:	
Step → / **Options**	**3 - *Horizontal Clearances***
1- Bio Retention Cell (BR-2)	Must be at least 10-ft from buildings (50-ft if basement), 5-ft from public road, and 20-ft from any pipeline infrastructure (gas, water, sewer, etc.)
2- Tree Box (BR-5)	Self-contained units can be placed without restriction
3- Bio Swale (BR-4)	Must be at least 10-ft from buildings (50-ft if basement), 5-ft from public roads.
4- Roof Cisterns (HR-1)	Self-contained units can be placed without restriction

Step 4: Downstream Outfall Conditions

Applicability Matrix Step 4 Check:	
Step → / **Options**	**4 - *Downstream Outfall Conditions***
1- Bio Retention Cell (BR-2)	Underground units require a downstream storm-drain or drywell (if applicable).
2- Tree Box (BR-5)	Underground Tree box filters require a downstream storm-drain or drywell (if applicable).
3- Bio Swale (BR-4)	Bio-swale can maintain a positive slope with positive outflow
4- Roof Cisterns (HR-1)	Above ground unit can overflow to yard as surface flow.

Summary of Region Applicability Matrix

Based on the example provided above, the table below provides a summary of the applicability of the selected options.

Applicability Matrix Check (Applicable - Y/N)				
Step → / **Options**	**1, Vertical Clearances**	**2, *Native/ In-Situ Soil Parameters***	**3, *Horizontal Clearances***	**4, *Downstream Outfall Conditions***
1- Bio Retention Cell (BR-2)	Y	Y	Y	Y
2- Tree Box (BR-5)	Y	Y	Y	Y
3- Bio Swale (BR-4)	Y	Y	Y	Y
4- Roof Cisterns (HR-1)	Y	Y	Y	Y

In addition to providing guidance on the selection of BMP and meeting the requirements set forth by UT DWQ, the Dixie Storm Water Coalition has provided a Storm Water Quality Report Template (Attachment 1). The Storm Water Quality Report Template shall be completed and submitted for review as part of the compliance process.

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Maps

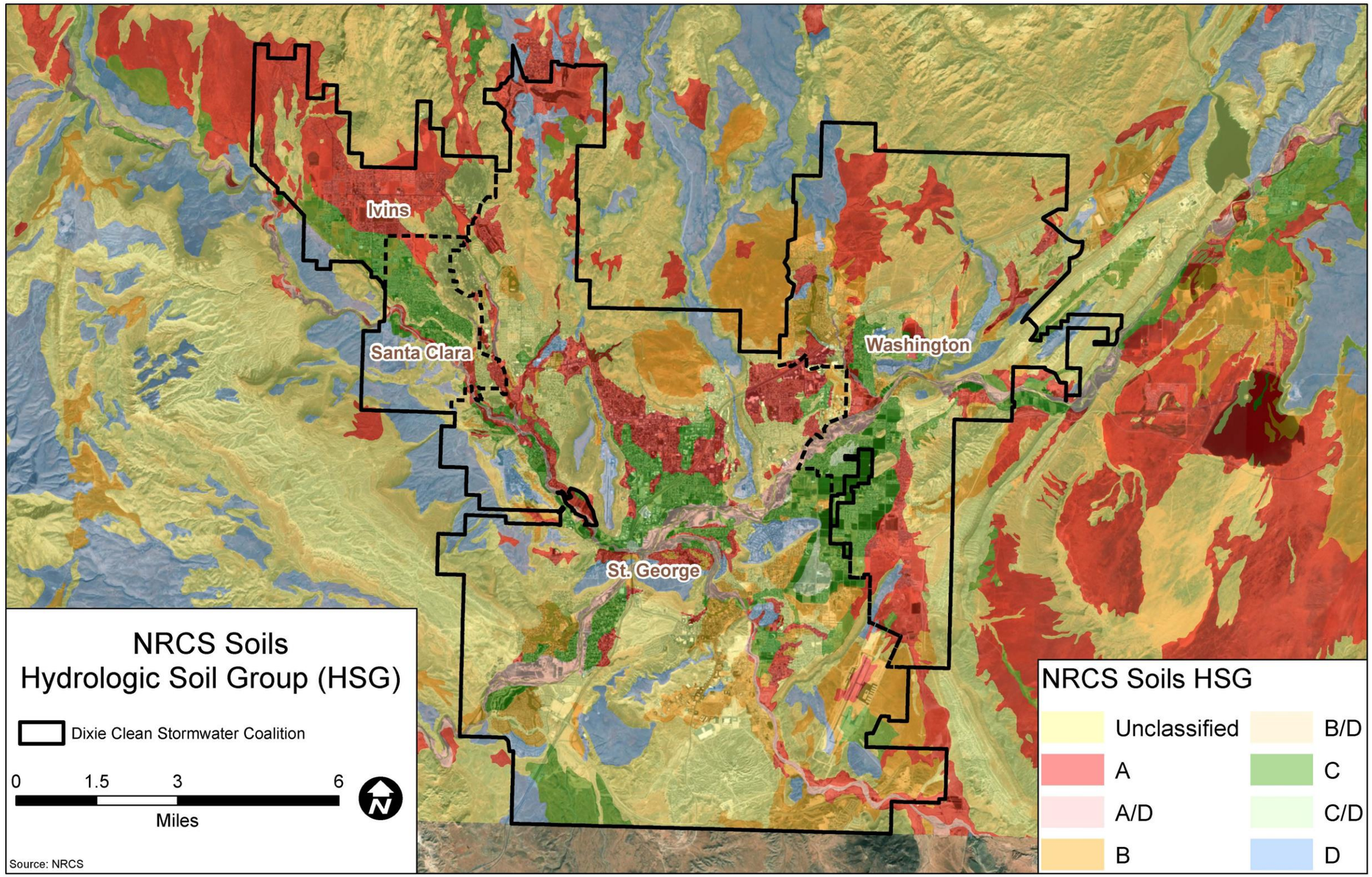


Figure 3 Hydrologic Soil Group Map

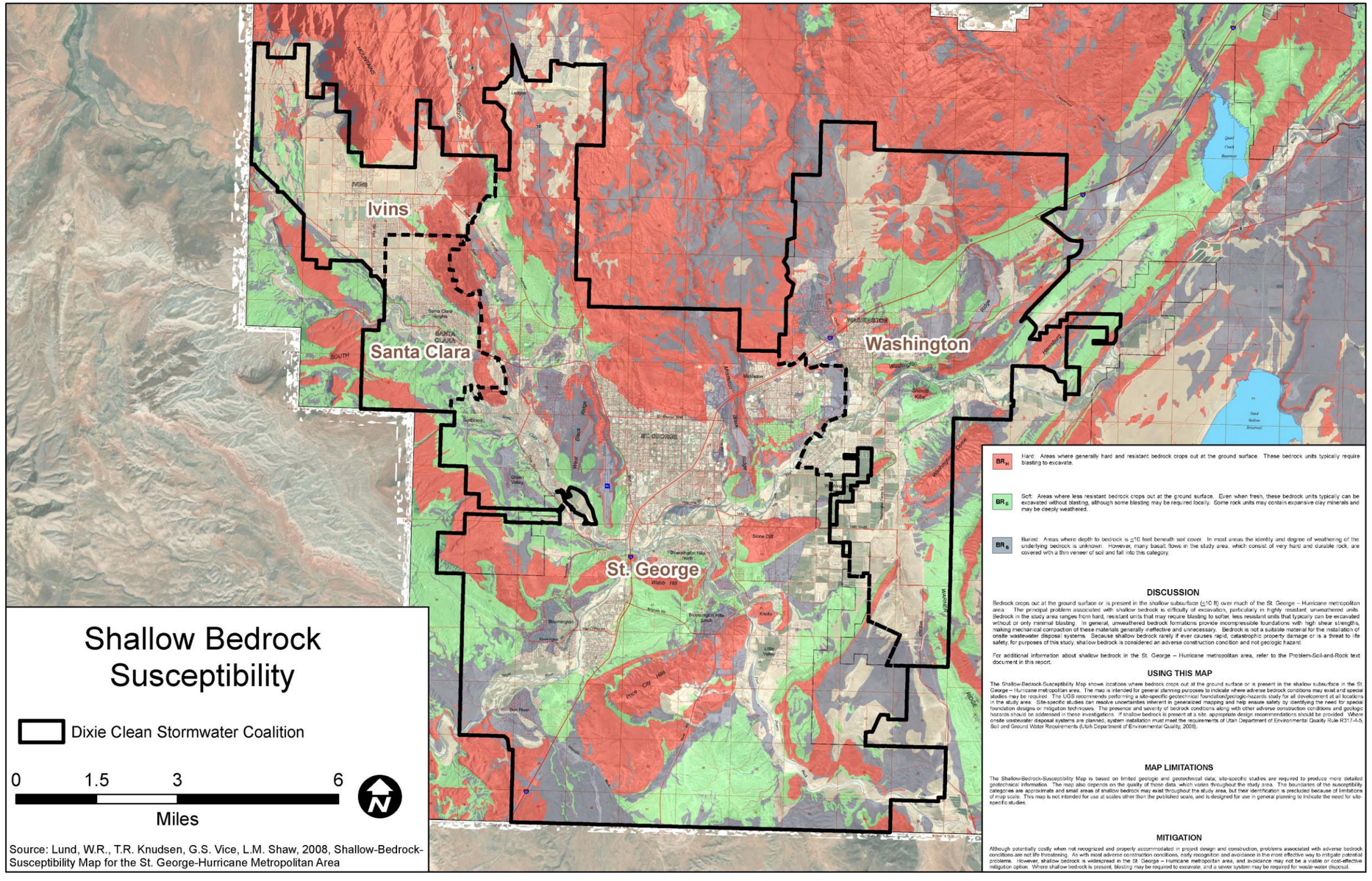


Figure 4 Shallow Bedrock Map

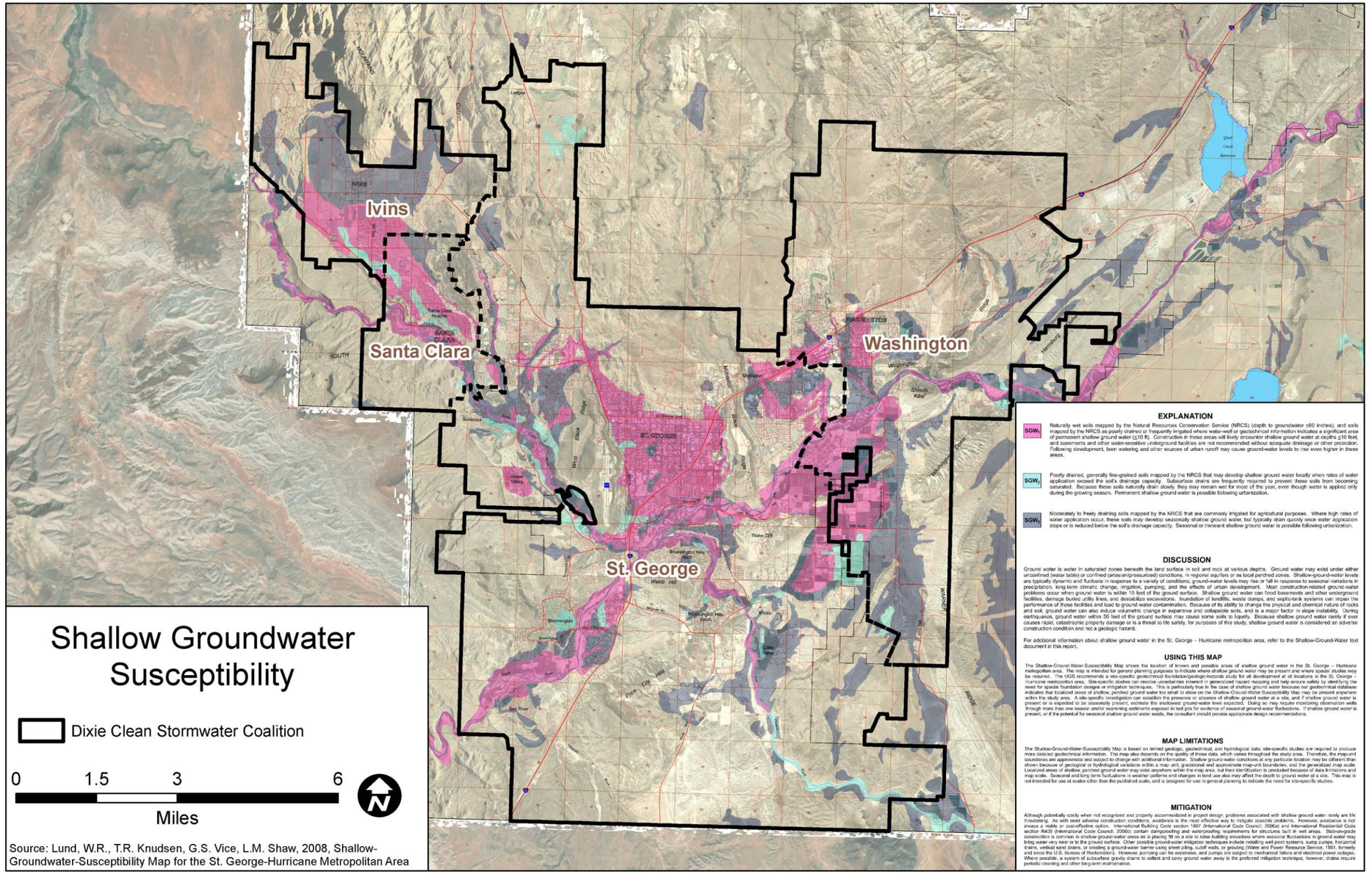


Figure 5 High/Shallow Groundwater Map

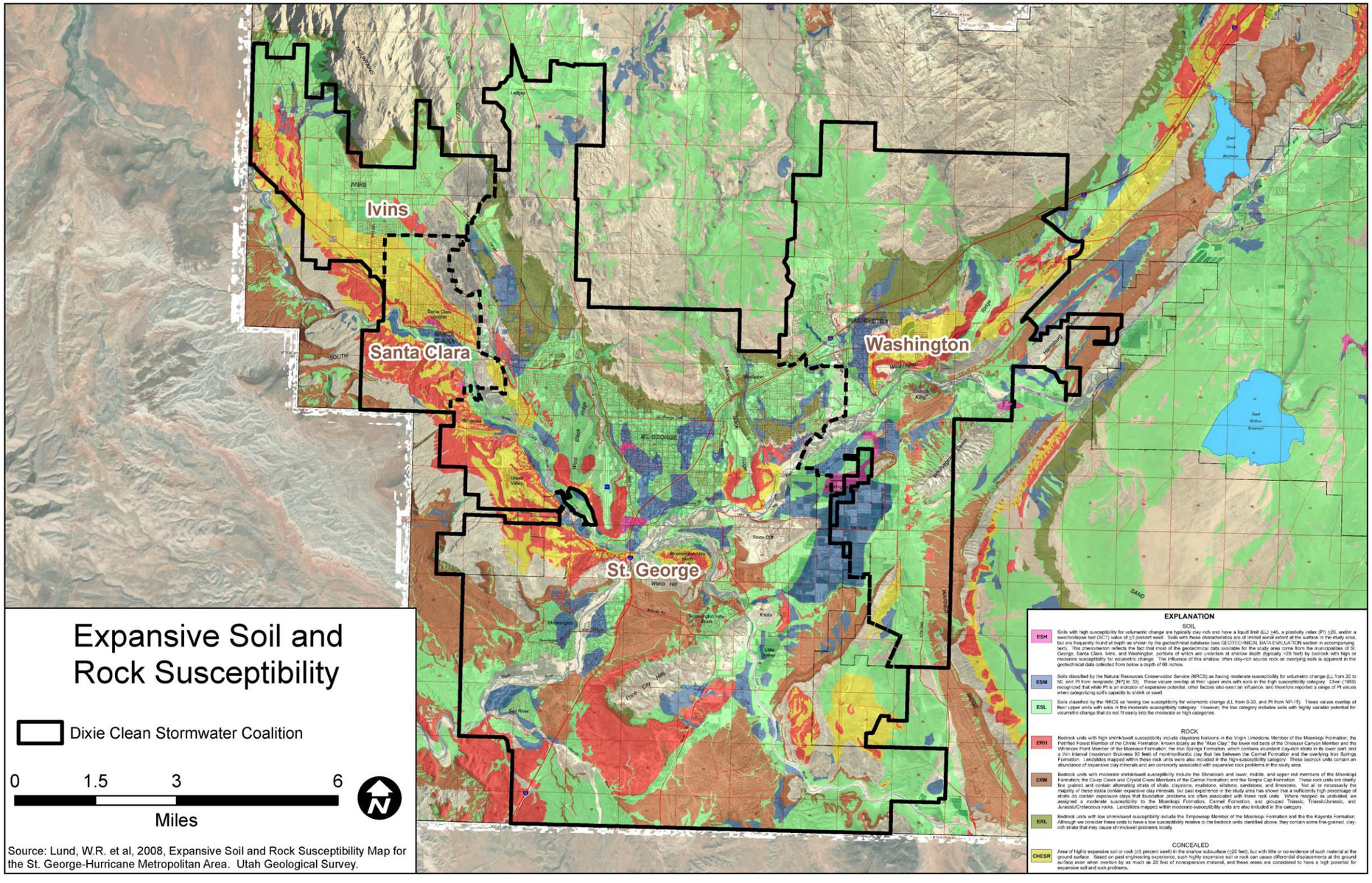


Figure 6 Expansive Soil & Rock Map

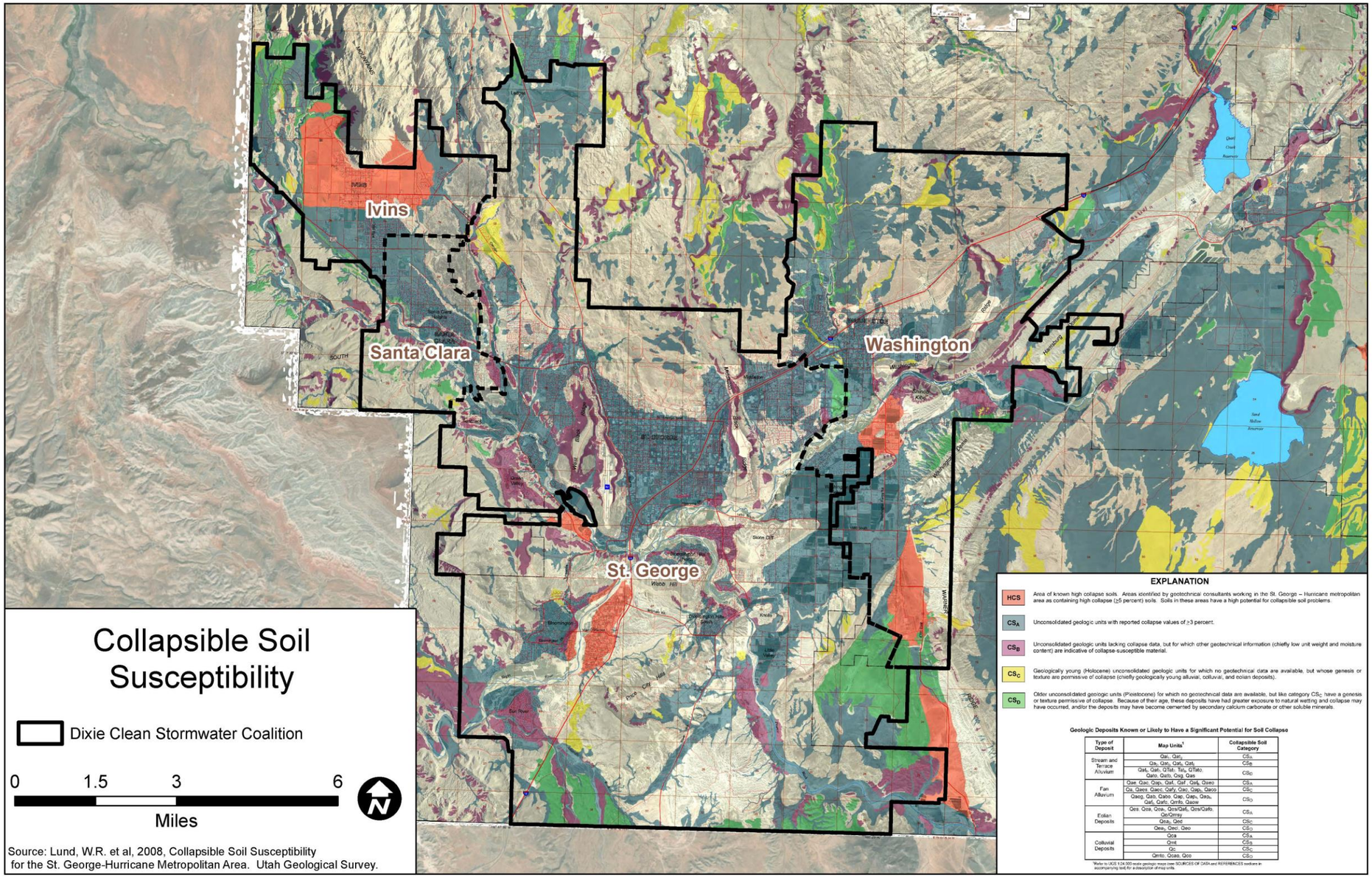


Figure 7 Collapsible Soil Map

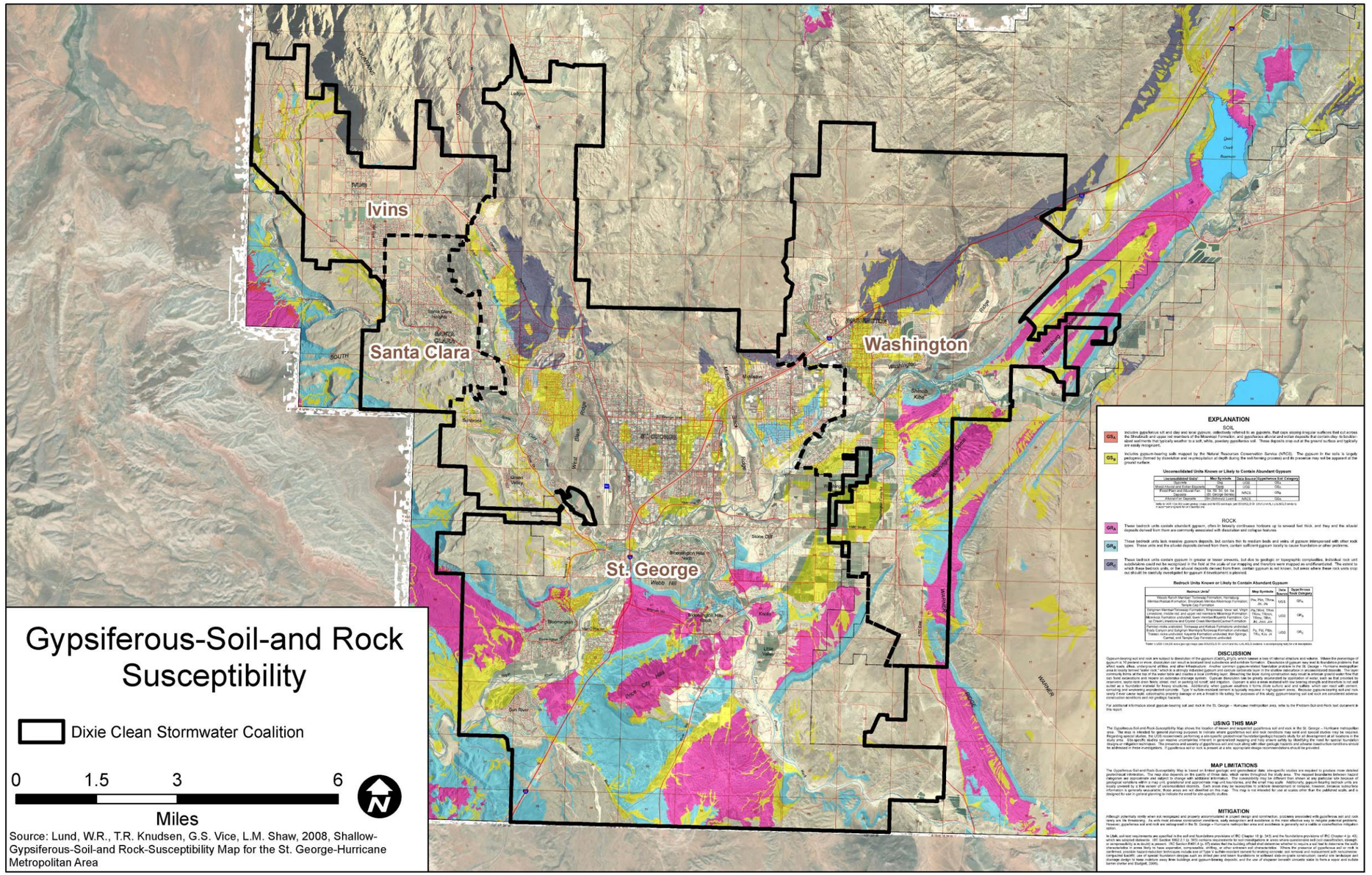


Figure 8 Gypsiferous Soils Map

Attachment 1 – Storm Water Quality Report - Template

Dixie Storm Water Coalition
St. George, Washington, Ivins, Santa Clara

Storm Water Quality Report – Template

Date: _____

Project Name: _____

Project ID: _____

Design Engineer: _____

Is the project within a watershed that is 303(d) listed? _____

If yes:

Name of receiving water(s): _____

Listed Impairment(s): _____

Does the watershed have an approved TMDL? _____

If yes:

Approved TMDL(s): _____

I have reviewed the storm water quality design and find this report to be complete, accurate, and current.

_____

[name], Project Manager

_____

[name], Designate Storm Water Coordinator

_____

[name], Head of Maintenance

[stamp required at final design phase]

_____

[name], Landscape Architect or Equivalent

Dixie Storm Water Coalition
St. George, Washington, Ivins, Santa Clara

Project Information

Type of Project (New Development, Redevelopment): _____

Area of Land Disturbance (ac): _____

Project Impervious Area (ac): _____

Project Imperviousness (%): _____

Project Volumetric Runoff Coefficient, R_V: _____

80th Storm Depth (in): _____

Project 80th Percentile Volume, V_{goal} (cf): _____

Subsurface Information

Groundwater

Depth to Groundwater (ft): _____

Historical High Depth to Groundwater if known (ft): _____

Source: _____

Groundwater Contamination at Site: _____

Soil Information

Infiltration Rate (in/hr): _____

Hydrologic Soil Group: _____

Source: _____

Soil Contamination at Site: _____

Drinking Water

Within Drinking Water Source Area Protection: _____

Additional Relevant Site Information

Dixie Storm Water Coalition
St. George, Washington, Ivins, Santa Clara

LID Drainage Areas

Add additional rows as needed.

Contributing Drainage Area	Area (ac)	Impervious Area (ac)	Imperviousness (%)	Volumetric Runoff Coefficient, R_V	Water Quality Volume, WQV (cf)
CDA 1					
CDA 2					
CDA 3					
CDA 4					
				Total WQV (cf)	

LID BMP Design

Add additional rows as needed.

Contributing Drainage Area	LID BMP Type	Water Quality Volume, WQV (cf)	Runoff Retained (cf)	Percent of Runoff Captured (%)
CDA1				
CDA 2				
CDA 3				
CDA 4				
		Total Volume Retained (cf)		

Percent of V_{goal} captured by LID BMPs: _____%

If 100% of V_{goal} is not captured, document and provide narrative of technical infeasibilities and/or alternate compliance measures below:

Describe additional storm water quality measures incorporated into the site:

Attachment 2 – Bowen Collins Procedure

BOWEN COLLINS & ASSOCIATES

TECHNICAL MEMORANDUM

TO:	Melinda Gibson Dixie Clean Storm Water Coalition Chair Ivins City Public Works 55 N Main Ivins, UT 84738
COPIES:	Lester Dalton – Washington City Public Works Todd Olsen – BC&A File
FROM:	Clinton Merrell, P.E., CFM 20 North Main, Suite No. 107 St. George, Utah 84770
DATE:	May 27, 2020
SUBJECT:	Disconnecting Impervious Areas to Increase On-site Infiltration and Reuse
JOB NO.:	446-20-01

BACKGROUND/PURPOSE

On February 26, 2020, the Utah Department of Environmental Quality (DEQ) General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) was modified. This permit (Permit No. UTR090000) establishes the requirements most MS4s in the state of Utah must meet in order to discharge stormwater runoff to downstream surface waters under the Utah Pollutant Discharge Elimination System (UPDES). Section 4.2.5.1.2 of the permit states:

> *Retention Requirement. The Permittee must develop and define a specific hydrologic method or methods for calculating runoff volumes and flow rates to ensure consistent sizing of structural BMPs* [Best Management Practices] *in their jurisdiction and to facilitate plan review.*
>
> *By July 1, 2020, new development projects that disturb land greater than or equal to one acre, including projects that are part of a larger common plan of development or sale which collectively disturbs land greater than or equal to one acre must manage rainfall on-site, and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event or a predevelopment hydrologic condition, whichever is less. This objective must be accomplished by the use of practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse rainwater. The 80th percentile rainfall event is the event whose precipitation total is greater than or equal to 80 percent of all storm events over a given period of record.*

Washington City, a member of the Dixie Clean Storm Water coalition, asked Bowen Collins and Associates (BC&A) to determine how to quantify the increase in on-site infiltration and reuse of stormwater resulting from decreasing the amount of directly connected impervious area (DCIA) on a site. Specifically, BC&A evaluated the practice of disconnecting residential building rooftop drains

(rain gutters) from downstream directly connected impervious areas (driveways, sidewalks, etc). This Technical Memorandum (TM) will provide background on the hydrologic analysis of both directly-connected and unconnected impervious areas, demonstrate how to apply these hydrologic methods to residential development in Washington County, and provide recommendations for implementing the practice of disconnecting directly connected impervious areas as a storm water Best Management Practice (BMP).

ESTIMATING RUNOFF FROM DIRECTLY CONNECTED IMPERVIOUS AREAS

Many different hydrologic methods exist for estimating the magnitude of runoff from any given site. The "SCS Curve Number" method described in the National Resource Conservation Service's (NRCS) National Engineering Handbook, Part 630 (NEH-630) and NRCS Technical Release 55, Urban Hydrology for Small Watersheds (TR-55) is a popular method due to its relative simplicity and ease of use. The method requires the user determine a "curve number," or CN, for the subject drainage area based on the combination of land cover and underlying soil type. This curve number is then used to determine the estimated volume of runoff that can be expected to result from a given volume of rainfall.

In addition to land use and soil type, the curve number for a given drainage area is dependent on the presence of impervious areas. The effects of impervious areas are more significant when the impervious areas are "directly connected." According to NEH-630.0901(c)(1):

> *"An impervious area is considered connected if runoff from it flows directly into the drainage system. It is also considered connected if runoff from it occurs as shallow concentrated flow that runs over a pervious area and then into a drainage system."*

TR-55 and NEH-630 provide several tables with typical CN values for various land cover and soil type combinations. Often engineers choose curve numbers directly from the TR-55 tables for their subject study areas. These table include descriptions for areas which include both pervious and impervious areas such as "Residential districts by average lot size." For these areas, the CN values listed include assumptions about the total percent impervious, directly connected impervious areas, and the hydrologic condition of pervious areas. If the subject area has different characteristics from those assumed to develop the CN values in the table, those values should not be applied to the subject area. Instead, NEH-630 provides additional equations and figures to determine the CN value representative of the subject area.

Another typically employed practice is to compute a composite CN value for a subject area based on an area weighted average of various land uses-soil type combinations present withing the subject area. While this approach is typically valid, special care should be taken in urban area hydrology where impervious areas are present in the drainage area. Per the limitations outlined in TR-55 page 1-4:

> *"The user should understand the assumption reflected in the initial abstraction term (Ia) and should ascertain that the assumption applies to the situation. Ia, which consists of interception, initial infiltration, surface depression storage, evapotranspiration, and other factors, was generalized as 0.2S based on data from agricultural watersheds (S is the potential maximum retention after runoff begins). This approximation can be especially important in an urban application because the combination of impervious areas with pervious areas can imply a significant initial loss that may not take place."*

Where directly connected impervious areas are present, the New Jersey Stormwater Best Management Practices Manual (NJ SWBMP 2004) recommends using a weighted average volume

method instead of the traditional weighted average curve number technique. With the weighted average volume method, the runoff for pervious and impervious areas in a subject drainage area are calculated separately and added together. Example 5-2 of the NJ SWBMP manual illustrates the difference in runoff volume between the two approaches. In the example, 1.25 inches of rainfall on a 3-acre development site, with 1 acre of connected impervious area (CN 98) and 2 acres of lawn and woods (CN 65) results in the following runoff volumes:

Weighted Average Curve Number Method: **1089 cu. ft.**

Weighted Average Volume Method: 3775 cu. ft. (impervious area) + 36 cu. ft. (pervious area) for a total of **3811 cu. ft.**

In this example, the weighted average volume method predicts approximately 3.5 times more runoff than the weighted average curve number method. Please refer to the excerpts of chapter 5 of the NJ SWBMP manual in Attachment A for the complete example.

It should be noted that when the commonly used hydrologic modeling software HEC-HMS is used to compute runoff volumes for drainage areas with impervious areas, the software uses an approach like the weighted average volume method recommended by the NJ SWBMP manual. HEC-HMS computes runoff volumes for the impervious areas and pervious areas separately if a percent impervious value is supplied for a sub basin element; however, for the impervious area, instead of using a curve number value of 98, the software assumes there are no losses for the impervious areas (i.e. CN 100) and all rainfall on those areas becomes runoff. If HEC-HMS were used for the Example above, the estimated volume would be:

HEC-HMS with % impervious: 4537 cu. ft (impervious area) + 36 cu. ft. (pervious area) for a total of **4573 cu. ft.**

The HEC-HMS estimate is the most conservative, predicting approximately 4.2 times the total runoff volume of the weighted average curve number method.

Based on these examples, a review of relevant hydrologic texts and experience, BC&A recommends using either the weighted average volume method or HEC-HMS with percent impervious for estimating runoff volumes from drainage areas with directly connected impervious areas.

ESTIMATING RUNOFF FROM UNCONNECTED IMPERVIOUS AREAS

When impervious areas are not directly connected to the downstream storm drain system, the areas are considered "unconnected." According to NEH-630:

> *"If runoff from impervious areas occurs over a pervious area as sheet flow prior to entering the drainage system, the impervious area is unconnected."*

NEH-630 provides a separate figure (NEH-630 Figure 9-4) or an equation (NEH-630 Figure 9-4) to determine a composite curve number for drainage areas with unconnected impervious areas; however, according to NEH-630, when more than 30 percent of the total drainage area is impervious area the absorptive capacity of the remaining pervious areas will not significantly affect runoff, and the unconnected impervious areas should be treated as directly connected.

All sites considered in this study have total percent impervious values greater than 30%, therefore another method for determining the runoff volume from unconnected impervious areas was needed. The NJ SWBMP provides a two-step runoff estimation technique for drainage areas with unconnected impervious areas. When using this approach, runoff from the upstream unconnected impervious areas is computed, then added as an additional rainfall depth on the downstream pervious area it sheet flows onto. Example 5-3 of the NJ SWBMP manual demonstrates this method for a 1.25-inch storm on a 3-acre drainage area with 1 acre of unconnected impervious area (CN 98) and 2 acres of

lawn and woods (CN 65). The results of this example are summarized below, additional details are provided in the excerpts of the NJ SWBMP provided in Attachment A.

Unconnected Impervious Area runoff volume: 3775 cu. ft.

Impervious area runoff spread over 2 acres of downstream pervious area:

(3775 cu. ft.) / (2 acres) x (43,560 sq. ft. per acre) = 0.52 inches

Total effective rainfall on downstream pervious areas: 1.25 + 0.52 = 1.77 inches

Total site runoff off (1.77 inches over 2-acre downstream pervious area: **581 cu. ft.**

The parameters of examples 5-2 and 5-3 (rainfall, total area, impervious area, etc.) are constant with the only difference being, the 1 acre of impervious area is directly connected in example 5-2 and unconnected in example 5-3. It is interesting to note the reduction in runoff volume between the two examples:

Example 5-2, one acre of directly connected impervious area: 3811 cu. ft.

Example 5-3, one acre of unconnected impervious area: 581 cu. ft.

Reduction from "disconnecting" one acre of impervious area: **3230 cu. ft.** (85% reduction)

APPLICATION TO RESIDENTIAL DEVELOPMENTS IN WASHINGTON COUNTY

A primary goal of this study was to determine how to quantify the increase in on-site infiltration and reuse of stormwater resulting from decreasing the amount of DCIA on a site. Specifically, BC&A evaluated the practice of disconnecting building rooftop drains (rain gutters) from downstream DCIAs. Thirteen sites were selected from recent development projects in Washington City. Nine sites from two developments in residential, ¼ acre zoning areas, three sites from a development in a residential 1/8-acre zoning area, and a single site of townhomes in a Planned Unit Development (PUD) were selected. Although these sites were all within Washington City, they were qualitatively compared to other recent developments throughout Washington County and are similar enough that results from the analysis of the selected sites can reasonably be applied to similar new developments throughout the county, based on sound engineering judgement.

For each site, the curve number method described previously was used to estimate runoff volume for several scenarios. The hydrologic parameters for each scenario were developed as described below.

Rainfall

The UPDES permit for MS4s as cited previously requires each permittee to "*prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 80th percentile rainfall event or a predevelopment hydrologic condition, whichever is less.*" The Utah DEQ Division of Water Quality (DWQ) published a guidance document titled "A Guide to Low Impact Development within Utah" (DWQ 2018) which includes guidance on how to determine the 90th percentile storm for a given location from historical daily rainfall data. Rainfall daily summaries were obtained from the National Oceanic and Atmospheric Administration (NOAA) website for St. George, Utah. Details regarding the weather station used can be downloaded from:

https://www.ncdc.noaa.gov/cdo-web/datasets/GHCND/stations/GHCND:USC00427516/detail

Following the procedure in the DWQ document, the 80th percentile rainfall depth for St. George, Utah was determined to be **0.44 inches**. This rainfall depth was used for all runoff estimates performed for this study.

Land Cover

For each selected site, 3-inch resolution, 2018 aerial imagery provided by Washington County was used to create polygons representing each of the following land cover types: directly connected impervious areas (driveways and public sidewalks), unconnected impervious areas (detached sheds and private sidewalks/concrete pads), roofs and lawns. The remaining portion of each lot was typically artificial desert landscaping and rock mulch with pervious weed barrier. The extent of each selected site was determined based on existing perimeter walls and extended to the top back of curb at the public roadway. For the purposes of this study, it was assumed that retention of runoff from the public roadways would be accounted for and treated separately from each individual lot in a subdivision. Site number one is shown in Figure 1. Figures for each site are provided in the detailed calculations in Attachment B.



Figure 1. Land cover map for Study Site 1.

Soil Type

Because all four hydrologic soil types are found throughout Washington County, each site was analyzed four times, once for each soil type. This approach facilitates the application of the results to other similar sites throughout the county.

Curve Number Selection and Runoff Estimates

For each site, curve numbers were selected, and runoff volume estimates were created for the following scenarios:

1. Undeveloped – using TR-55 Table 2-2d CN value for desert in fair hydrologic condition (30-70% ground cover).
2. Developed (Composite Curve Number) – using the weighted average (composite) curve number method. Composite curve numbers for each site were computed using the typical

values from TR-55 shown in Table 1. This scenario was analyzed for comparison with the more conservative weighted average volume method.

Table 1
Curve Numbers Selected from TR-55

Land Cover Description	Curve Numbers for Soil Type			
	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98

3. Roof Connected (Weighted Average Volume) – This scenario is the same as the developed condition analysis, except the analysis was performed using the weighted average volume method described previously and in the NJ SWBMP manual. For this scenario, the roof of the main residence was assumed to be **directly connected** via rain gutters and yard drains to the downstream driveways, public sidewalks, and roadway storm drain system.
4. Roof Disconnected (Two-step Runoff Method) – This scenario is the same as the "Roof Connected" scenario, except that the roof of the main residence was assumed to be **disconnected** from the downstream driveways, public sidewalks, and roadway storm drain system. Specific guidelines for ensuring the rain gutters are adequately disconnected from downstream impervious areas will be provided later in this TM.

The difference between the volumes computed in the "Roof Connected" and "Roof Disconnected" scenarios is the reduction in runoff achieved by disconnecting a site's roof from the downstream impervious areas. A summary of the results of the runoff volume calculations for each studied site is included in Table 2 below. Detailed calculations for each site are provided in Attachment B. For specific details and step-by-step examples of the weighted average volume and two-step runoff methods, please refer to chapter 5 of the NJ SWMP manual.

Table 2
Summary of Runoff Volume Estimates

Site Parameters													
Site Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Zoning Type	Residential 1/4 Acre									Residential 1/8 Acre			Townhomes
Zoning Code	R-1-10									R-1-6			PUD
Total Area (acres)	0.23	0.24	0.19	0.19	0.19	0.29	0.23	0.21	0.26	0.12	0.14	0.12	12.77
Impervious Area (acres)	0.15	0.11	0.12	0.09	0.11	0.10	0.15	0.12	0.16	0.08	0.08	0.07	7.11
Total Percent Impervious	64%	49%	63%	46%	57%	34%	64%	57%	63%	64%	57%	57%	56%
Overall Average % Impervious	56%												
Runoff Volumes from the 80th Percentile Storm (0.46 in)													
Soil Type A													
Undeveloped (Desert, Fair) (Cu. Ft,)	0	0	0	0	0	0	0	0	0	0	0	0	0
Developed (Weighted Curve Number) (Cu. Ft,)	67	53	73	33	57	27	66	47	59	35	32	27	4756
Roofs Connected (Weighted Average Volume) (Cu. Ft,)	141	110	117	84	105	94	140	113	156	74	77	65	6813
Roofs Disconnected (Two-Step Runoff Method) (Cu. Ft,)	20	24	35	14	19	22	61	31	78	16	15	16	3538
Total Reduction in Runoff by Disconnecting Roofs (Cu. Ft,)	121	86	82	70	86	72	79	82	78	58	62	49	3275
Total Reduction in Runoff by Disconnecting Roofs (Gal.)	910	640	610	520	640	540	590	610	580	430	460	370	24500
Percent Reduction in Runoff by Disconnecting Roofs	86%	78%	70%	83%	82%	77%	56%	73%	50%	78%	81%	75%	52%
Average Reduction	74%												See Note 1
Soil Type B													
Undeveloped (Desert, Fair) (Cu. Ft,)	0	0	0	0	0	0	0	0	0	0	0	0	0
Developed (Weighted Curve Number) (Cu. Ft,)	67	53	73	33	57	27	66	47	59	35	32	27	4756
Roofs Connected (Weighted Average Volume) (Cu. Ft,)	141	110	117	84	105	94	140	113	156	74	77	65	6813
Roofs Disconnected (Two-Step Runoff Method) (Cu. Ft,)	20	24	36	14	19	22	61	31	78	16	15	16	3538
Total Reduction in Runoff by Disconnecting Roofs (Cu. Ft,)	121	86	81	70	86	72	79	82	78	58	62	49	3275
Total Reduction in Runoff by Disconnecting Roofs (Gal.)	910	640	610	520	640	540	590	610	580	430	460	370	24500
Percent Reduction in Runoff by Disconnecting Roofs	86%	78%	69%	83%	82%	77%	56%	73%	50%	78%	81%	75%	48%
Average Reduction	74%												See Note 1
Soil Type C													
Undeveloped (Desert, Fair) (Cu. Ft,)	0	0	0	0	0	0	0	0	0	0	0	0	0
Developed (Weighted Curve Number) (Cu. Ft,)	67	53	73	33	57	27	66	47	59	35	32	27	4756
Roofs Connected (Weighted Average Volume) (Cu. Ft,)	141	110	117	84	106	94	140	113	156	74	77	65	6850
Roofs Disconnected (Two-Step Runoff Method) (Cu. Ft,)	30	32	48	20	31	24	67	37	79	23	19	20	4002
Total Reduction in Runoff by Disconnecting Roofs (Cu. Ft,)	111	78	69	64	75	70	73	76	77	51	58	45	2848
Total Reduction in Runoff by Disconnecting Roofs (Gal.)	830	580	520	480	560	520	550	570	580	380	430	340	21300
Percent Reduction in Runoff by Disconnecting Roofs	79%	71%	59%	76%	71%	74%	52%	67%	49%	69%	75%	69%	42%
Average Reduction	68%												See Note 1
Soil Type D													
Undeveloped (Desert, Fair) (Cu. Ft,)	6	6	5	5	5	8	6	6	7	3	4	3	348
Developed (Weighted Curve Number) (Cu. Ft,)	67	53	73	33	57	27	66	47	59	35	32	27	4756
Roofs Connected (Weighted Average Volume) (Cu. Ft,)	141	113	120	87	109	97	141	114	156	75	78	66	7189
Roofs Disconnected (Two-Step Runoff Method) (Cu. Ft,)	43	47	63	32	47	35	79	49	88	31	29	27	4839
Total Reduction in Runoff by Disconnecting Roofs (Cu. Ft,)	98	66	57	55	62	62	62	65	68	44	49	39	2350
Total Reduction in Runoff by Disconnecting Roofs (Gal.)	730	490	430	410	460	460	460	490	510	330	370	290	17580
Percent Reduction in Runoff by Disconnecting Roofs	70%	58%	48%	63%	57%	64%	44%	57%	44%	59%	63%	59%	33%
Average Reduction	57%												See Note 1

Notes:

1. Site 13 was the only townhome site analyzed, therefore there is insufficient data to make solid recommendations for similar developments. Such developments should have a site-specific analysis performed to determine the estimated reduction runoff by disconnecting roofs.

Based on the results shown in Table 2 above, a number of observations can be made:

- The average total percent impervious across all sites is 56-percent, with values ranging from 34% to 64%. The typical residential development curve numbers in Table 2-2a of TR-55 assume a total percent impervious of 38% for 1/4-acre residential development and 65% for 1/8 acre or less residential developments. This reinforces the fact that engineers should exercise caution when using curve numbers for urban areas directly from Table 2-2a.
- For all soil types and all sites, there is a large difference in runoff volume predicted by the weighted average curve number and the weighted average volume methods. The weighted average volume method is about 200% of the weighted average curve number method for all sites except for the townhome subdivision, where the difference is about 150%.
- For all sites and soil types, there is a minimum 55% average reduction in estimated runoff when roofs are disconnected from downstream impervious areas.
- For soil types A and B at all sites (except site 13) when roofs are disconnected, the remaining downstream pervious area can absorb all the rainfall falling on the pervious area as well as all runoff from the rooftop. The only runoff from these sites is the runoff from rain fall on the remaining directly connected impervious areas (driveways and public sidewalks).

RECOMMENDATIONS

The DWQ low impact development (LID) guidance document (DWQ 2018) mentions the practice of disconnecting impervious areas as a recommended LID site design practice; however, no details are provided for quantifying the potential runoff reduction of the practice. The designer can use a site-specific analysis or approximate method as described in the following sections to refine post-development runoff volume estimates to account for disconnecting roofs from downstream impervious areas .

The reader should note that reducing runoff from a site by disconnecting rooftop drains as described in this TM will increase the amount of infiltration, retention, and evapotranspiration on a site. This TM provides guidelines and recommendations for determining the magnitude of this increase in infiltration. The potential geotechnical concerns which may arise from increasing retention and infiltration in the vicinity of structures is beyond the scope of this study. In evaluating the implementation of disconnected impervious areas as described herein, engineers, developers, and reviewers should exercise caution and consider all potential impacts of increased infiltration on a proposed site.

Site-Specific Analysis

A site-specific analysis can be conducted as follows:

1. Identify the 80th percentile rainfall depth
2. Determine the hydrologic soil type for the site – Sites with more than one soil type were not addressed in this TM but similar methods can be used to develop composite CN values for site pervious areas.
3. Determine undeveloped runoff volume – Calculate the estimated runoff for the site in the undeveloped condition using a weighted average for the undeveloped land cover. (Typically desert in Washington County)
4. Determine developed land cover areas –For the developed condition, delineate and measure the areas of land cover types present within a site, including but not limited to: directly connected impervious areas (driveways and public sidewalks), unconnected impervious

areas (detached sheds and private sidewalks/concrete pads), roofs and lawns, and other pervious areas (planters, gravel with pervious weed barrier).

5. Determine developed runoff volume with roofs connected – Use the weighted average volume method. Include the area of building rooftops in the value for DCIA. (See Example 5-2 of the NJ SWMP)

6. Determine developed runoff with roofs disconnected - Use the two-step runoff method (See NJ SWBMP Example 5-3)

    a. Calculate the runoff from building rooftops (using a CN of 98), then convert that volume to an equivalent rainfall depth over the area of the downstream unconnected pervious areas using the equations below:

$$P_{roofs} = \frac{V_{roofs}}{A_{per}} \; x \; 12$$

Where:

V_{roofs} = *Volume of runoff from roofs, cubic feet*

A_{per} = *Area of downstream, unconnected pervious areas where roof drains will discharge, square feet*

P_{roofs} = *Runoff from roofs as additional precipitation depth to be applied on downstream pervious areas, inches*

And:

$$P_{eqv} = P_{85} + P_{roofs}$$

Where:

P_{85} = *Precipitation depth of 85th percentile storm (0.44 inches in Washington County)*

P_{eqv} = *Total equivalent precipitation depth to be applied on downstream pervious areas, inches*

    b. Calculate the estimated runoff from the remaining pervious and connected impervious areas, using the weighted average volume method. For pervious areas, use the total equivalent precipitation depth (P_{eqv}) as calculated in 6a above. For remaining impervious areas, use the 85th percentile rainfall depth (P_{85}).

7. Determine volume reduction obtained by disconnecting roofs - Subtract the result of 6 from 5 above.

8. Compare undeveloped and developed runoff volumes – Subtract the result of 6 from 3 above. If the resulting difference in volume is greater than zero, additional BMPs can be implemented as feasible to further reduce post-development runoff volume to the maximum extent practical (MEP) as required by the general MS4 permit.

Approximate Method

Based on the results of the analysis conducted for sites 1 through 12, approximate reduction factors were selected to quickly approximate the runoff volume reduction achievable by disconnecting rooftops from downstream impervious areas. An approximate method analysis is conducted in the same manner as the site-specific analysis outlined above, however, the developed runoff volume with roofs disconnected (Step 6) can be approximated as follows:

6. Determine developed runoff volume with roofs disconnected – For a given site soil type, multiply the calculated volume by the appropriate factor from Table 3 below to obtain the runoff volume for the site when roofs are disconnected:

Table 3
Factors for Converting Runoff Volumes from Sites with Roofs Connected to Roofs Disconnected Condition

Soil Type	Reduction Factor[1]
A or B	0.35
C	0.45
D	0.55

Notes:
1. Reduction factor is the average ratio of disconnected to connected runoff with an additional factor for the uncertainty of site-specific conditions

This simplified method should be used only if the subject site meets the following conditions:

- The site is a single residential lot with land covers similar in type and proportion to the sites used in this study (see Attachment B for details).
- Total percent impervious is less than 65%.
- Pervious areas must include at least 20% lawn in good condition.

Additional Limitations

For any impervious area to be considered unconnected, the following conditions must be met:

1. All runoff from the unconnected impervious area must be sheet flow.
2. Upon entering the downstream pervious area, all runoff must remain as sheet flow.
3. Flow from the impervious surface must enter the downstream pervious area as sheet flow or, in the case of roofs, from downspouts equipped with splash pads, level spreaders, or dispersion trenches that reduce flow velocity and induce sheet flow in the downstream pervious area.
4. All discharges onto the downstream pervious surfaces must be stable and nonerosive.
5. The shape, slope, and vegetated cover in the downstream pervious area must be sufficient to maintain sheet flow throughout its length. Maximum slope of the downstream pervious area is 8 percent.
6. The maximum roof area that can be drained by a single downspout is 600 square feet.

In addition, downstream unconnected pervious areas must meet the following conditions:

1. The minimum sheet flow length across the downstream pervious area is 25 feet.
2. The maximum sheet flow length across the unconnected impervious area is 100 feet.
3. While the total flow length area may be greater, the maximum sheet flow length across the downstream pervious area that can be used to compute the total resultant runoff volume is 150 feet.

CONCLUSIONS

Based on the analysis of the residential sites selected for this study, the practice of disconnecting rooftops from downstream impervious areas can be used to reduce the runoff volume from the site by 55 to 74% on average, depending on the soil type. Using a combination of the weighted average volume and two-step runoff volume methods described in this TM, site designers and reviewers can quantify the estimated reduction in runoff volume achieved by disconnecting impervious areas for

almost any site. When implementing this practice, designers and reviewers must ensure the proposed design meets the limitations for unconnected impervious and downstream unconnected pervious areas described in this TM.

REFERENCES

Natural Resources Conservation Service, National Engineering Handbook, Part 630, Hydrology.

New Jersey Department of Environmental Protection, April 2004, New Jersey Stormwater Best Management Practices Manual (https://www.njstormwater.org/bmp_manual2.htm).

U.S. Department of Agriculture, Soil Conservation Service, June 1986, Urban Hydrology for Small Watersheds, Technical Release 55.

Utah Department of Environmental Quality, Division of Water Quality, December 2018, A Guide to Low Impact Development within Utah.

Utah Department of Environmental Quality, Division of Water Quality, February 2020, General Permit for Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), UPDES Permit Number UTR09000.

Attachment A – Excerpts from Chapter 5 of New Jersey Storm Water Best Management Practices Manual (2004)

Example 5-2: Site With Pervious and Directly Connected Impervious Cover Runoff Volume Computation Using NRCS Methodology

Description: A 3-acre development site is comprised of 1 acre of impervious surface and 2 acres of lawn and woods with an NRCS Curve Number (CN) of 65. The entire impervious surface is directly connected to the site's drainage system. Compute the site's total runoff volume for the 1.25-inch stormwater quality design storm using the Weighted Average CN technique. Compare the results with the Weighted Average Volume technique.

Stormwater Quality Design Storm = P = 1.25 inches

Total drainage area = 3 acres

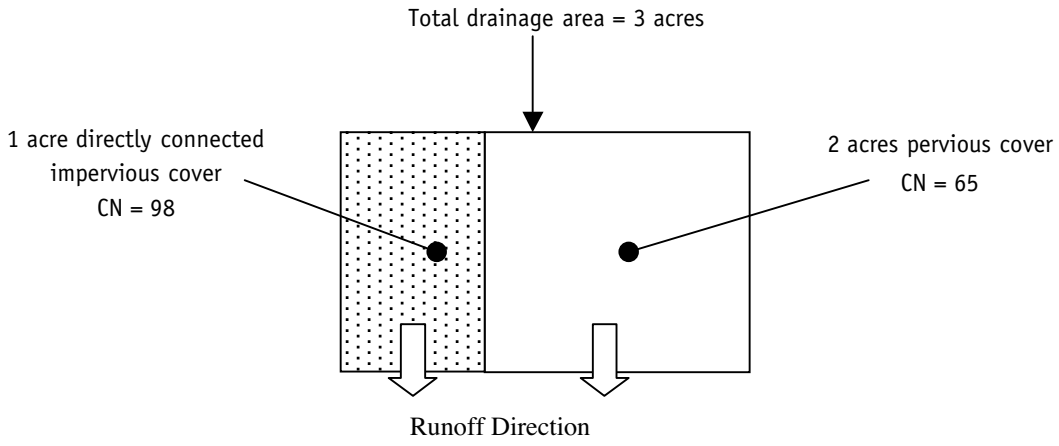
Impervious area = 1 acre (1/3 of total area)

Pervious area = 2 acres (2/3 of total area)

Pervious cover = mixture of lawn and woods Pervious CN = 65

Impervious cover = asphalt Impervious CN = 98

Note: All impervious cover is connected to the drainage system



1. Using Weighted Average Curve Number Technique

Weighted CN = (65)(2/3) + (98)(1/3) = 76

$$\text{Average } S = \frac{1000}{CN} - 10 = \frac{1000}{76} - 10 = 3.16 \text{ inches}$$

Average initial abstraction = Ia = 0.2S = (0.2)(3.16) = 0.63 inches

0.8S = (0.8)(3.16) = 2.53 inches

$$\text{Runoff volume} = Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{(1.25 - 0.63)^2}{1.25 + 2.53} = 0.10 \text{ inches}$$

Runoff volume = (0.10 inches/12 inches per foot)(3 acres)(43,560 sf per acre)

Total site runoff volume = 1089 cubic feet

Excerpt From New Jersey Stormwater Best Management Practices Manual, Chapter 5, February 2004.
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2. Using Weighted Average Volume Technique

Impervious Area

$$\text{Impervious area } S = \frac{1000}{CN} - 10 = \frac{1000}{98} - 10 = 0.20 \text{ inches}$$

$$\text{Impervious area initial abstraction} = 0.2S = (0.2)(0.20) = 0.04 \text{ inches}$$

$$0.8S = (0.8)(0.20) = 0.16 \text{ inches}$$

$$\text{Impervious area runoff volume} = Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S} = \frac{(1.25 - 0.04)^2}{1.25 + 0.16} = 1.04 \text{ inches}$$

Runoff volume = (1.04 inches/12 inches per foot)(1 acre)(43,560 sf per acre)

Impervious area runoff volume = 3775 cubic feet

Pervious Area

$$\text{Pervious area } S = \frac{1000}{CN} - 10 = \frac{1000}{65} - 10 = 5.38 \text{ inches}$$

$$\text{Pervious area initial abstraction} = 0.2S = (0.2)(5.38) = 1.08 \text{ inches}$$

$$0.8S = (0.8)(5.38) = 4.30 \text{ inches}$$

$$\text{Pervious area runoff volume} = Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S} = \frac{(1.25 - 1.08)^2}{1.25 + 4.30} = 0.005 \text{ inches}$$

Runoff volume = (0.005 inches/12 inches per foot)(2 acres)(43,560 sf per acre)

Pervious area runoff volume = 36 cubic feet

Total site runoff volume = 3775 + 36 = 3811 cubic feet
(vs. 1089 cubic feet using weighted average CN)

As can be seen in Example 5-2 above, the weighted average CN technique produced an estimated stormwater quality design storm runoff volume that was less than 30 percent of the volume produced by the weighted average volume technique. Perhaps more significantly, the example also demonstrates how virtually the entire site runoff for the stormwater quality design storm comes from the impervious portion and that very little comes from the pervious portion (i.e., 3775 cubic feet vs. 36 cubic feet). The significant but erroneous initial loss that the NRCS cautions about in TR-55 can also be seen in the 0.63 inch initial abstraction for the entire site (including 1 acre of impervious surface) produced by the weighted average CN technique.

It is important to note that, in computing a weighted average runoff volume from the development site, Example 5-2 does not address the resultant peak discharge or hydrograph from the site. If both the pervious and directly connected impervious site areas will have the same time of concentration, the weighted runoff volume can then be used directly to compute the peak site discharge or hydrograph. However, if these areas will respond to rainfall with different times of concentration, separate hydrographs should be computed for each and then combined to produce the peak site discharge or hydrograph.

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their own direct rainfall as well as the "rainfall" flowing from the upstream unconnected impervious areas. The resultant runoff from the downstream pervious areas in response to this combined rainfall can then be computed using the NRCS runoff equation again.

Example 5-3 illustrates this two-step runoff computation technique for unconnected impervious areas. In reviewing the example, it is important to note that the unconnected impervious area runoff depth must be converted to an equivalent uniform rainfall depth over the entire downstream pervious area based on the relative sizes of the unconnected impervious and downstream pervious areas.

Example 5-3: Site With Unconnected Impervious Cover
Runoff Volume Computation Using Two-Step Technique

Description: A 3-acre development site is comprised of 1 acre of impervious surface and 2 acres of lawn and woods with an NRCS Curve Number (CN) of 65. Runoff from the entire impervious surface sheet flows onto to the pervious portion of the site before entering the site's drainage system. Compute the total runoff volume for the 1.25-inch stormwater quality design storm using the NRCS methodology.

Stormwater Quality Design Storm = P = 1.25 inches

Total drainage area = 3 acres

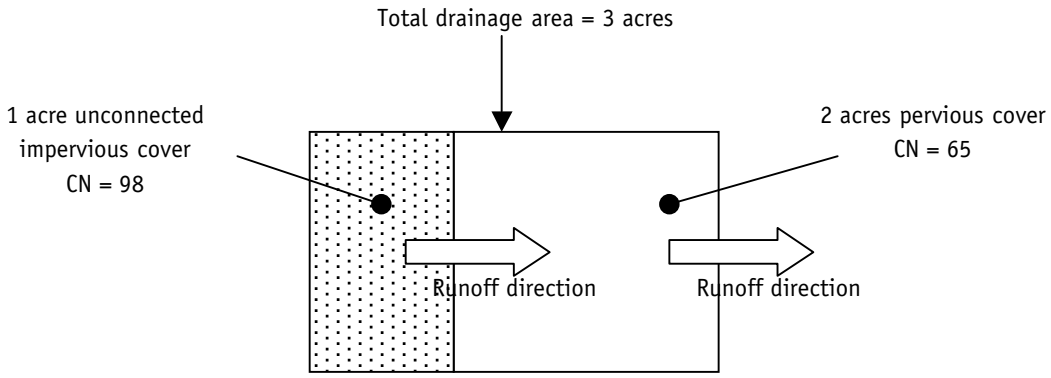
Impervious area = 1 acre (1/3 of total area)

Pervious area = 2 acres (2/3 of total area)

Pervious cover = mixture of lawn and woods pervious CN = 65

Impervious cover = asphalt impervious CN = 98

Note: All impervious area runoff sheet flows onto downstream pervious area



Impervious Area

$$\text{Impervious area } S = \frac{1000}{CN} - 10 = \frac{1000}{98} - 10 = 0.20 \text{ inches}$$

Impervious area initial abstraction = 0.2S = (0.2)(0.20) = 0.04 inches

0.8S = (0.8)(0.20) = 0.16 inches

$$\text{Impervious area runoff volume} = Q = \frac{(P - 0.2\,S)^2}{P + 0.8\,S} = \frac{(1.25 - 0.04)^2}{1.25 + 0.16} = 1.04 \text{ inches}$$

Runoff volume = (1.04 inches/12 inches per foot)(1 acre)(43,560 sf per acre)

Impervious area runoff volume = 3775 cubic feet

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PROVIDED FOR INFORMATION ONLY

Equivalent rainfall depth on downstream pervious area =

(3775 cubic feet)/(2 acres)(43,560 sf per acre) = 0.043 feet = 0.52 inches

Pervious Area

Total effective rainfall = direct rainfall + unconnected impervious area runoff

= 1.25 inches + 0.52 inches = 1.77 inches total

$$\text{Pervious area } S = \frac{1000}{CN} - 10 = \frac{1000}{65} - 10 = 5.38 \text{ inches}$$

Pervious area initial abstraction = 0.2S = (0.2)(5.38) = 1.08 inches

0.8S = (0.8)(5.38) = 4.30 inches

$$\text{Pervious area runoff volume} = Q = \frac{(P - 0.2S)^2}{P + 0.8S} = \frac{(1.77 - 1.08)^2}{1.77 + 4.30} = 0.08 \text{ inches}$$

Runoff volume = (0.08 inches/12 inches per foot)(2 acres)(43,560 sf per acre)
= 581 cubic feet

Pervious area runoff volume = total runoff volume = 581 cubic feet

From the above example, it can be seen that a key parameter in the two-step runoff computation technique for unconnected impervious cover is the effective size of the downstream pervious area. The following three criteria, in conjunction with the seven requirements for all unconnected impervious areas shown above, should be used to determine the effective size of this downstream area:

1. The minimum sheet flow length across the downstream pervious area is 25 feet.
2. The maximum sheet flow length across the unconnected impervious area is 100 feet.
3. While the total flow length area may be greater, the maximum sheet flow length across the downstream pervious area that can be used to compute the total resultant runoff volume is 150 feet.

These criteria are illustrated below in Figures 5-5 and 5-6 for both on-grade and above-grade unconnected impervious areas, respectively. Additional criteria for determining the lower limits of the downstream pervious area are presented in Figure 5-7. When using Figure 5-6 with overlapping pervious areas downstream of roof downspouts, the overlapping areas should be counted only once in the computation of the total pervious area downstream of the roof.

Finally, when computing the peak runoff rate or hydrograph from an area with unconnected impervious cover, the time of concentration of the combined impervious and downstream pervious area should be based upon the Tc of the downstream pervious area only, with the Tc route beginning as sheet flow at the upper end of the pervious area.

Attachment B – Runoff Volume Calculations

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	1
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.229**	acres	9981	sq ft
Roof	0.119	acres	5187	sq ft
Driveway/sidewalk	0.021	acres	928	sq ft
Other Impervious	0.007	acres	288	sq ft
Lawn	0.046	acres	2021	sq ft
Other Pervious	0.036	acres	1556	sq ft

Impervious Areas				
Total Impervious Area	**0.147**	acres	6404	sq ft
	64%			
Directly Connected Impervious Areas				
w/ Roof connected	0.140	acres	6116	sq ft
w/ Roof disconnected	0.021	acres	928	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.007	acres	288	sq ft
w/ Roof disconnected	0.126	acres	5476	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**49**	**68**	**79**	**83**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.147	0.082	64		83	93	0.75	0.15	0.080	**67**	**500**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.082				49	10.41	2.08	0.000	0	0	
	Impervious Area		0.147					98	0.20	0.04	0.264	141	1055	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**141**	**1055**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.126					98	0.20	0.04	0.264	121	902	
	Equiv. Rain on Downstream Pervious Area (in)	0.40												
	New Total Effective Rainfall Depth (in)	0.84												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.082				49	10.41	2.08	0.000	0	0	
	Downstream Impervious Area Runoff		0.021					98	0.20	0.04	0.264	20	153	
	Weighted Volume Total											**20**	**153**	
Reduction in Runoff obtained by disconnecting Roof												**121**	**902**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.147	0.082	64		83	93	0.75	0.15	0.080	**67**	**500**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.082				68	4.71	0.94	0.000	0	0	
	Impervious Area		0.147					98	0.20	0.04	0.264	141	1055	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**141**	**1055**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.126					98	0.20	0.04	0.264	121	902	
	Equiv. Rain on Downstream Pervious Area (in)	0.40												
	New Total Effective Rainfall Depth (in)	0.84												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.082				68	4.71	0.94	0.000	0	0	
	Downstream Impervious Area Runoff		0.021					98	0.20	0.04	0.264	20	153	
	Weighted Volume Total											**20**	**153**	
Reduction in Runoff obtained by disconnecting Roof												**121**	**902**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.147	0.082	64		83	93	0.75	0.15	0.080	**67**	**500**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.082				79	2.66	0.53	0.000	0	0	
	Impervious Area		0.147					98	0.20	0.04	0.264	141	1055	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**141**	**1055**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.126					98	0.20	0.04	0.264	121	902	
	Equiv. Rain on Downstream Pervious Area (in)	0.40												
	New Total Effective Rainfall Depth (in)	0.84												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.082				79	2.66	0.53	0.032	10	71	
	Downstream Impervious Area Runoff		0.021					98	0.20	0.04	0.264	20	153	
	Weighted Volume Total											**30**	**224**	
Reduction in Runoff obtained by disconnecting Roof												**111**	**830**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**6**	**47**	
Developed (Composite Curve Number Approach)			0.147	0.082	64		83	93	0.75	0.15	0.080	**67**	**500**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.082				83	2.05	0.41	0.000	0	1	
	Impervious Area		0.147					98	0.20	0.04	0.264	141	1055	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.265	**141**	**1056**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.126					98	0.20	0.04	0.264	121	902	
	Equiv. Rain on Downstream Pervious Area (in)	0.40												
	New Total Effective Rainfall Depth (in)	0.84												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.082				83	2.05	0.41	0.075	22	167	
	Downstream Impervious Area Runoff		0.021					98	0.20	0.04	0.264	20	153	
	Weighted Volume Total											**43**	**319**	
Reduction in Runoff obtained by disconnecting Roof												**98**	**736**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	2
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.235**	acres	10255	sq ft
Roof	0.085	acres	3718	sq ft
Driveway/sidewalk	0.025	acres	1100	sq ft
Other Impervious	0.004	acres	170	sq ft
Lawn	0.030	acres	1289	sq ft
Other Pervious	0.091	acres	3978	sq ft

Impervious Areas				
Total Impervious Area	**0.115**	acres	4988	sq ft
	49%			
Directly Connected Impervious Areas				
w/ Roof connected	0.111	acres	4818	sq ft
w/ Roof disconnected	0.025	acres	1100	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.004	acres	170	sq ft
w/ Roof disconnected	0.089	acres	3888	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**57**	**73**	**82**	**86**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.115	0.121	49		86	92	0.87	0.17	0.062	**53**	**399**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.121				57	7.54	1.51	0.000	0	0	
	Impervious Area		0.115					98	0.20	0.04	0.264	110	821	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**110**	**821**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.089					98	0.20	0.04	0.264	86	640	
	Equiv. Rain on Downstream Pervious Area (in)	0.20												
	New Total Effective Rainfall Depth (in)	0.64												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.121				57	7.54	1.51	0.000	0	0	
	Downstream Impervious Area Runoff		0.025					98	0.20	0.04	0.264	24	181	
	Weighted Volume Total											**24**	**181**	
Reduction in Runoff obtained by disconnecting Roof												**86**	**640**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.115	0.121	49		86	92	0.87	0.17	0.062	**53**	**399**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.121				73	3.70	0.74	0.000	0	0	
	Impervious Area		0.115					98	0.20	0.04	0.264	110	821	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**110**	**821**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.089					98	0.20	0.04	0.264	86	640	
	Equiv. Rain on Downstream Pervious Area (in)	0.20												
	New Total Effective Rainfall Depth (in)	0.64												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.121				73	3.70	0.74	0.000	0	0	
	Downstream Impervious Area Runoff		0.025					98	0.20	0.04	0.264	24	181	
	Weighted Volume Total											**24**	**181**	
Reduction in Runoff obtained by disconnecting Roof												**86**	**640**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.115	0.121	49		86	92	0.87	0.17	0.062	**53**	**399**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.121				82	2.20	0.44	0.000	0	0	
	Impervious Area		0.115					98	0.20	0.04	0.264	110	821	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**110**	**821**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.089					98	0.20	0.04	0.264	86	640	
	Equiv. Rain on Downstream Pervious Area (in)	0.20												
	New Total Effective Rainfall Depth (in)	0.64												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.121				82	2.20	0.44	0.017	7	55	
	Downstream Impervious Area Runoff		0.025					98	0.20	0.04	0.264	24	181	
	Weighted Volume Total											**32**	**236**	
Reduction in Runoff obtained by disconnecting Roof												**78**	**585**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**6**	**48**	
Developed (Composite Curve Number Approach)			0.115	0.121	49		86	92	0.87	0.17	0.062	**53**	**399**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.121				86	1.63	0.33	0.008	3	25	
	Impervious Area		0.115					98	0.20	0.04	0.264	110	821	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.272	**113**	**846**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.089					98	0.20	0.04	0.264	86	640	
	Equiv. Rain on Downstream Pervious Area (in)	0.20												
	New Total Effective Rainfall Depth (in)	0.64												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.121				86	1.63	0.33	0.051	22	167	
	Downstream Impervious Area Runoff		0.025					98	0.20	0.04	0.264	24	181	
	Weighted Volume Total											**47**	**348**	
Reduction in Runoff obtained by disconnecting Roof												**67**	**498**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	3
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

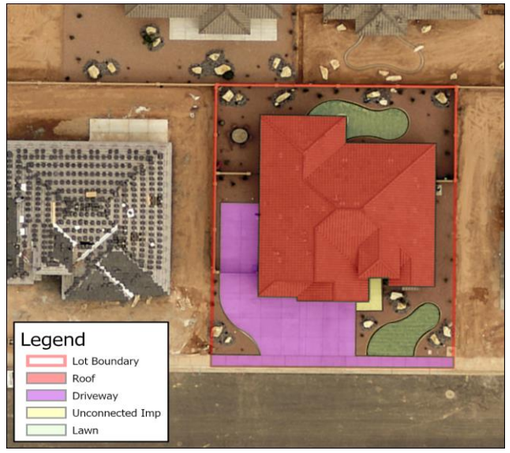
80th Percentile Storm Depth	**0.44**	in

Total Area	**0.195**	acres	8486	sq ft
Roof	0.083	acres	3624	sq ft
Driveway/sidewalk	0.037	acres	1613	sq ft
Other Impervious	0.002	acres	71	sq ft
Lawn	0.013	acres	563	sq ft
Other Pervious	0.060	acres	2615	sq ft

Impervious Areas				
Total Impervious Area	**0.122**	acres	5308	sq ft
	63%			
Directly Connected Impervious Areas				
w/ Roof connected	0.120	acres	5237	sq ft
w/ Roof disconnected	0.037	acres	1613	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.002	acres	71	sq ft
w/ Roof disconnected	0.085	acres	3695	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**59**	**74**	**83**	**87**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.122	0.073	63		87	94	0.64	0.13	0.103	**73**	**543**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.073				59	6.95	1.39	0.000	0	0	
	Impervious Area		0.122					98	0.20	0.04	0.264	117	874	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**117**	**874**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	81	609	
	Equiv. Rain on Downstream Pervious Area (in)	0.31												
	New Total Effective Rainfall Depth (in)	0.75												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.073				59	6.95	1.39	0.000	0	0	
	Downstream Impervious Area Runoff		0.037					98	0.20	0.04	0.264	35	266	
	Weighted Volume Total											**35**	**266**	
Reduction in Runoff obtained by disconnecting Roof												**81**	**609**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.122	0.073	63		87	94	0.64	0.13	0.103	**73**	**543**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.073				74	3.51	0.70	0.000	0	0	
	Impervious Area		0.122					98	0.20	0.04	0.264	117	874	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**117**	**874**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	81	609	
	Equiv. Rain on Downstream Pervious Area (in)	0.31												
	New Total Effective Rainfall Depth (in)	0.75												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.073				74	3.51	0.70	0.001	0	1	
	Downstream Impervious Area Runoff		0.037					98	0.20	0.04	0.264	35	266	
	Weighted Volume Total											**36**	**267**	
Reduction in Runoff obtained by disconnecting Roof												**81**	**607**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.122	0.073	63		87	94	0.64	0.13	0.103	**73**	**543**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.073				83	2.05	0.41	0.000	0	1	
	Impervious Area		0.122					98	0.20	0.04	0.264	117	874	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.265	**117**	**875**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	81	609	
	Equiv. Rain on Downstream Pervious Area (in)	0.31												
	New Total Effective Rainfall Depth (in)	0.75												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.073				83	2.05	0.41	0.049	13	96	
	Downstream Impervious Area Runoff		0.037					98	0.20	0.04	0.264	35	266	
	Weighted Volume Total											**48**	**362**	
Reduction in Runoff obtained by disconnecting Roof												**69**	**513**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**5**	**40**	
Developed (Composite Curve Number Approach)			0.122	0.073	63		87	94	0.64	0.13	0.103	**73**	**543**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.073				87	1.49	0.30	0.012	3	24	
	Impervious Area		0.122					98	0.20	0.04	0.264	117	874	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.276	**120**	**898**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	81	609	
	Equiv. Rain on Downstream Pervious Area (in)	0.31												
	New Total Effective Rainfall Depth (in)	0.75												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.073				87	1.49	0.30	0.105	28	207	
	Downstream Impervious Area Runoff		0.037					98	0.20	0.04	0.264	35	266	
	Weighted Volume Total											**63**	**473**	
Reduction in Runoff obtained by disconnecting Roof												**57**	**425**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	4
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.193**	acres	8394	sq ft
Roof	0.069	acres	3027	sq ft
Driveway/sidewalk	0.015	acres	638	sq ft
Other Impervious	0.004	acres	170	sq ft
Lawn	0.027	acres	1166	sq ft
Other Pervious	0.078	acres	3393	sq ft

Impervious Areas				
Total Impervious Area	**0.088**	acres	3834	sq ft
	46%			
Directly Connected Impervious Areas				
w/ Roof connected	0.084	acres	3664	sq ft
w/ Roof disconnected	0.015	acres	638	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.004	acres	170	sq ft
w/ Roof disconnected	0.073	acres	3197	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**57**	**73**	**82**	**86**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.088	0.105	46		86	91	0.99	0.20	0.048	**33**	**249**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.105				57	7.54	1.51	0.000	0	0	
	Impervious Area		0.088					98	0.20	0.04	0.264	84	631	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**84**	**631**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.073					98	0.20	0.04	0.264	70	526	
	Equiv. Rain on Downstream Pervious Area (in)	0.19												
	New Total Effective Rainfall Depth (in)	0.63												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.105				57	7.54	1.51	0.000	0	0	
	Downstream Impervious Area Runoff		0.015					98	0.20	0.04	0.264	14	105	
	Weighted Volume Total											**14**	**105**	
Reduction in Runoff obtained by disconnecting Roof												**70**	**526**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.088	0.105	46		86	91	0.99	0.20	0.048	**33**	**249**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.105				73	3.70	0.74	0.000	0	0	
	Impervious Area		0.088					98	0.20	0.04	0.264	84	631	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**84**	**631**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.073					98	0.20	0.04	0.264	70	526	
	Equiv. Rain on Downstream Pervious Area (in)	0.19												
	New Total Effective Rainfall Depth (in)	0.63												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.105				73	3.70	0.74	0.000	0	0	
	Downstream Impervious Area Runoff		0.015					98	0.20	0.04	0.264	14	105	
	Weighted Volume Total											**14**	**105**	
Reduction in Runoff obtained by disconnecting Roof												**70**	**526**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.088	0.105	46		86	91	0.99	0.20	0.048	**33**	**249**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.105				82	2.20	0.44	0.000	0	0	
	Impervious Area		0.088					98	0.20	0.04	0.264	84	631	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**84**	**631**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.073					98	0.20	0.04	0.264	70	526	
	Equiv. Rain on Downstream Pervious Area (in)	0.19												
	New Total Effective Rainfall Depth (in)	0.63												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.105				82	2.20	0.44	0.015	6	43	
	Downstream Impervious Area Runoff		0.015					98	0.20	0.04	0.264	14	105	
	Weighted Volume Total											**20**	**148**	
Reduction in Runoff obtained by disconnecting Roof												**65**	**483**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**5**	**39**	
Developed (Composite Curve Number Approach)			0.088	0.105	46		86	91	0.99	0.20	0.048	**33**	**249**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.105				86	1.63	0.33	0.008	3	21	
	Impervious Area		0.088					98	0.20	0.04	0.264	84	631	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.272	**87**	**653**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.073					98	0.20	0.04	0.264	70	526	
	Equiv. Rain on Downstream Pervious Area (in)	0.19												
	New Total Effective Rainfall Depth (in)	0.63												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.105				86	1.63	0.33	0.048	18	136	
	Downstream Impervious Area Runoff		0.015					98	0.20	0.04	0.264	14	105	
	Weighted Volume Total											**32**	**241**	
Reduction in Runoff obtained by disconnecting Roof												**55**	**411**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	5
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.195**	acres	8474	sq ft
Roof	0.088	acres	3812	sq ft
Driveway/sidewalk	0.020	acres	855	sq ft
Other Impervious	0.003	acres	123	sq ft
Lawn	0.016	acres	684	sq ft
Other Pervious	0.069	acres	2999	sq ft

Impervious Areas				
Total Impervious Area	**0.110**	acres	4791	sq ft
	57%			
Directly Connected Impervious Areas				
w/ Roof connected	0.107	acres	4667	sq ft
w/ Roof disconnected	0.020	acres	855	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.003	acres	123	sq ft
w/ Roof disconnected	0.090	acres	3935	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**59**	**74**	**83**	**87**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.110	0.085	57		87	93	0.75	0.15	0.080	**57**	**425**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.085				59	6.95	1.39	0.000	0	0	
	Impervious Area		0.110					98	0.20	0.04	0.264	105	789	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**105**	**789**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.090					98	0.20	0.04	0.264	87	648	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.085				59	6.95	1.39	0.000	0	0	
	Downstream Impervious Area Runoff		0.020					98	0.20	0.04	0.264	19	141	
	Weighted Volume Total											**19**	**141**	
Reduction in Runoff obtained by disconnecting Roof												**87**	**648**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.110	0.085	57		87	93	0.75	0.15	0.080	**57**	**425**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.085				74	3.51	0.70	0.000	0	0	
	Impervious Area		0.110					98	0.20	0.04	0.264	105	789	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**105**	**789**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.090					98	0.20	0.04	0.264	87	648	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.085				74	3.51	0.70	0.000	0	0	
	Downstream Impervious Area Runoff		0.020					98	0.20	0.04	0.264	19	141	
	Weighted Volume Total											**19**	**141**	
Reduction in Runoff obtained by disconnecting Roof												**87**	**648**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.110	0.085	57		87	93	0.75	0.15	0.080	**57**	**425**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.085				83	2.05	0.41	0.000	0	1	
	Impervious Area		0.110					98	0.20	0.04	0.264	105	789	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.265	**106**	**790**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.090					98	0.20	0.04	0.264	87	648	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.085				83	2.05	0.41	0.041	13	94	
	Downstream Impervious Area Runoff		0.020					98	0.20	0.04	0.264	19	141	
	Weighted Volume Total											**31**	**235**	
Reduction in Runoff obtained by disconnecting Roof												**74**	**555**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**5**	**40**	
Developed (Composite Curve Number Approach)			0.110	0.085	57		87	93	0.75	0.15	0.080	**57**	**425**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.085				87	1.49	0.30	0.012	4	28	
	Impervious Area		0.110					98	0.20	0.04	0.264	105	789	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.276	**109**	**817**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.090					98	0.20	0.04	0.264	87	648	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.085				87	1.49	0.30	0.093	28	213	
	Downstream Impervious Area Runoff		0.020					98	0.20	0.04	0.264	19	141	
	Weighted Volume Total											**47**	**353**	
Reduction in Runoff obtained by disconnecting Roof												**62**	**463**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	6
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.286**	acres	12450	sq ft
Roof	0.062	acres	2696	sq ft
Driveway/sidewalk	0.023	acres	992	sq ft
Other Impervious	0.013	acres	580	sq ft
Lawn	0.063	acres	2744	sq ft
Other Pervious	0.125	acres	5438	sq ft

Impervious Areas				
Total Impervious Area	**0.098**	acres	4268	sq ft
	34%			
Directly Connected Impervious Areas				
w/ Roof connected	0.085	acres	3688	sq ft
w/ Roof disconnected	0.023	acres	992	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.013	acres	580	sq ft
w/ Roof disconnected	0.075	acres	3276	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**55**	**72**	**81**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.098	0.188	34		85	89	1.24	0.25	0.026	**27**	**202**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.188				55	8.18	1.64	0.000	0	0	
	Impervious Area		0.098					98	0.20	0.04	0.264	94	703	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**94**	**703**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.075					98	0.20	0.04	0.264	72	539	
	Equiv. Rain on Downstream Pervious Area (in)	0.11												
	New Total Effective Rainfall Depth (in)	0.55												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.188				55	8.18	1.64	0.000	0	0	
	Downstream Impervious Area Runoff		0.023					98	0.20	0.04	0.264	22	163	
	Weighted Volume Total											**22**	**163**	
Reduction in Runoff obtained by disconnecting Roof												**72**	**539**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.098	0.188	34		85	89	1.24	0.25	0.026	**27**	**202**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.188				72	3.89	0.78	0.000	0	0	
	Impervious Area		0.098					98	0.20	0.04	0.264	94	703	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**94**	**703**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.075					98	0.20	0.04	0.264	72	539	
	Equiv. Rain on Downstream Pervious Area (in)	0.11												
	New Total Effective Rainfall Depth (in)	0.55												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.188				72	3.89	0.78	0.000	0	0	
	Downstream Impervious Area Runoff		0.023					98	0.20	0.04	0.264	22	163	
	Weighted Volume Total											**22**	**163**	
Reduction in Runoff obtained by disconnecting Roof												**72**	**539**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.098	0.188	34		85	89	1.24	0.25	0.026	**27**	**202**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.188				81	2.35	0.47	0.000	0	0	
	Impervious Area		0.098					98	0.20	0.04	0.264	94	703	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**94**	**703**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.075					98	0.20	0.04	0.264	72	539	
	Equiv. Rain on Downstream Pervious Area (in)	0.11												
	New Total Effective Rainfall Depth (in)	0.55												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.188				81	2.35	0.47	0.003	2	14	
	Downstream Impervious Area Runoff		0.023					98	0.20	0.04	0.264	22	163	
	Weighted Volume Total											**24**	**177**	
Reduction in Runoff obtained by disconnecting Roof												**70**	**526**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**8**	**58**	
Developed (Composite Curve Number Approach)			0.098	0.188	34		85	89	1.24	0.25	0.026	**27**	**202**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.188				85	1.76	0.35	0.004	3	21	
	Impervious Area		0.098					98	0.20	0.04	0.264	94	703	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**97**	**724**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.075					98	0.20	0.04	0.264	72	539	
	Equiv. Rain on Downstream Pervious Area (in)	0.11												
	New Total Effective Rainfall Depth (in)	0.55												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.188				85	1.76	0.35	0.020	13	101	
	Downstream Impervious Area Runoff		0.023					98	0.20	0.04	0.264	22	163	
	Weighted Volume Total											**35**	**264**	
Reduction in Runoff obtained by disconnecting Roof												**61**	**459**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	7
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.227**	acres	9881	sq ft
Roof	0.077	acres	3345	sq ft
Driveway/sidewalk	0.063	acres	2764	sq ft
Other Impervious	0.006	acres	240	sq ft
Lawn	0.032	acres	1400	sq ft
Other Pervious	0.049	acres	2132	sq ft

Impervious Areas				
Total Impervious Area	**0.146**	acres	6349	sq ft
	64%			
Directly Connected Impervious Areas				
w/ Roof connected	0.140	acres	6109	sq ft
w/ Roof disconnected	0.063	acres	2764	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.006	acres	240	sq ft
w/ Roof disconnected	0.082	acres	3585	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**53**	**71**	**81**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.146	0.081	64		85	93	0.75	0.15	0.080	**66**	**495**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.081				53	8.87	1.77	0.000	0	0	
	Impervious Area		0.146					98	0.20	0.04	0.264	140	1045	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**140**	**1045**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.082					98	0.20	0.04	0.264	79	590	
	Equiv. Rain on Downstream Pervious Area (in)	0.27												
	New Total Effective Rainfall Depth (in)	0.71												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.081				53	8.87	1.77	0.000	0	0	
	Downstream Impervious Area Runoff		0.063					98	0.20	0.04	0.264	61	455	
	Weighted Volume Total											**61**	**455**	
Reduction in Runoff obtained by disconnecting Roof												**79**	**590**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.146	0.081	64		85	93	0.75	0.15	0.080	**66**	**495**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.081				71	4.08	0.82	0.000	0	0	
	Impervious Area		0.146					98	0.20	0.04	0.264	140	1045	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**140**	**1045**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.082					98	0.20	0.04	0.264	79	590	
	Equiv. Rain on Downstream Pervious Area (in)	0.27												
	New Total Effective Rainfall Depth (in)	0.71												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.081				71	4.08	0.82	0.000	0	0	
	Downstream Impervious Area Runoff		0.063					98	0.20	0.04	0.264	61	455	
	Weighted Volume Total											**61**	**455**	
Reduction in Runoff obtained by disconnecting Roof												**79**	**590**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.146	0.081	64		85	93	0.75	0.15	0.080	**66**	**495**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.081				81	2.35	0.47	0.000	0	0	
	Impervious Area		0.146					98	0.20	0.04	0.264	140	1045	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**140**	**1045**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.082					98	0.20	0.04	0.264	79	590	
	Equiv. Rain on Downstream Pervious Area (in)	0.27												
	New Total Effective Rainfall Depth (in)	0.71												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.081				81	2.35	0.47	0.022	7	49	
	Downstream Impervious Area Runoff		0.063					98	0.20	0.04	0.264	61	455	
	Weighted Volume Total											**67**	**504**	
Reduction in Runoff obtained by disconnecting Roof												**72**	**541**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**6**	**46**	
Developed (Composite Curve Number Approach)			0.146	0.081	64		85	93	0.75	0.15	0.080	**66**	**495**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.081				85	1.76	0.35	0.004	1	9	
	Impervious Area		0.146					98	0.20	0.04	0.264	140	1045	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**141**	**1055**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.082					98	0.20	0.04	0.264	79	590	
	Equiv. Rain on Downstream Pervious Area (in)	0.27												
	New Total Effective Rainfall Depth (in)	0.71												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.081				85	1.76	0.35	0.060	18	132	
	Downstream Impervious Area Runoff		0.063					98	0.20	0.04	0.264	61	455	
	Weighted Volume Total											**79**	**587**	
Reduction in Runoff obtained by disconnecting Roof												**62**	**467**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	8
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.206**	acres	8976	sq ft
Roof	0.075	acres	3255	sq ft
Driveway/sidewalk	0.033	acres	1417	sq ft
Other Impervious	0.010	acres	456	sq ft
Lawn	0.033	acres	1454	sq ft
Other Pervious	0.055	acres	2394	sq ft

Impervious Areas				
Total Impervious Area	**0.118**	acres	5128	sq ft
	57%			
Directly Connected Impervious Areas				
w/ Roof connected	0.107	acres	4672	sq ft
w/ Roof disconnected	0.033	acres	1417	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.010	acres	456	sq ft
w/ Roof disconnected	0.085	acres	3711	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**54**	**71**	**81**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.118	0.088	57		85	92	0.87	0.17	0.062	**47**	**349**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.088				54	8.52	1.70	0.000	0	0	
	Impervious Area		0.118					98	0.20	0.04	0.264	113	844	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**113**	**844**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	82	611	
	Equiv. Rain on Downstream Pervious Area (in)	0.25												
	New Total Effective Rainfall Depth (in)	0.69												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.088				54	8.52	1.70	0.000	0	0	
	Downstream Impervious Area Runoff		0.033					98	0.20	0.04	0.264	31	233	
	Weighted Volume Total											**31**	**233**	
Reduction in Runoff obtained by disconnecting Roof												**82**	**611**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.118	0.088	57		85	92	0.87	0.17	0.062	**47**	**349**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.088				71	4.08	0.82	0.000	0	0	
	Impervious Area		0.118					98	0.20	0.04	0.264	113	844	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**113**	**844**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	82	611	
	Equiv. Rain on Downstream Pervious Area (in)	0.25												
	New Total Effective Rainfall Depth (in)	0.69												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.088				71	4.08	0.82	0.000	0	0	
	Downstream Impervious Area Runoff		0.033					98	0.20	0.04	0.264	31	233	
	Weighted Volume Total											**31**	**233**	
Reduction in Runoff obtained by disconnecting Roof												**82**	**611**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.118	0.088	57		85	92	0.87	0.17	0.062	**47**	**349**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.088				81	2.35	0.47	0.000	0	0	
	Impervious Area		0.118					98	0.20	0.04	0.264	113	844	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**113**	**844**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	82	611	
	Equiv. Rain on Downstream Pervious Area (in)	0.25												
	New Total Effective Rainfall Depth (in)	0.69												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.088				81	2.35	0.47	0.019	6	46	
	Downstream Impervious Area Runoff		0.033					98	0.20	0.04	0.264	31	233	
	Weighted Volume Total											**37**	**279**	
Reduction in Runoff obtained by disconnecting Roof												**76**	**565**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**6**	**42**	
Developed (Composite Curve Number Approach)			0.118	0.088	57		85	92	0.87	0.17	0.062	**47**	**349**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.088				85	1.76	0.35	0.004	1	10	
	Impervious Area		0.118					98	0.20	0.04	0.264	113	844	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**114**	**854**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.085					98	0.20	0.04	0.264	82	611	
	Equiv. Rain on Downstream Pervious Area (in)	0.25												
	New Total Effective Rainfall Depth (in)	0.69												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.088				85	1.76	0.35	0.054	17	130	
	Downstream Impervious Area Runoff		0.033					98	0.20	0.04	0.264	31	233	
	Weighted Volume Total											**49**	**363**	
Reduction in Runoff obtained by disconnecting Roof												**66**	**491**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	9
Zoning Type	Residential 1/4 Acre
Zoning ID	R-1-10

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.260**	acres	11320	sq ft
Roof	0.072	acres	3147	sq ft
Driveway/sidewalk	0.081	acres	3548	sq ft
Other Impervious	0.009	acres	380	sq ft
Lawn	0.059	acres	2550	sq ft
Other Pervious	0.039	acres	1695	sq ft

Impervious Areas				
Total Impervious Area	**0.162**	acres	7075	sq ft
	63%			
Directly Connected Impervious Areas				
w/ Roof connected	0.154	acres	6695	sq ft
w/ Roof disconnected	0.081	acres	3548	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.009	acres	380	sq ft
w/ Roof disconnected	0.081	acres	3527	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**49**	**67**	**78**	**83**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.162	0.097	63		83	92	0.87	0.17	0.062	**59**	**440**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.097				49	10.41	2.08	0.000	0	0	
	Impervious Area		0.162					98	0.20	0.04	0.264	156	1165	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**156**	**1165**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.081					98	0.20	0.04	0.264	78	581	
	Equiv. Rain on Downstream Pervious Area (in)	0.22												
	New Total Effective Rainfall Depth (in)	0.66												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.097				49	10.41	2.08	0.000	0	0	
	Downstream Impervious Area Runoff		0.081					98	0.20	0.04	0.264	78	584	
	Weighted Volume Total											**78**	**584**	
Reduction in Runoff obtained by disconnecting Roof												**78**	**581**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.162	0.097	63		83	92	0.87	0.17	0.062	**59**	**440**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.097				67	4.93	0.99	0.000	0	0	
	Impervious Area		0.162					98	0.20	0.04	0.264	156	1165	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**156**	**1165**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.081					98	0.20	0.04	0.264	78	581	
	Equiv. Rain on Downstream Pervious Area (in)	0.22												
	New Total Effective Rainfall Depth (in)	0.66												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.097				67	4.93	0.99	0.000	0	0	
	Downstream Impervious Area Runoff		0.081					98	0.20	0.04	0.264	78	584	
	Weighted Volume Total											**78**	**584**	
Reduction in Runoff obtained by disconnecting Roof												**78**	**581**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.162	0.097	63		83	92	0.87	0.17	0.062	**59**	**440**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.097				78	2.82	0.56	0.000	0	0	
	Impervious Area		0.162					98	0.20	0.04	0.264	156	1165	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**156**	**1165**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.081					98	0.20	0.04	0.264	78	581	
	Equiv. Rain on Downstream Pervious Area (in)	0.22												
	New Total Effective Rainfall Depth (in)	0.66												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.097				78	2.82	0.56	0.003	1	8	
	Downstream Impervious Area Runoff		0.081					98	0.20	0.04	0.264	78	584	
	Weighted Volume Total											**79**	**593**	
Reduction in Runoff obtained by disconnecting Roof												**77**	**572**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**7**	**53**	
Developed (Composite Curve Number Approach)			0.162	0.097	63		83	92	0.87	0.17	0.062	**59**	**440**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.097				83	2.05	0.41	0.000	0	1	
	Impervious Area		0.162					98	0.20	0.04	0.264	156	1165	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.265	**156**	**1166**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.081					98	0.20	0.04	0.264	78	581	
	Equiv. Rain on Downstream Pervious Area (in)	0.22												
	New Total Effective Rainfall Depth (in)	0.66												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.097				83	2.05	0.41	0.027	10	72	
	Downstream Impervious Area Runoff		0.081					98	0.20	0.04	0.264	78	584	
	Weighted Volume Total											**88**	**656**	
Reduction in Runoff obtained by disconnecting Roof												**68**	**510**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	10
Zoning Type	Residential 1/8 Acre
Zoning ID	R-1-6

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.120**	acres	5225	sq ft
Roof	0.049	acres	2155	sq ft
Driveway/sidewalk	0.017	acres	722	sq ft
Other Impervious	0.011	acres	479	sq ft
Lawn	0.017	acres	762	sq ft
Other Pervious	0.025	acres	1107	sq ft

Impervious Areas				
Total Impervious Area	**0.077**	acres	3356	sq ft
	64%			
Directly Connected Impervious Areas				
w/ Roof connected	0.066	acres	2878	sq ft
w/ Roof disconnected	0.017	acres	722	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.011	acres	479	sq ft
w/ Roof disconnected	0.060	acres	2634	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**53**	**70**	**81**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.077	0.043	64		85	93	0.75	0.15	0.080	**35**	**262**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.043				53	8.87	1.77	0.000	0	0	
	Impervious Area		0.077					98	0.20	0.04	0.264	74	553	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**74**	**553**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.060					98	0.20	0.04	0.264	58	434	
	Equiv. Rain on Downstream Pervious Area (in)	0.37												
	New Total Effective Rainfall Depth (in)	0.81												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.043				53	8.87	1.77	0.000	0	0	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	119	
	Weighted Volume Total											**16**	**119**	
Reduction in Runoff obtained by disconnecting Roof												**58**	**434**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.077	0.043	64		85	93	0.75	0.15	0.080	**35**	**262**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.043				70	4.29	0.86	0.000	0	0	
	Impervious Area		0.077					98	0.20	0.04	0.264	74	553	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**74**	**553**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.060					98	0.20	0.04	0.264	58	434	
	Equiv. Rain on Downstream Pervious Area (in)	0.37												
	New Total Effective Rainfall Depth (in)	0.81												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.043				70	4.29	0.86	0.000	0	0	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	119	
	Weighted Volume Total											**16**	**119**	
Reduction in Runoff obtained by disconnecting Roof												**58**	**434**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.077	0.043	64		85	93	0.75	0.15	0.080	**35**	**262**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.043				81	2.35	0.47	0.000	0	0	
	Impervious Area		0.077					98	0.20	0.04	0.264	74	553	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**74**	**553**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.060					98	0.20	0.04	0.264	58	434	
	Equiv. Rain on Downstream Pervious Area (in)	0.37												
	New Total Effective Rainfall Depth (in)	0.81												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.043				81	2.35	0.47	0.043	7	50	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	119	
	Weighted Volume Total											**23**	**169**	
Reduction in Runoff obtained by disconnecting Roof												**51**	**383**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**3**	**24**	
Developed (Composite Curve Number Approach)			0.077	0.043	64		85	93	0.75	0.15	0.080	**35**	**262**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.043				85	1.76	0.35	0.004	1	5	
	Impervious Area		0.077					98	0.20	0.04	0.264	74	553	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**75**	**557**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.060					98	0.20	0.04	0.264	58	434	
	Equiv. Rain on Downstream Pervious Area (in)	0.37												
	New Total Effective Rainfall Depth (in)	0.81												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.043				85	1.76	0.35	0.094	15	110	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	119	
	Weighted Volume Total											**31**	**228**	
Reduction in Runoff obtained by disconnecting Roof												**44**	**329**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	11
Zoning Type	Residential 1/8 Acre
Zoning ID	R-1-6

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.142**	acres	6166	sq ft
Roof	0.054	acres	2333	sq ft
Driveway/sidewalk	0.016	acres	699	sq ft
Other Impervious	0.011	acres	475	sq ft
Lawn	0.025	acres	1093	sq ft
Other Pervious	0.036	acres	1566	sq ft

Impervious Areas				
Total Impervious Area	**0.081**	acres	3507	sq ft
	57%			
Directly Connected Impervious Areas				
w/ Roof connected	0.070	acres	3032	sq ft
w/ Roof disconnected	0.016	acres	699	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.011	acres	475	sq ft
w/ Roof disconnected	0.064	acres	2808	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**53**	**70**	**80**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.081	0.061	57		85	92	0.87	0.17	0.062	**32**	**240**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.061				53	8.87	1.77	0.000	0	0	
	Impervious Area		0.081					98	0.20	0.04	0.264	77	577	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**77**	**577**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.064					98	0.20	0.04	0.264	62	462	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.061				53	8.87	1.77	0.000	0	0	
	Downstream Impervious Area Runoff		0.016					98	0.20	0.04	0.264	15	115	
	Weighted Volume Total											**15**	**115**	
Reduction in Runoff obtained by disconnecting Roof												**62**	**462**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.081	0.061	57		85	92	0.87	0.17	0.062	**32**	**240**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.061				70	4.29	0.86	0.000	0	0	
	Impervious Area		0.081					98	0.20	0.04	0.264	77	577	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**77**	**577**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.064					98	0.20	0.04	0.264	62	462	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.061				70	4.29	0.86	0.000	0	0	
	Downstream Impervious Area Runoff		0.016					98	0.20	0.04	0.264	15	115	
	Weighted Volume Total											**15**	**115**	
Reduction in Runoff obtained by disconnecting Roof												**62**	**462**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.081	0.061	57		85	92	0.87	0.17	0.062	**32**	**240**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.061				80	2.50	0.50	0.000	0	0	
	Impervious Area		0.081					98	0.20	0.04	0.264	77	577	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**77**	**577**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.064					98	0.20	0.04	0.264	62	462	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.061				80	2.50	0.50	0.018	4	30	
	Downstream Impervious Area Runoff		0.016					98	0.20	0.04	0.264	15	115	
	Weighted Volume Total											**19**	**145**	
Reduction in Runoff obtained by disconnecting Roof												**58**	**433**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**4**	**29**	
Developed (Composite Curve Number Approach)			0.081	0.061	57		85	92	0.87	0.17	0.062	**32**	**240**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.061				85	1.76	0.35	0.004	1	7	
	Impervious Area		0.081					98	0.20	0.04	0.264	77	577	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**78**	**584**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.064					98	0.20	0.04	0.264	62	462	
	Equiv. Rain on Downstream Pervious Area (in)	0.28												
	New Total Effective Rainfall Depth (in)	0.72												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.061				85	1.76	0.35	0.063	14	105	
	Downstream Impervious Area Runoff		0.016					98	0.20	0.04	0.264	15	115	
	Weighted Volume Total											**29**	**220**	
Reduction in Runoff obtained by disconnecting Roof												**49**	**364**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	12
Zoning Type	Residential 1/8 Acre
Zoning ID	R-1-6

80th Percentile Storm Depth	**0.44**	in

Total Area	**0.120**	acres	5219	sq ft
Roof	0.048	acres	2097	sq ft
Driveway/sidewalk	0.017	acres	750	sq ft
Other Impervious	0.002	acres	104	sq ft
Lawn	0.019	acres	806	sq ft
Other Pervious	0.034	acres	1463	sq ft

Impervious Areas				
Total Impervious Area	**0.068**	acres	2951	sq ft
	57%			
Directly Connected Impervious Areas				
w/ Roof connected	0.065	acres	2847	sq ft
w/ Roof disconnected	0.017	acres	750	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.002	acres	104	sq ft
w/ Roof disconnected	0.051	acres	2201	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**54**	**71**	**81**	**85**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.068	0.052	57		85	92	0.87	0.17	0.062	**27**	**203**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.052				54	8.52	1.70	0.000	0	0	
	Impervious Area		0.068					98	0.20	0.04	0.264	65	486	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**65**	**486**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.051					98	0.20	0.04	0.264	48	362	
	Equiv. Rain on Downstream Pervious Area (in)	0.26												
	New Total Effective Rainfall Depth (in)	0.70												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.052				54	8.52	1.70	0.000	0	0	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	123	
	Weighted Volume Total											**16**	**123**	
Reduction in Runoff obtained by disconnecting Roof												**48**	**362**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.068	0.052	57		85	92	0.87	0.17	0.062	**27**	**203**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.052				71	4.08	0.82	0.000	0	0	
	Impervious Area		0.068					98	0.20	0.04	0.264	65	486	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**65**	**486**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.051					98	0.20	0.04	0.264	48	362	
	Equiv. Rain on Downstream Pervious Area (in)	0.26												
	New Total Effective Rainfall Depth (in)	0.70												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.052				71	4.08	0.82	0.000	0	0	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	123	
	Weighted Volume Total											**16**	**123**	
Reduction in Runoff obtained by disconnecting Roof												**48**	**362**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			0.068	0.052	57		85	92	0.87	0.17	0.062	**27**	**203**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.052				81	2.35	0.47	0.000	0	0	
	Impervious Area		0.068					98	0.20	0.04	0.264	65	486	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**65**	**486**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.051					98	0.20	0.04	0.264	48	362	
	Equiv. Rain on Downstream Pervious Area (in)	0.26												
	New Total Effective Rainfall Depth (in)	0.70												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.052				81	2.35	0.47	0.021	4	29	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	123	
	Weighted Volume Total											**20**	**153**	
Reduction in Runoff obtained by disconnecting Roof												**45**	**333**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**3**	**24**	
Developed (Composite Curve Number Approach)			0.068	0.052	57		85	92	0.87	0.17	0.062	**27**	**203**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			0.052				85	1.76	0.35	0.004	1	6	
	Impervious Area		0.068					98	0.20	0.04	0.264	65	486	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.268	**66**	**492**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		0.051					98	0.20	0.04	0.264	48	362	
	Equiv. Rain on Downstream Pervious Area (in)	0.26												
	New Total Effective Rainfall Depth (in)	0.70												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			0.052				85	1.76	0.35	0.057	11	81	
	Downstream Impervious Area Runoff		0.017					98	0.20	0.04	0.264	16	123	
	Weighted Volume Total											**27**	**204**	
Reduction in Runoff obtained by disconnecting Roof												**38**	**288**	

Sample Site Data and Calculations are Provided FOR INFORMATION ONLY

Example Number	13
Zoning Type	Townhomes
Zoning ID	PUD

80th Percentile Storm Depth	**0.44**	in

Total Area	**12.767**	acres	556120	sq ft
Roof	2.817	acres	122706	sq ft
Driveway/sidewalk	3.689	acres	160710	sq ft
Other Impervious	0.599	acres	26108	sq ft
Lawn	0.325	acres	14151	sq ft
Other Pervious	5.336	acres	232444	sq ft

Impervious Areas				
Total Impervious Area	**7.106**	acres	309525	sq ft
	56%			
Directly Connected Impervious Areas				
w/ Roof connected	6.506	acres	283416	sq ft
w/ Roof disconnected	3.689	acres	160710	sq ft
Unconnnected Impervious Areas				
w/ Roof connected	0.599	acres	26108	sq ft
w/ Roof disconnected	3.416	acres	148815	sq ft

Curve numbers				
Soil Type	A	B	C	D
Undeveloped (Desert, Fair)	55	72	81	86
Natural Desert Landscaping	63	77	85	88
Lawn	39	61	74	80
Impervious Areas	98	98	98	98
Composite Pervious Numbers for this lot	**62**	**76**	**84**	**88**

Variable Abbreviations	
A_{imp}	Impervious Area, acres
A_{per}	Pervious Area, acres
P_{imp}	Percent Impervious, %
CN_p	Pervious Area Curve Number
CN_c	Composite Curve Number
S	Maxiumum Potential Retention, inches
Ia	Initial Abstraction, inches



Volume NEH 630/TR-55 Method

Scenario Description			A_{imp} (acres)	A_{per} (acres)	P_{imp} (%)	R (%)	CN_p -	CN_c -	S (in)	Ia (in)	Volume (in)	Volume (cu ft)	Volume (gal)	Comments
Soil Type A														
Undeveloped (Desert, Fair)					0	0	55	55	8.18	1.64	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			7.106	5.661	56		88	94	0.64	0.13	0.103	**4756**	**35576**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			5.661				62	6.13	1.23	0.000	0	0	
	Impervious Area		7.106					98	0.20	0.04	0.264	6813	50966	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**6813**	**50966**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		3.416					98	0.20	0.04	0.264	3276	24504	
	Equiv. Rain on Downstream Pervious Area (in)	0.16												
	New Total Effective Rainfall Depth (in)	0.60												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			5.661				62	6.13	1.23	0.000	0	0	
	Downstream Impervious Area Runoff		3.689					98	0.20	0.04	0.264	3538	26463	
	Weighted Volume Total											**3538**	**26463**	
Reduction in Runoff obtained by disconnecting Roof												**3276**	**24504**	
Soil Type B														
Undeveloped (Desert, Fair)					0	0	72	72	3.89	0.78	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			7.106	5.661	56		88	94	0.64	0.13	0.103	**4756**	**35576**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			5.661				76	3.16	0.63	0.000	0	0	
	Impervious Area		7.106					98	0.20	0.04	0.264	6813	50966	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.264	**6813**	**50966**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		3.416					98	0.20	0.04	0.264	3276	24504	
	Equiv. Rain on Downstream Pervious Area (in)	0.16												
	New Total Effective Rainfall Depth (in)	0.60												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			5.661				76	3.16	0.63	0.000	0	0	
	Downstream Impervious Area Runoff		3.689					98	0.20	0.04	0.264	3538	26463	
	Weighted Volume Total											**3538**	**26463**	
Reduction in Runoff obtained by disconnecting Roof												**3276**	**24504**	
Soil Type C														
Undeveloped (Desert, Fair)					0	0	81	81	2.35	0.47	0.000	**0**	**0**	
Developed (Composite Curve Number Approach)			7.106	5.661	56		88	94	0.64	0.13	0.103	**4756**	**35576**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			5.661				84	1.90	0.38	0.002	36	273	
	Impervious Area		7.106					98	0.20	0.04	0.264	6813	50966	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.266	**6850**	**51239**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		3.416					98	0.20	0.04	0.264	3276	24504	
	Equiv. Rain on Downstream Pervious Area (in)	0.16												
	New Total Effective Rainfall Depth (in)	0.60												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			5.661				84	1.90	0.38	0.023	464	3473	
	Downstream Impervious Area Runoff		3.689					98	0.20	0.04	0.264	3538	26463	
	Weighted Volume Total											**4002**	**29935**	
Reduction in Runoff obtained by disconnecting Roof												**2848**	**21304**	
Soil Type D														
Undeveloped (Desert, Fair)					0	0	86	86	1.63	0.33	0.008	**348**	**2605**	
Developed (Composite Curve Number Approach)			7.106	5.661	56		88	94	0.64	0.13	0.103	**4756**	**35576**	Typical Method - Underestimates runoff for areas with directly connected impervious surfaces.
Roof Connected - Weighted Average Volume	Pervious Area			5.661				88	1.36	0.27	0.018	376	2810	
	Impervious Area		7.106					98	0.20	0.04	0.264	6813	50966	Calculates runoff from impervious area and pervious areas separately.
	Weighted Volume Total										0.282	**7189**	**53776**	
Roof Disconnected - Two-Step Runoff Method	Runoff from Disconnected Imp Area		3.416					98	0.20	0.04	0.264	3276	24504	
	Equiv. Rain on Downstream Pervious Area (in)	0.16												
	New Total Effective Rainfall Depth (in)	0.60												Calculates runoff from roof, then applies that runoff as "rainfall" to the remaining downstream pervious areas.
	Downstream Pervious Area Runoff			5.661				88	1.36	0.27	0.063	1302	9737	
	Downstream Impervious Area Runoff		3.689					98	0.20	0.04	0.264	3538	26463	
	Weighted Volume Total											**4839**	**36200**	
Reduction in Runoff obtained by disconnecting Roof												**2350**	**17576**	