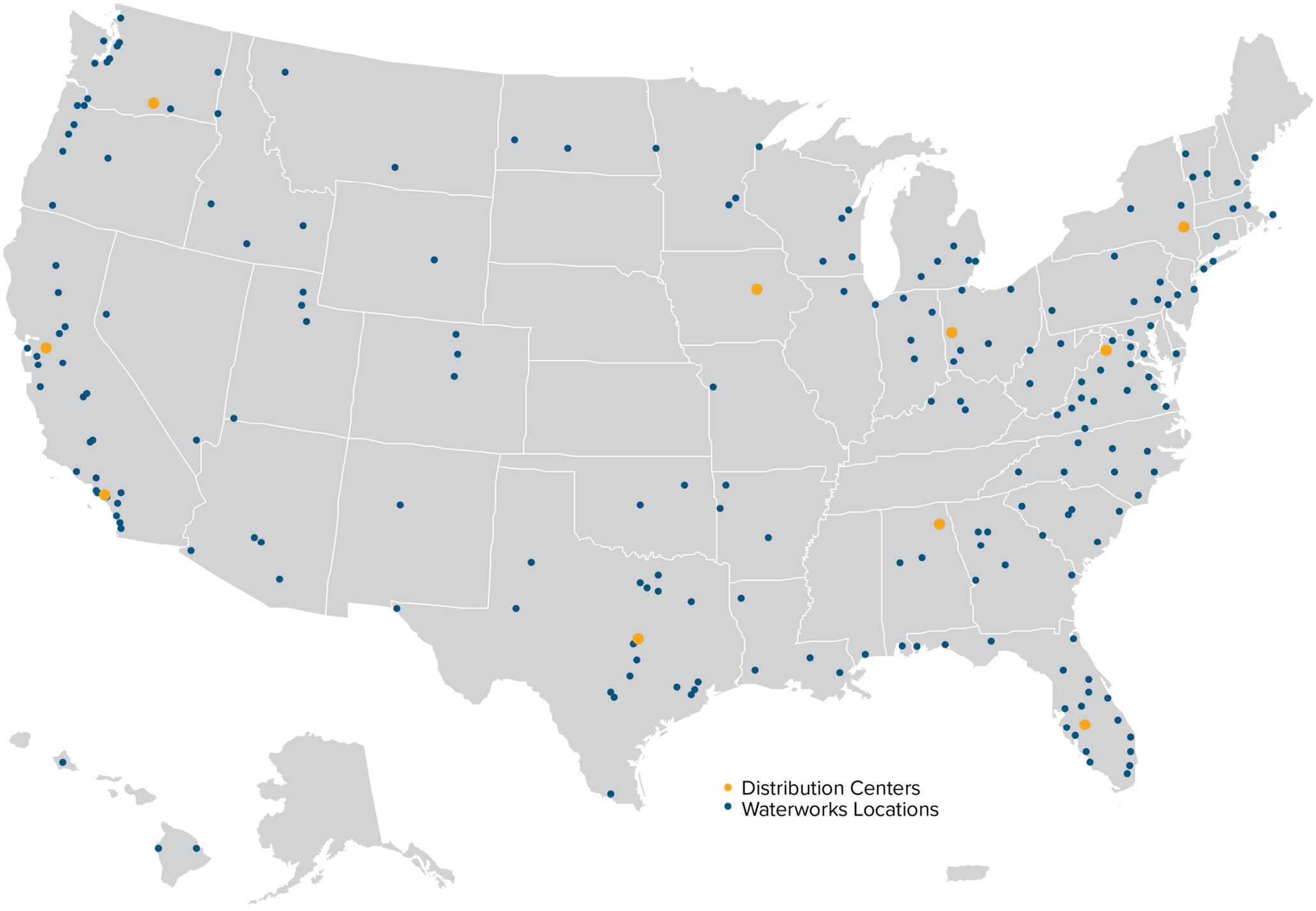
2023 GREEN INFRASTRUCTURE DESIGNER SURVEY

RESULTS AND LEARNINGS TO CONSIDER

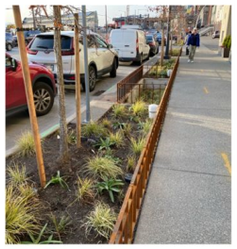
Rob Woodman, PE, NGICP, CPESC

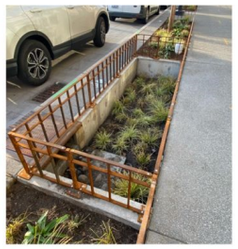
National Urban Green Infrastructure Manager

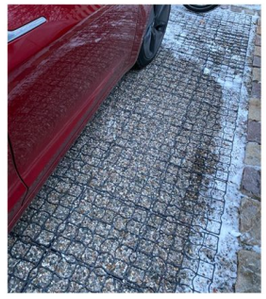
FERGUSON WATERWORKS LOCATIONS

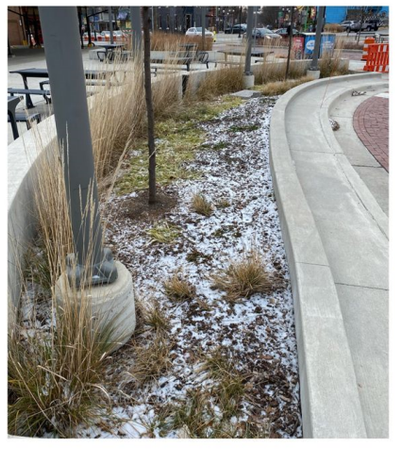


DEFENDER OF NATURAL RESOURCES









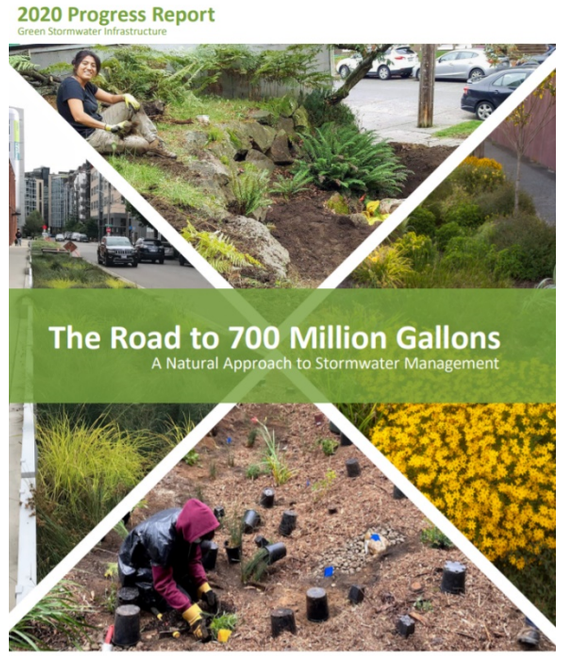
MY BACKGROUND

- Consulting engineer for 10 years
- Engineered solutions specialist for 9 years
- Supported engineers, landscape architects, municipalities and city scale GSI programs
- Perform 3rd party inspections on a wide variety of SWM BMPs throughout Southern Maine.
- Developed a VLOG LidBIT
- Had the opportunity to see and observe many challenges that go beyond the typical engineering plan

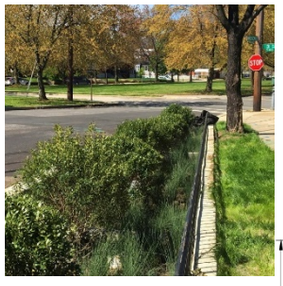
EACH CITY HAS THEIR OWN TAKE

CITY SCALE GI PROGRAMS

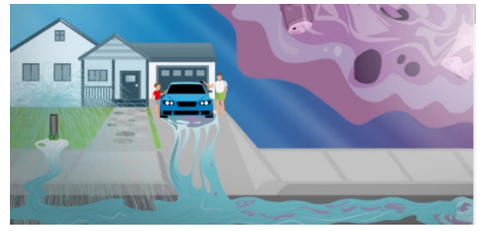
NYC Environmental Protection



Seattle Public Utilities

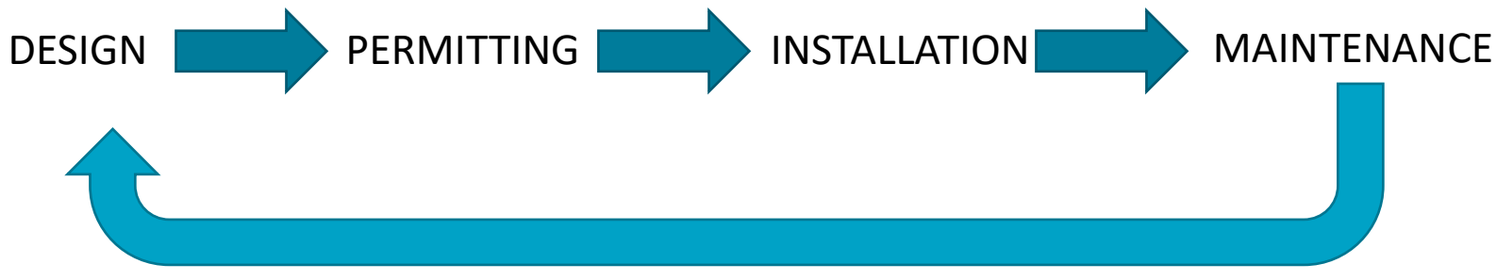


GREEN STREETS CLEAN WATER



COLLABORATION SHORTCOMINGS

- Interactions between Owner and designers
- Interactions between design team members
- Adequate funding
- Quality of bid documents
- Lack of oversight in field
- Planning for ongoing inspection and maintenance



COLLABORATION SHORTCOMINGS

WHEN IT IS DONE RIGHT

THE SURVEY

- Created to get useful feedback from the design community
- Great response from designers so far… still collecting responses.
- Add on / dig deeper from 2021 survey
- Addressed design process, construction, maintenance and overall connectivity
- Confirmed several items I was expecting – but hoping weren't true….
- Started to see some trends

The 2023 GSI Designer Survey

Collecting data to help educate on the improvement needed in green stormwater infrastructure (GSI) design and collaboration

What is your email address? *

Short answer text

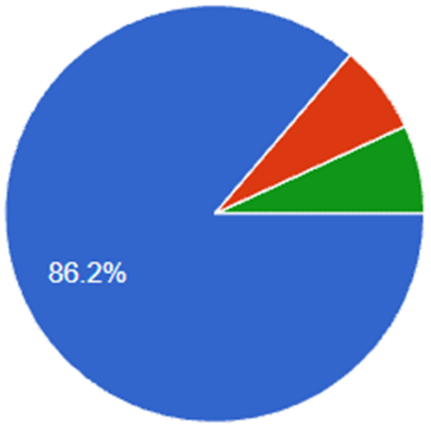
Are you a *

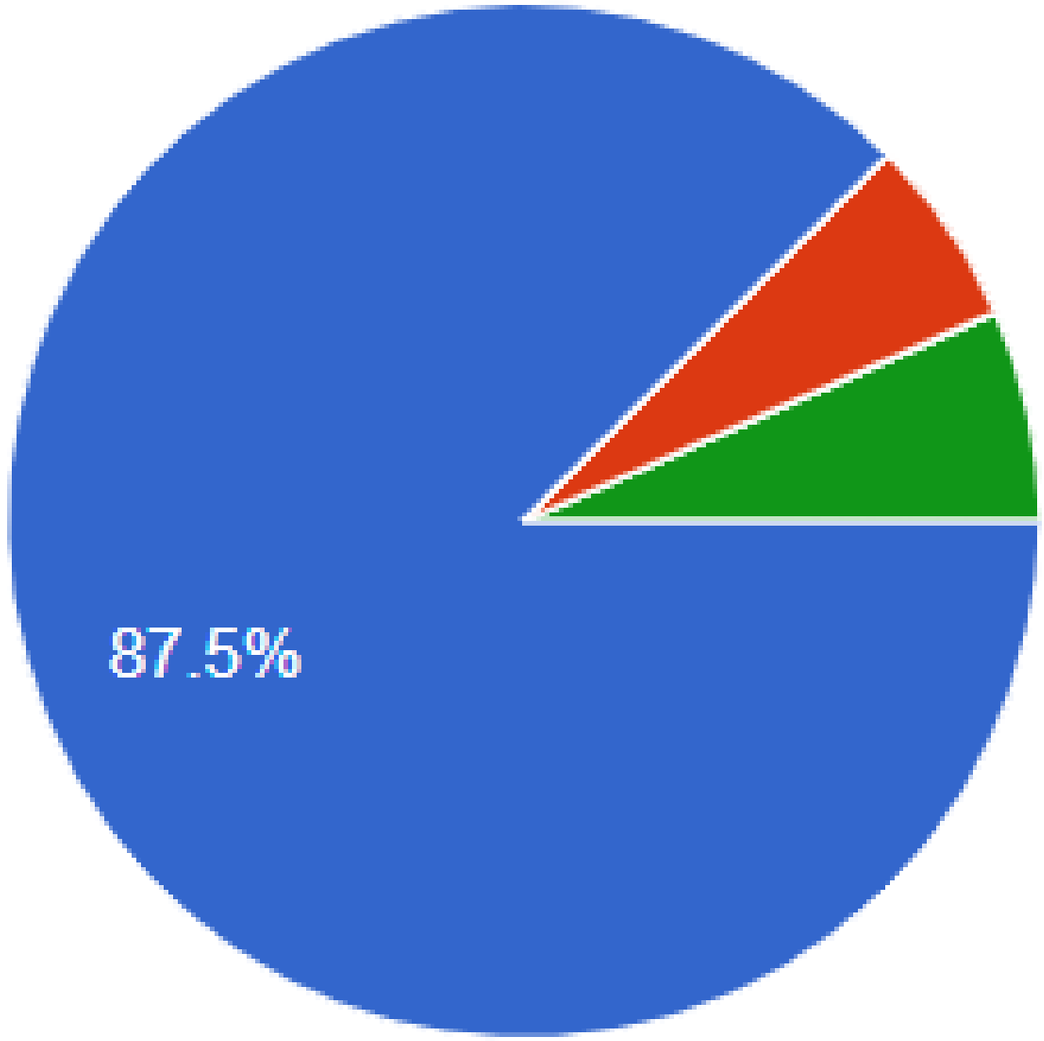
Civil Engineer

Landscape Architect

QUESTION 2

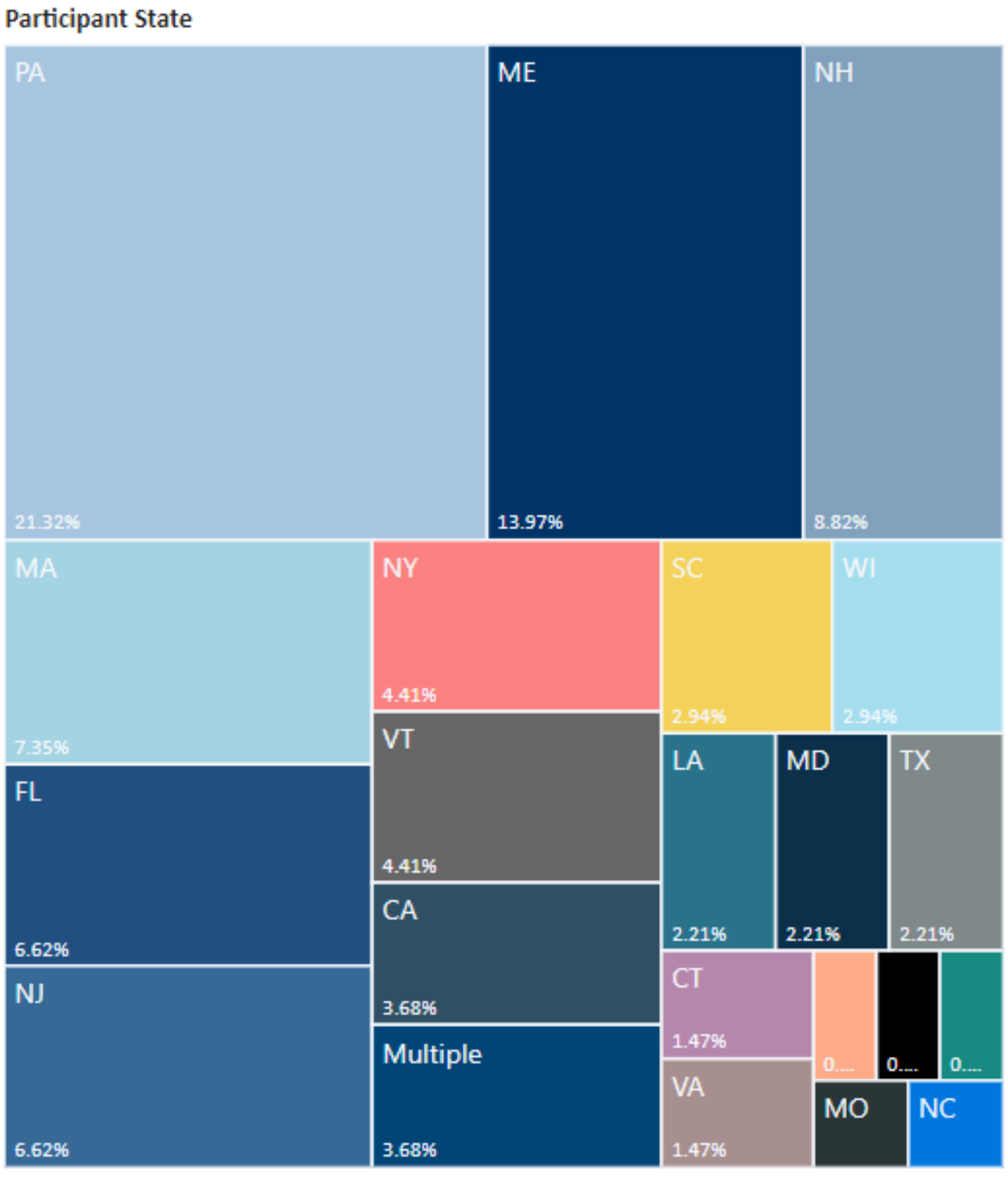
ARE YOU A….





QUESTION 3

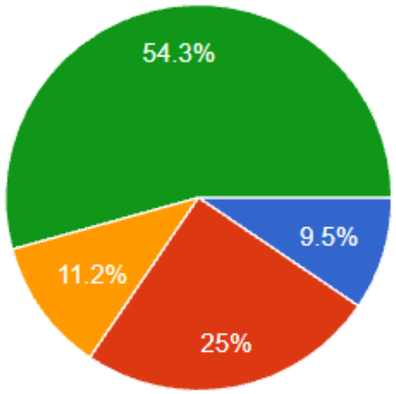
WHAT STATE ARE YOUR PROJECTS IN?



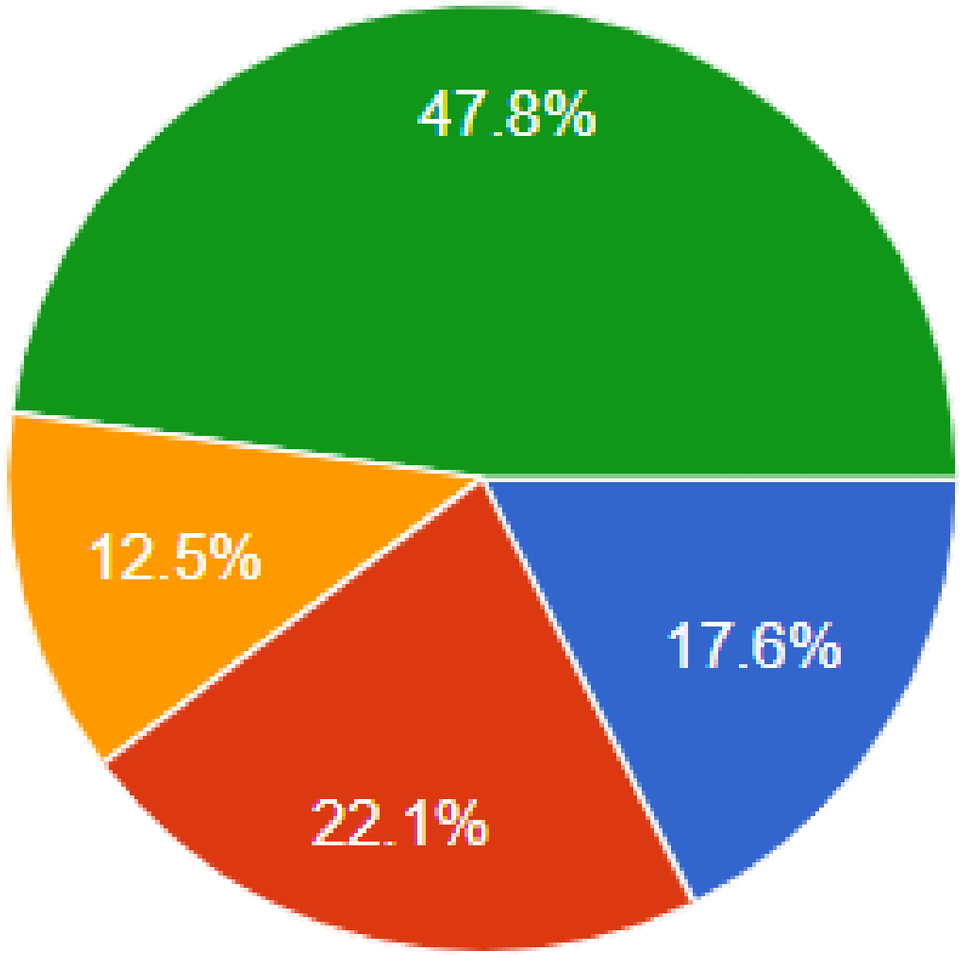
- 75% Between Maine and PA
- 7% Florida
- 5% on the West Coast

QUESTION 4

HOW MANY YEARS EXPERIENCE DO YOU HAVE?

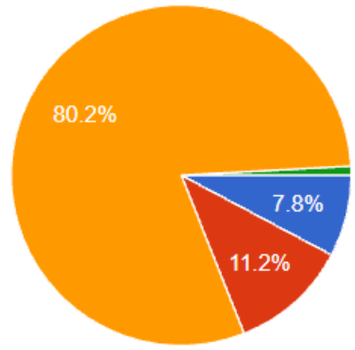


- 0 - 5 years
- 6-10 years
- 11-15 years
- More than 15 years

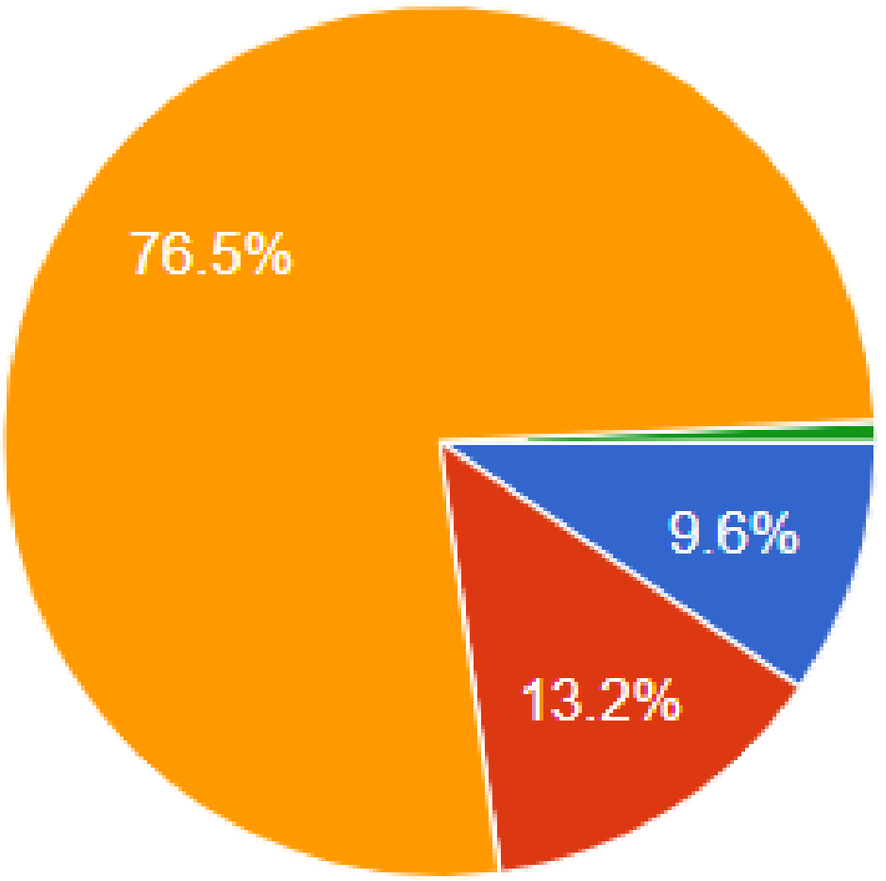


QUESTION 5

WHAT IS THE PRIMARY GOAL OF YOUR GSI DESIGNS

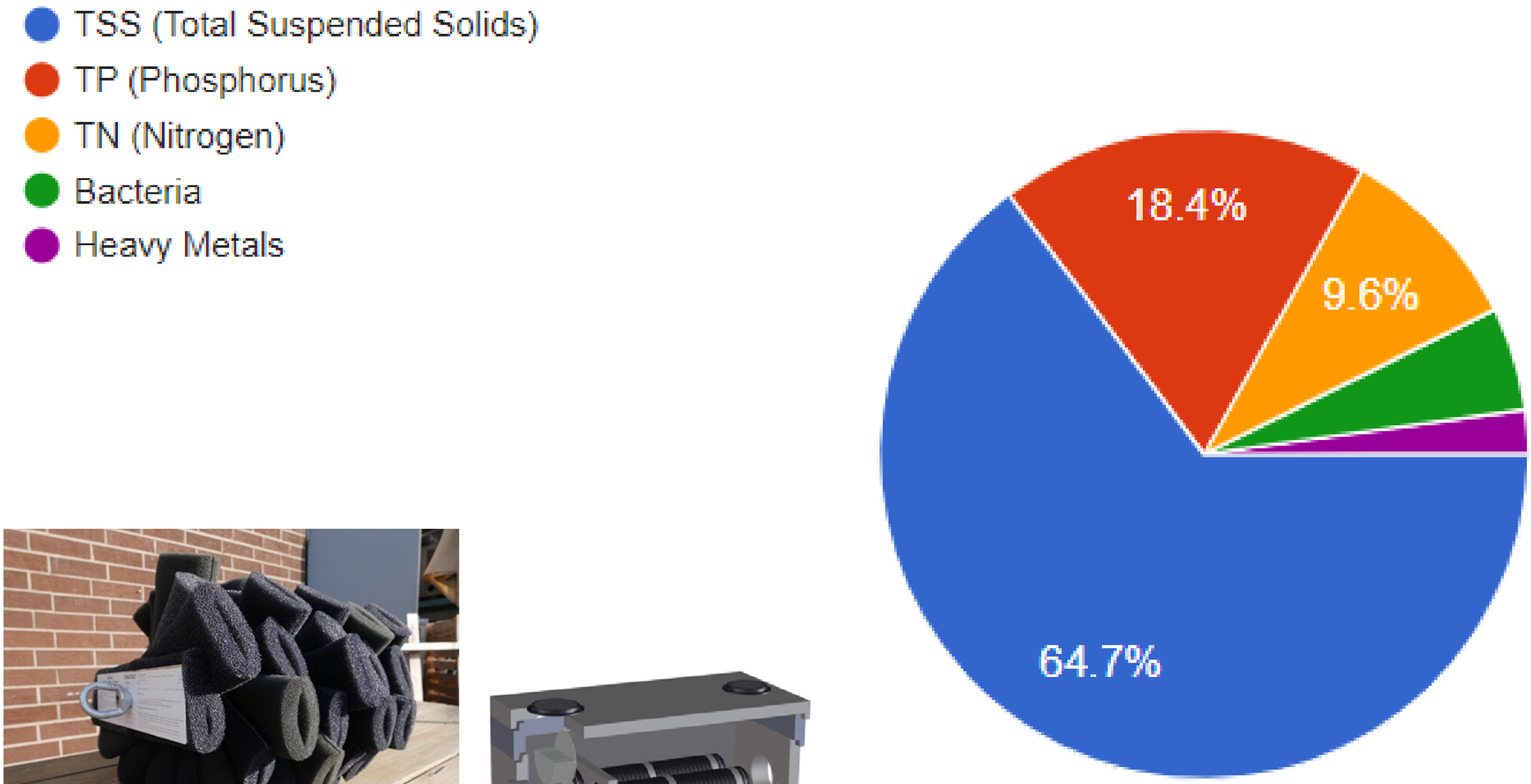


- Water Quantity management
- Water Quality Treatment
- Both Quantity and Quality
- Streetscape Beautification only



QUESTION 6

FOR WQ PROJECTS WHAT POLLUTANTS ARE YOUR MOSTLY DESIGNING TO TREAT?

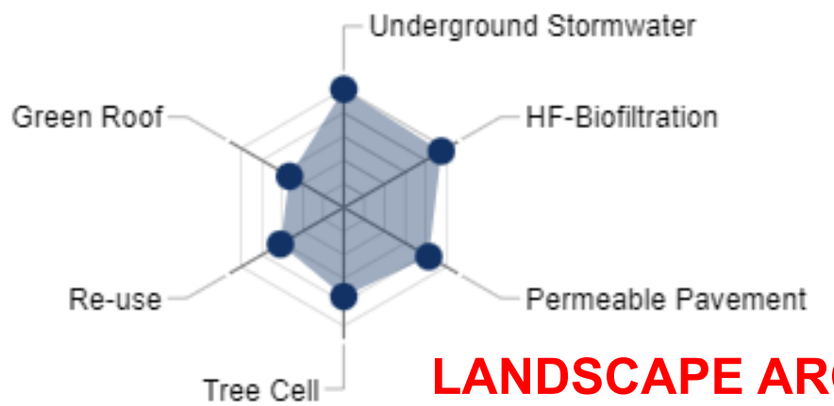


QUESTION 8

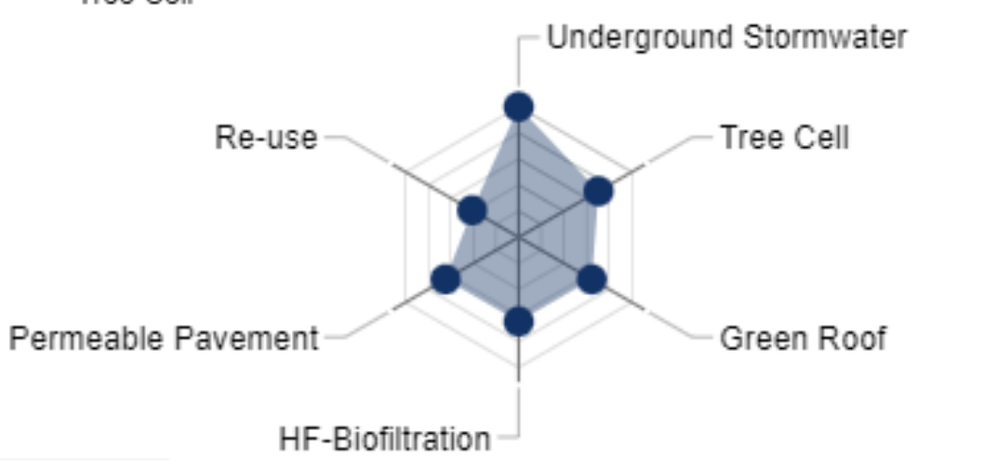
RANK IN ORDER WITH 1 BEING THE MOST IMPORTANT AND 6 BEING THE LEAST IMPORTANT THE FOLLOWING BEST MANAGEMENT PRACTICES FOR URBAN STORMWATER TREATMENT / UTILIZATION

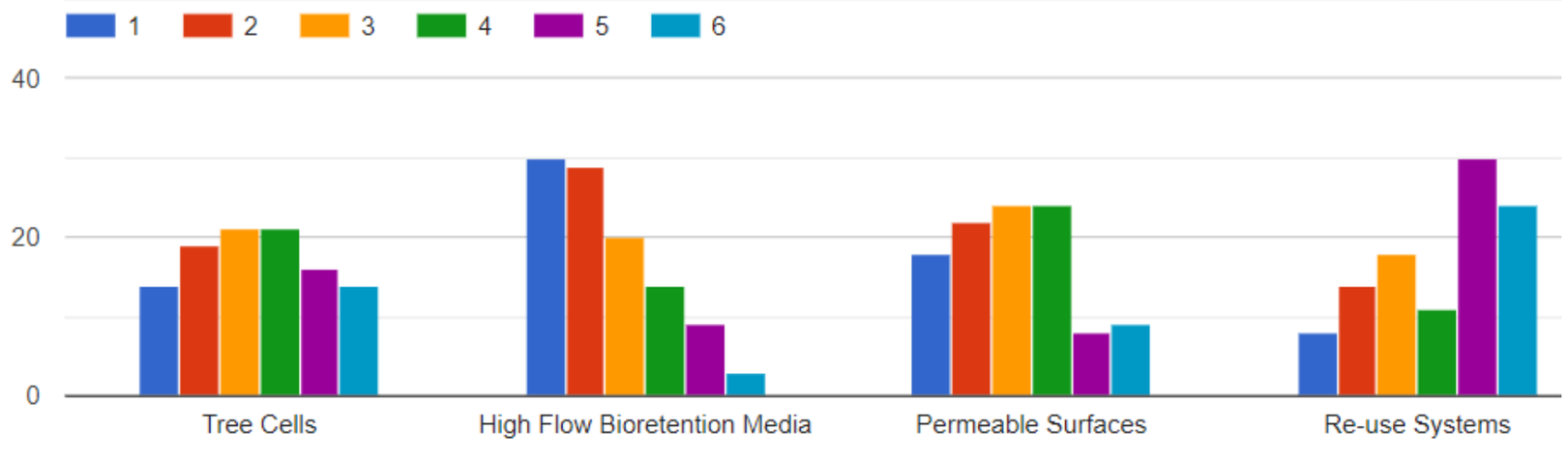
- TREE CELLS
- HIGH FLOW BIORETENTION MEDIA
- PERMEABLE SURFACES
- RE-USE SYSTEMS
- GREEN ROOF
- UNDERGROUND STORMWATER STORAGE

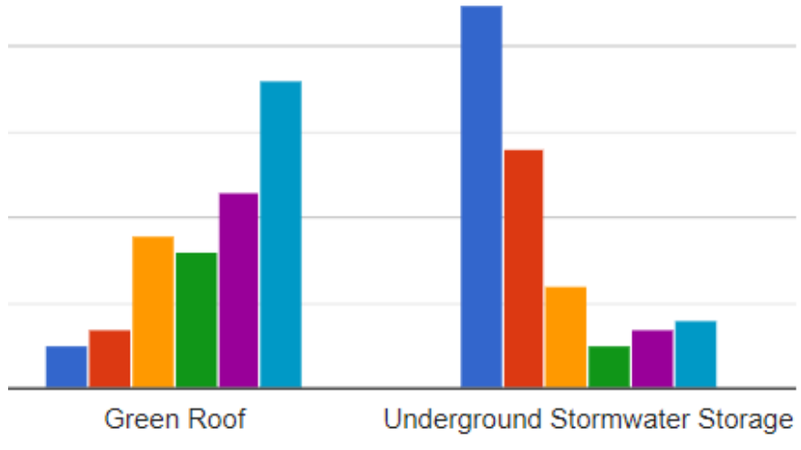
CIVIL ENGINEER



LANDSCAPE ARCHITECT



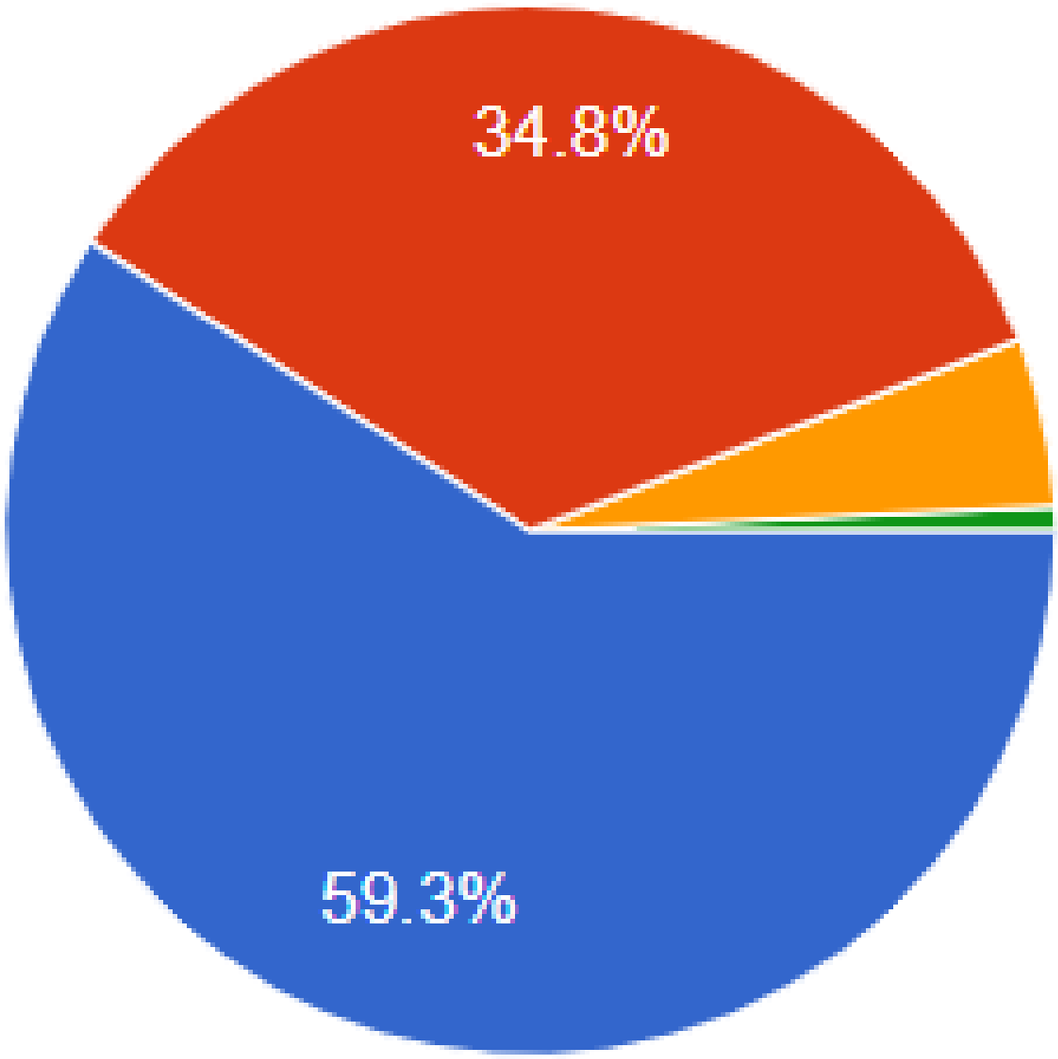


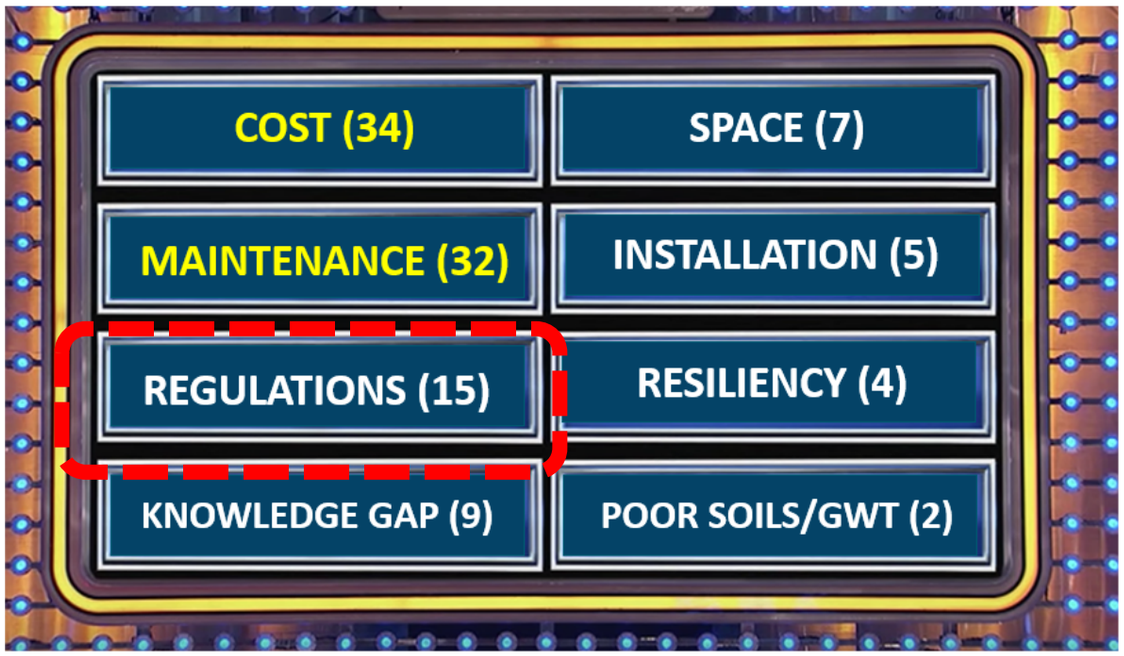


QUESTION 9

DO YOUR LOCAL/STATE REGULATIONS ALLOW FOR GSI PRACTICES TO BE USED TOWARD MEETING THE REGULATORY GOALS OF YOUR PROJECT?

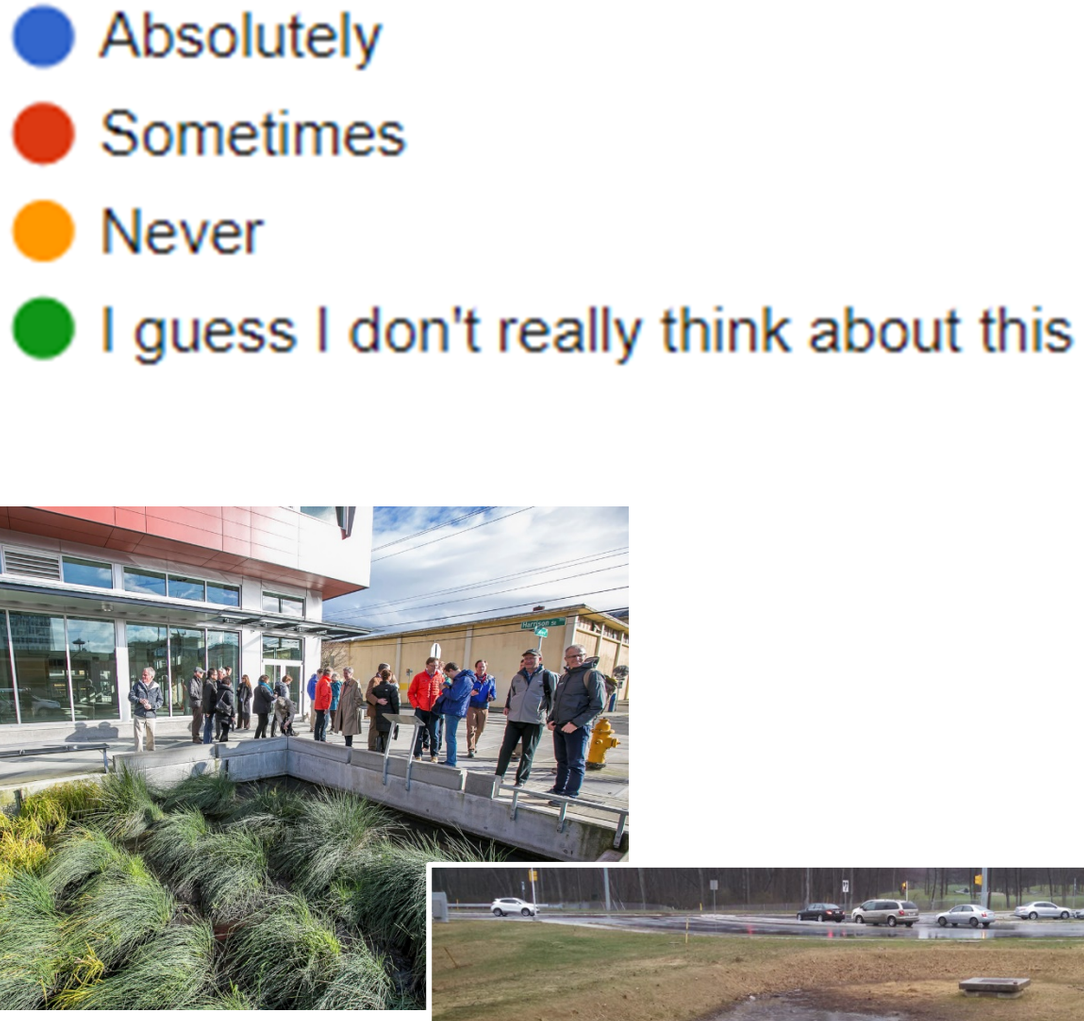
- A wide variety of GSI practices are accepted
- A limited number of GSI practices are accepted
- GSI practices can be used but no regulatory credit is offered
- GSI practices cannot be used

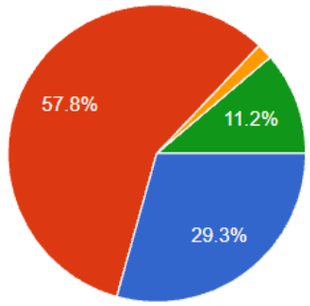


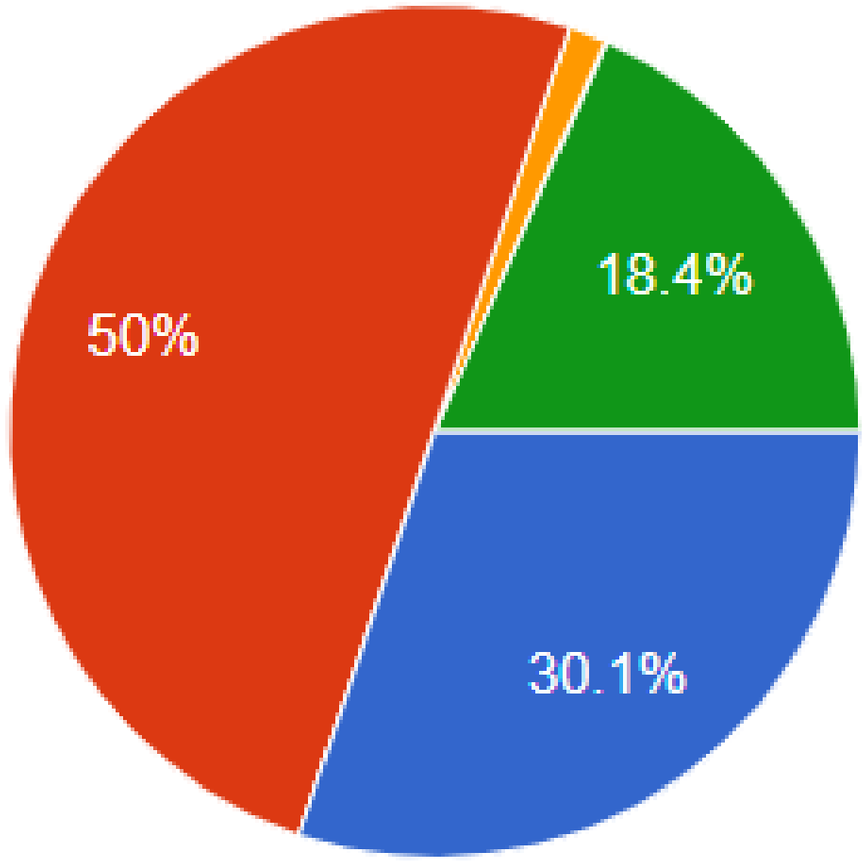


QUESTION 12

DO YOU BELIEVE THAT YOUR DESIGNS CONNECT WITH THE “TRIPLE BOTTOM LINE” CO BENEFITS OF GSI? (I.E. **ENVIRONMENTAL, SOCIAL AND FINANCIAL**)

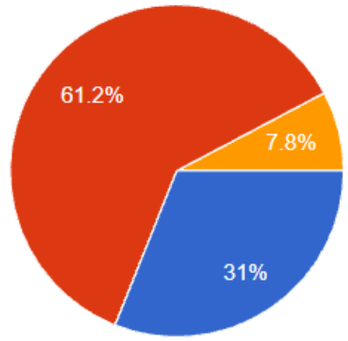


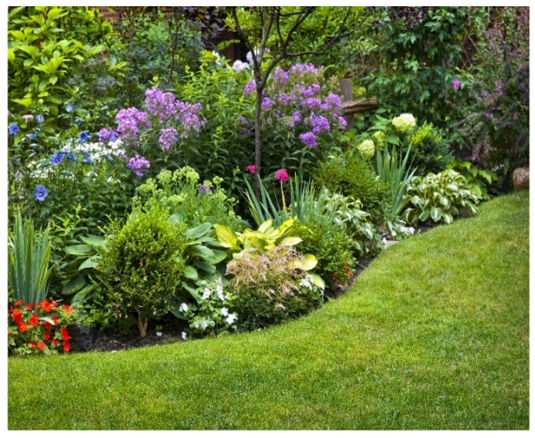


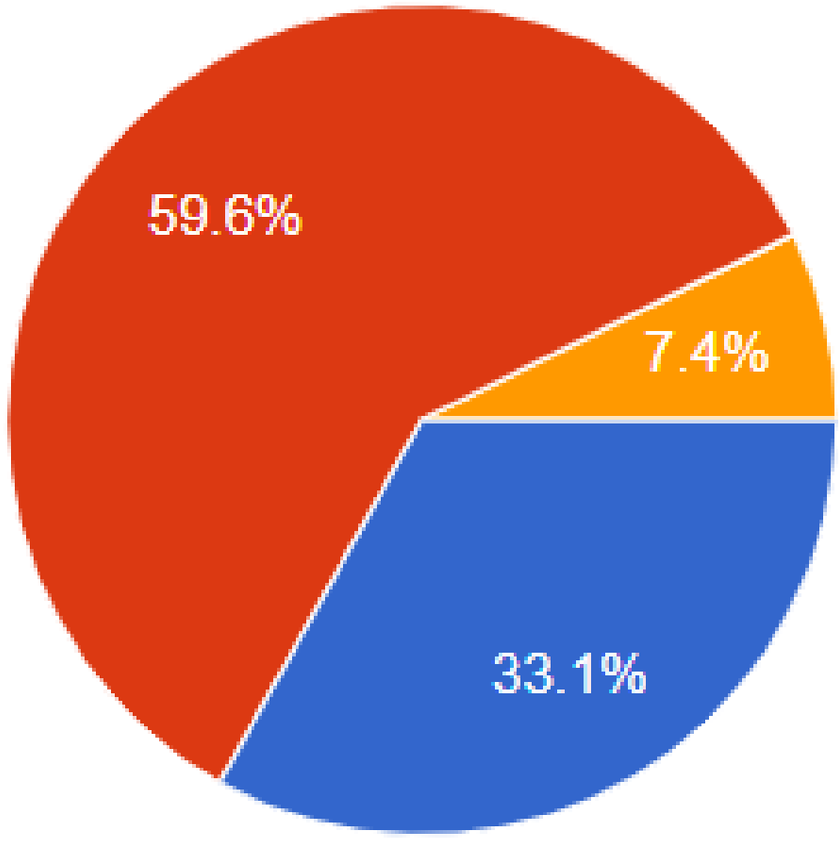


QUESTION 15

DO THE CIVIL ENGINEER AND LANDSCAPE ARCHITECT COLLABORATE AND WORK TOGETHER IN YOUR DESIGNS?

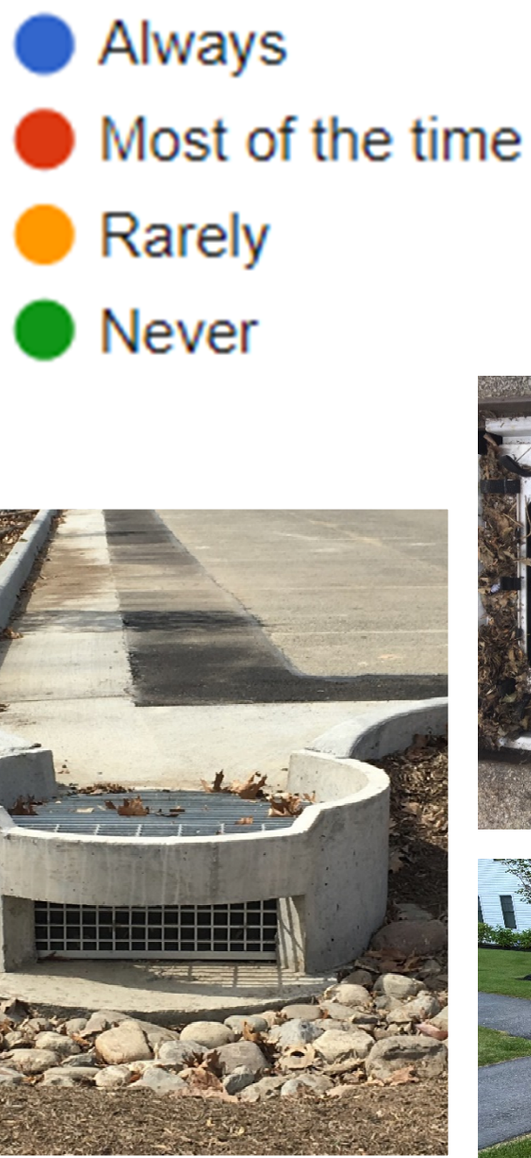


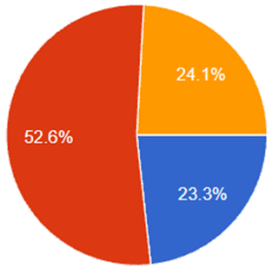


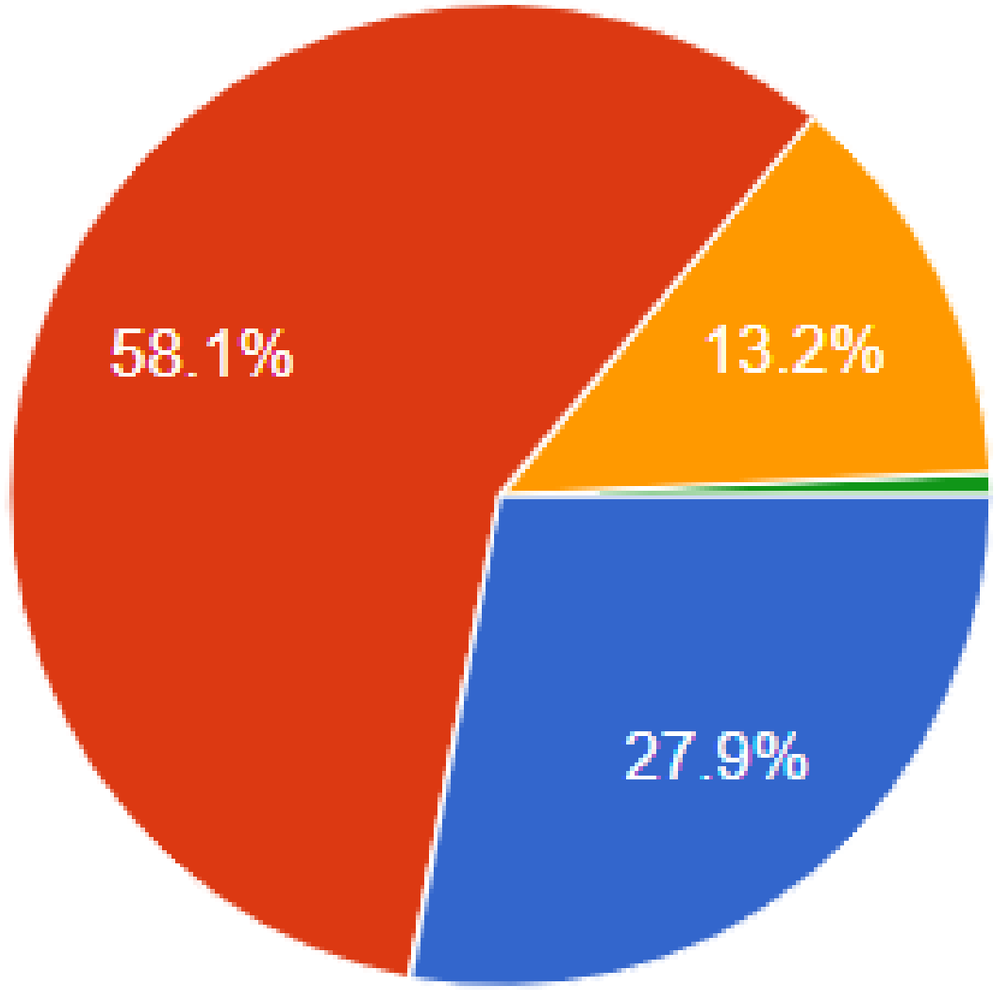


QUESTION 17

IS PRETREATMENT INCLUDED IN ALL OF YOUR GSI PRACTICE DESIGNS?



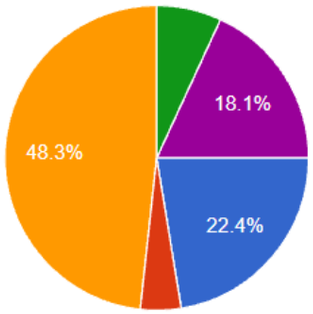


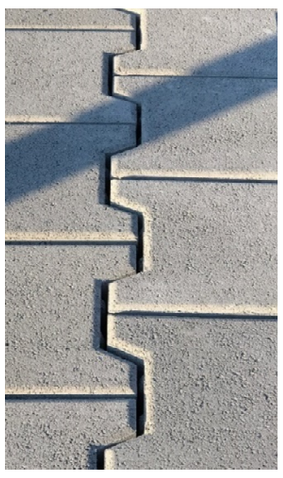


QUESTION 18

IF YOU DESIGN WITH PERMEABLE SURFACES DO YOU MOSTLY DESIGN WITH:

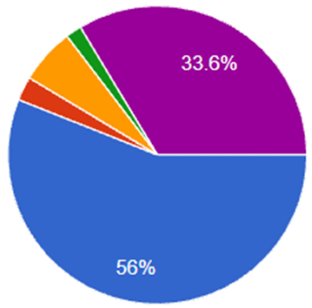
- Porous Asphalt Pavement
- Porous Concrete Pavement
- Permeable Pavers
- Stone filled grid systems
- N/A - I don't design with permeable surfaces



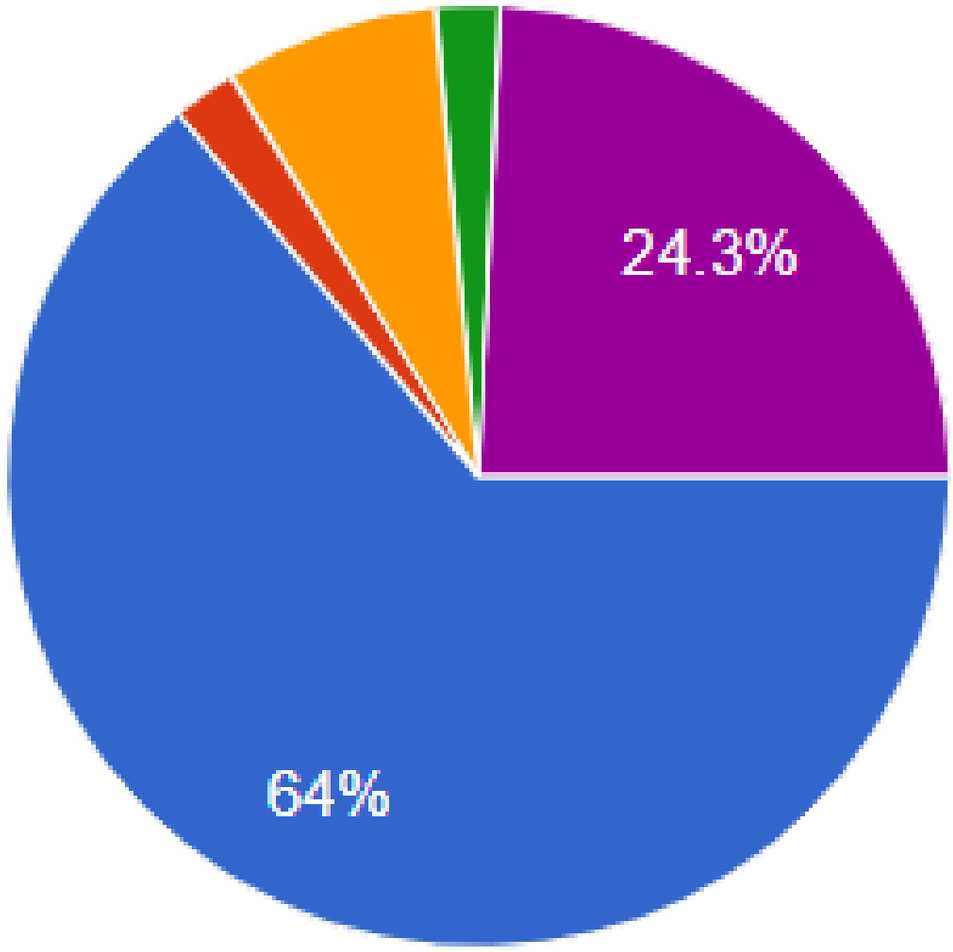


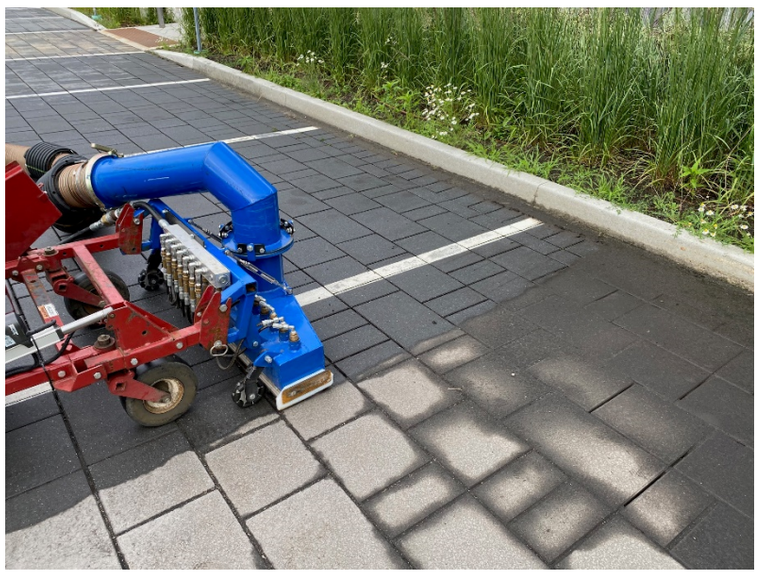
QUESTION 19

IF YOU DON’T DESIGN WITH PERMEABLE SURFACES, WHAT IS THE PRIMARY REASON?



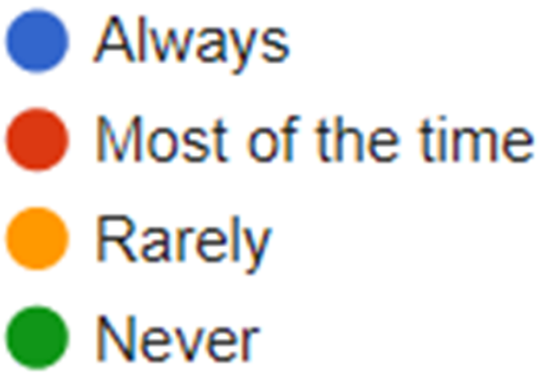
- Concerned about maintenance
- Never considered designing with them
- Concerned about performance during intense rain events
- The company I work for doesn't allow me to use them
- N/A - I use them all the time

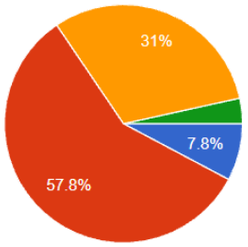


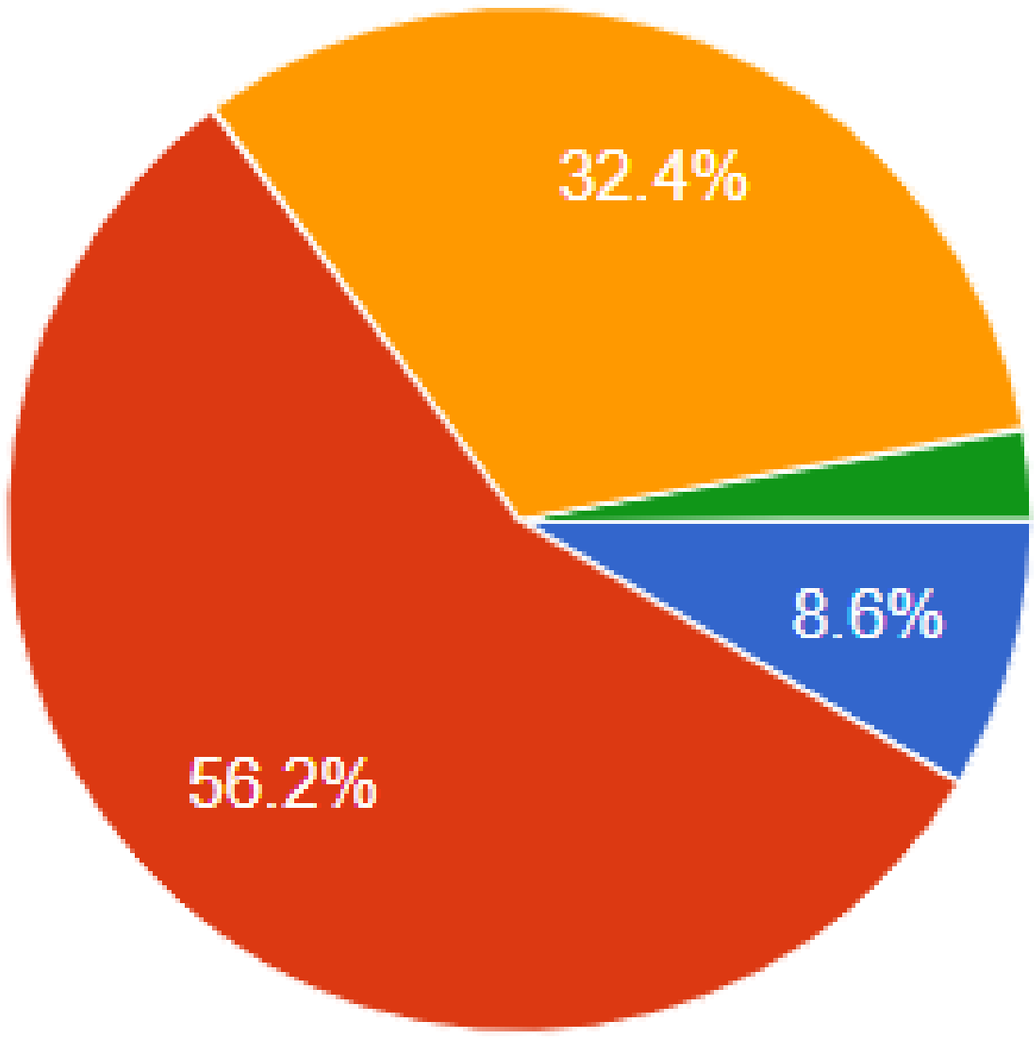


QUESTION 22

ARE YOU INVOLVED IN CONSTRUCTION OVERSIGHT OF YOUR PROJECTS?







R-TANK

TECHNICAL STORMWATER MANAGEMENT

PRE-CONSTRUCTION CHECKLIST

Project Name: _____

Project City/State: _____ Reviewer Name: _____

The following points of discussion cover portions of the R-Tank® installation where questions arise and mistakes are commonly made. A thorough review of the R-Tank Installation Guide should be completed FIRST, and then the following items discussed in further detail:

- ❑ **SUPPLY & REVIEW INSTALLATION GUIDE AND APPROVED SUBMITTAL**
- ❑ **General Notes:** Contact ACF one week prior to installation for on-site installation support at NO COST.
- ❑ **General Notes:** Discuss timing of system installation (cover materials with tarp per Spec Section 1.05 A if needed), as well as timing of activation and pre-treatment.
- ❑ **General Notes:** Discuss importance of protecting R-Tank from construction traffic loads. Construction loads are typically the heaviest loads an R-Tank installation will ever experience, and many construction loads exceed the design loads of the system.
- ❑ **Step #1:** Review proper assembly of unit for project: ❑ LD ❑ HD ❑ SD ❑ UD ❑ XD
  Review questions / concerns about man hours, assembly tools, assembly area, staging units, etc.
- ❑ **Step #2:** Excavation must exceed the actual R-Tank footprint by 2' around the entire system.
- ❑ **Step #3:** Base MUST be smooth across entire excavation, even outside of R-Tank footprint. Hand raking is almost always needed to remove ruts, dips, and any other areas that are not level.
- ❑ **Step #4:** Units simply butt together. If tying units together is desired, connecting the outside row should be adequate. Use zip ties or hog rings.
- ❑ **Step #5:** End rows should be turned 90 degrees so that the large plate faces the perimeter of the excavation. As the units are roughly twice as long as they are wide, one parallel row can easily be converted into two perpendicular rows.
- ❑ **Step #6:** If locations of Maintenance Ports are not identified on the plans, install them within 10' of all inlet/outlet pipes and roughly 50' on center. Don't forget to install anti-scour plate in the tank bottom and drill vent holes as specified.
- ❑ **Step #7:** All pipe connections must penetrate the geotextile envelope and make direct contact with the R-Tank unit. Two hose clamps are included with each boot. One can be used inside the boot on the flaps of the "X" cut into the geotextile envelope, and the other on the neck of the boot.
- ❑ **Step #8:** Side backfill must be placed evenly around the units to prevent shoving/tilting of the units. ALWAYS use vibratory compaction of the side backfill to help consolidate BOTH the tanks and the backfill materials.
- ❑ **Step #9:** Always use light-weight track machinery to push backfill materials over the top of the system. Compact material with walk-behind equipment or max 6 ton roller. Failure to do this step properly accounts for 90% of all installation errors!
- ❑ **Step #10:** Geogrid should extend at least 5' beyond the R-Tank footprint. If magnetic locating tape is required, this is a good place to install it.
- ❑ **STEP #12:** Use of safety fence, caution tape, or some form of barricade surrounding the installation is required until completion of the project (not just during the installation of the R-Tank).

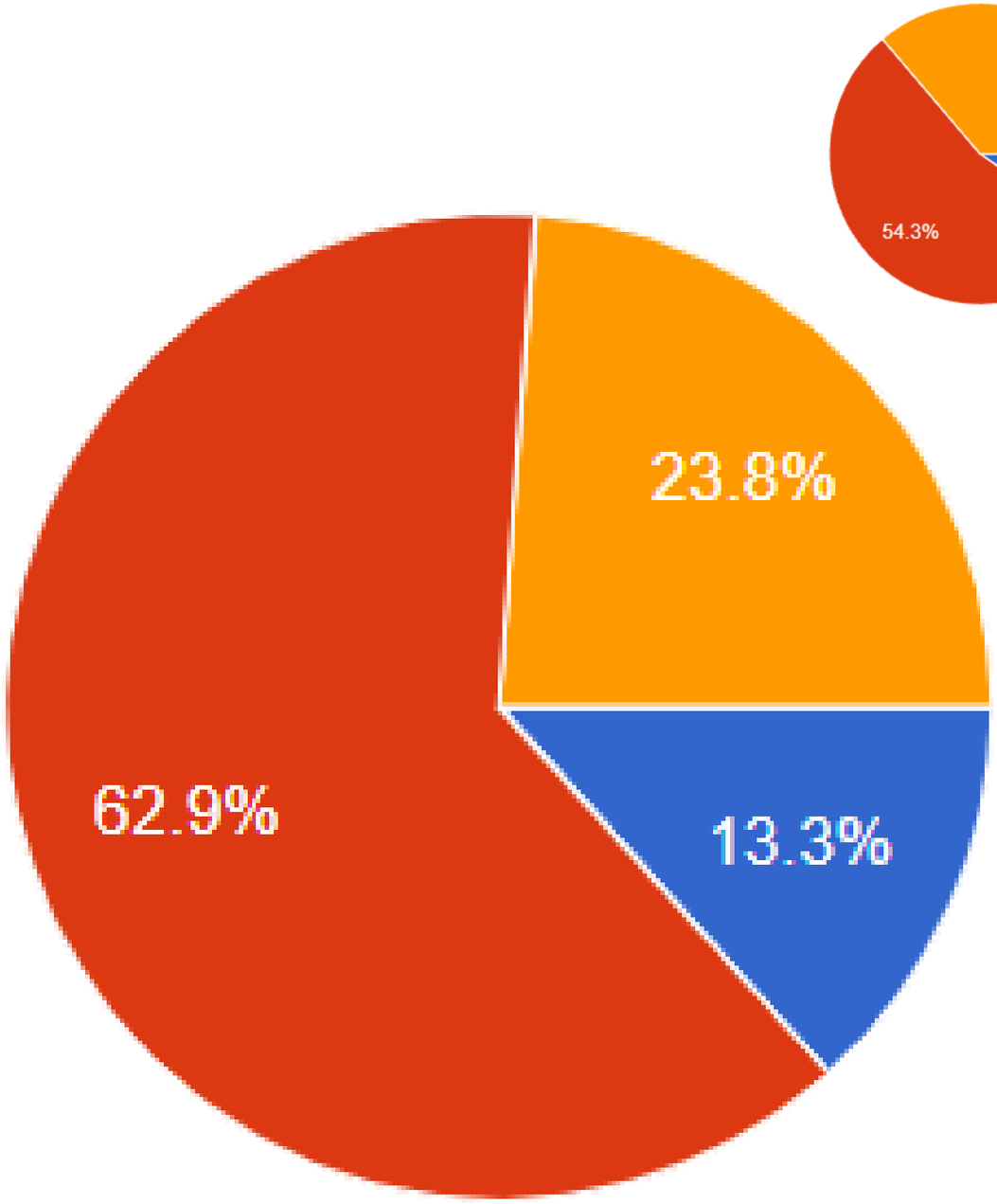
Reviewed With: _____ Company Name: _____

Printed Name: _____ Date: _____

ACF ENVIRONMENTAL

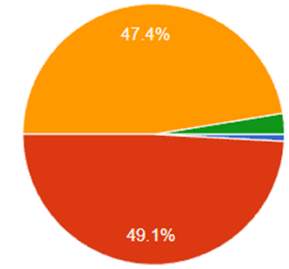
QUESTION 23

AFTER THE PROJECT IS COMPLETE, DO YOU MEET WITH YOUR DESIGN TEAM FOR PROJECT “FORENSICS” TO DISCUSS WHAT MODIFICATIONS NEED TO BE MADE FOR FUTURE PROJECTS?

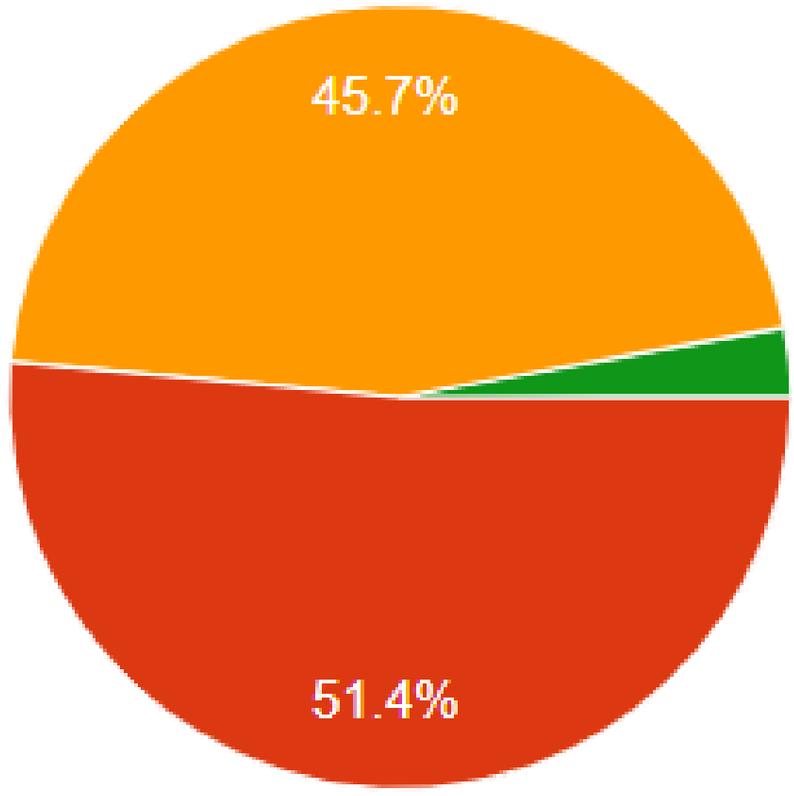


QUESTION 24

ARE THE SYSTEMS YOU DESIGN GENERALLY MAINTAINED TO THE LEVEL YOU ARE HOPING FOR?



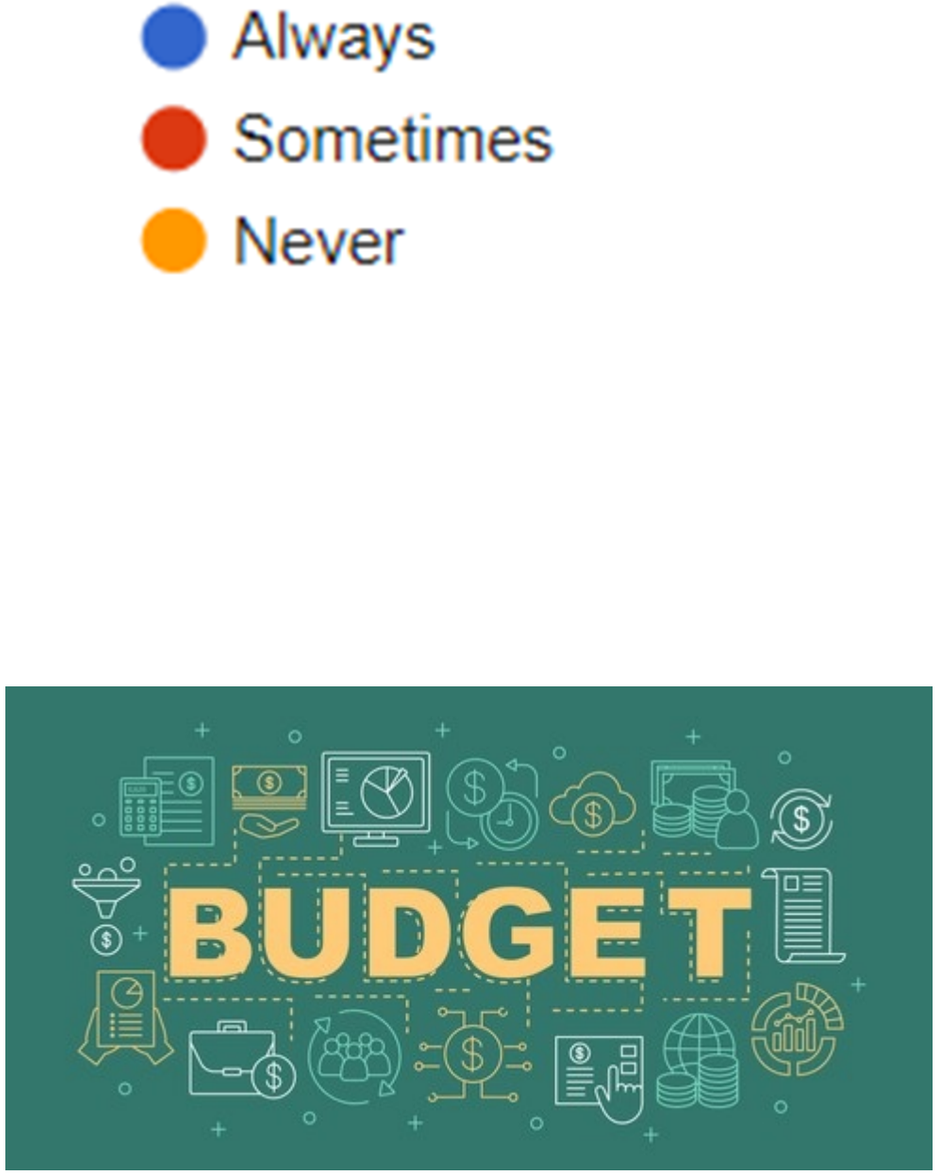
- Always
- Most of the time
- Rarely
- Never

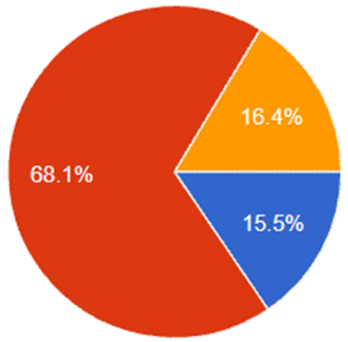


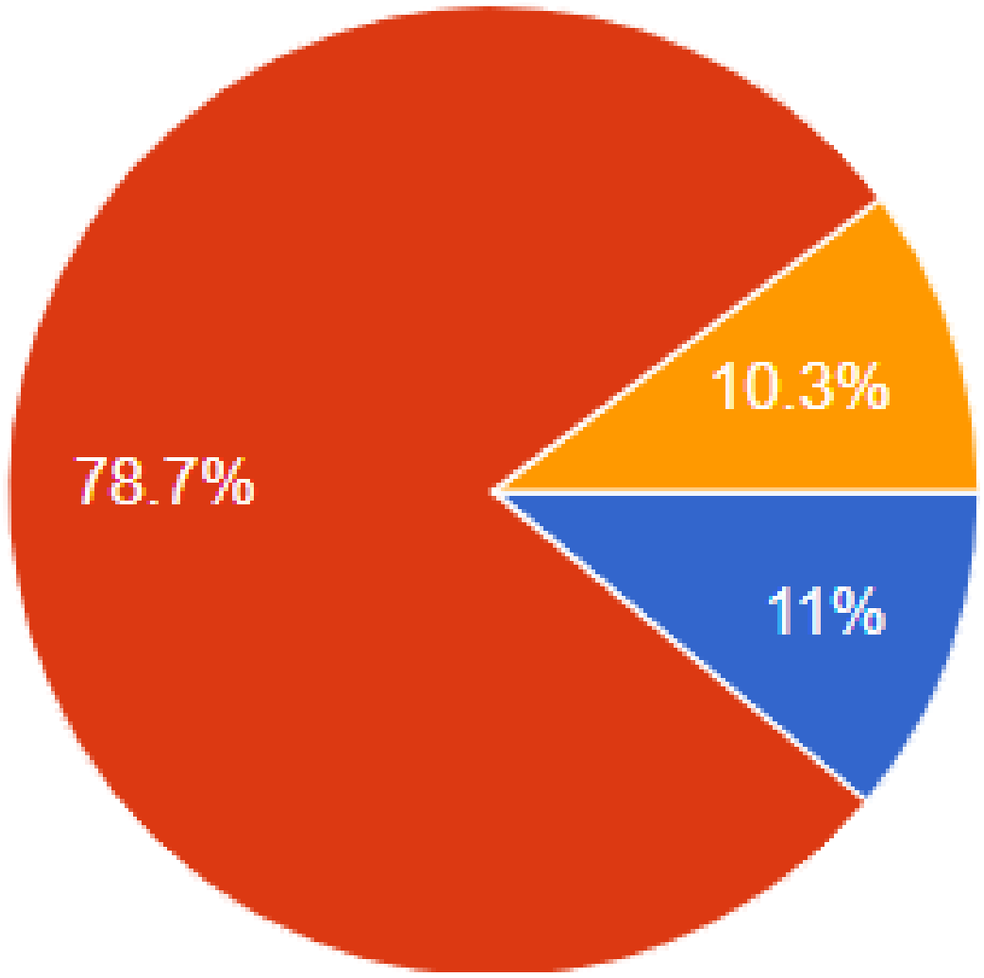
TWO VERY DISTINCT GROUPS – ONES THAT MAINTAIN AND ONES THAT DONT

QUESTION 25

DO YOUR CLIENTS BUDGET FOR ONGOING MAINTENANCE OF GSI PROJECTS?



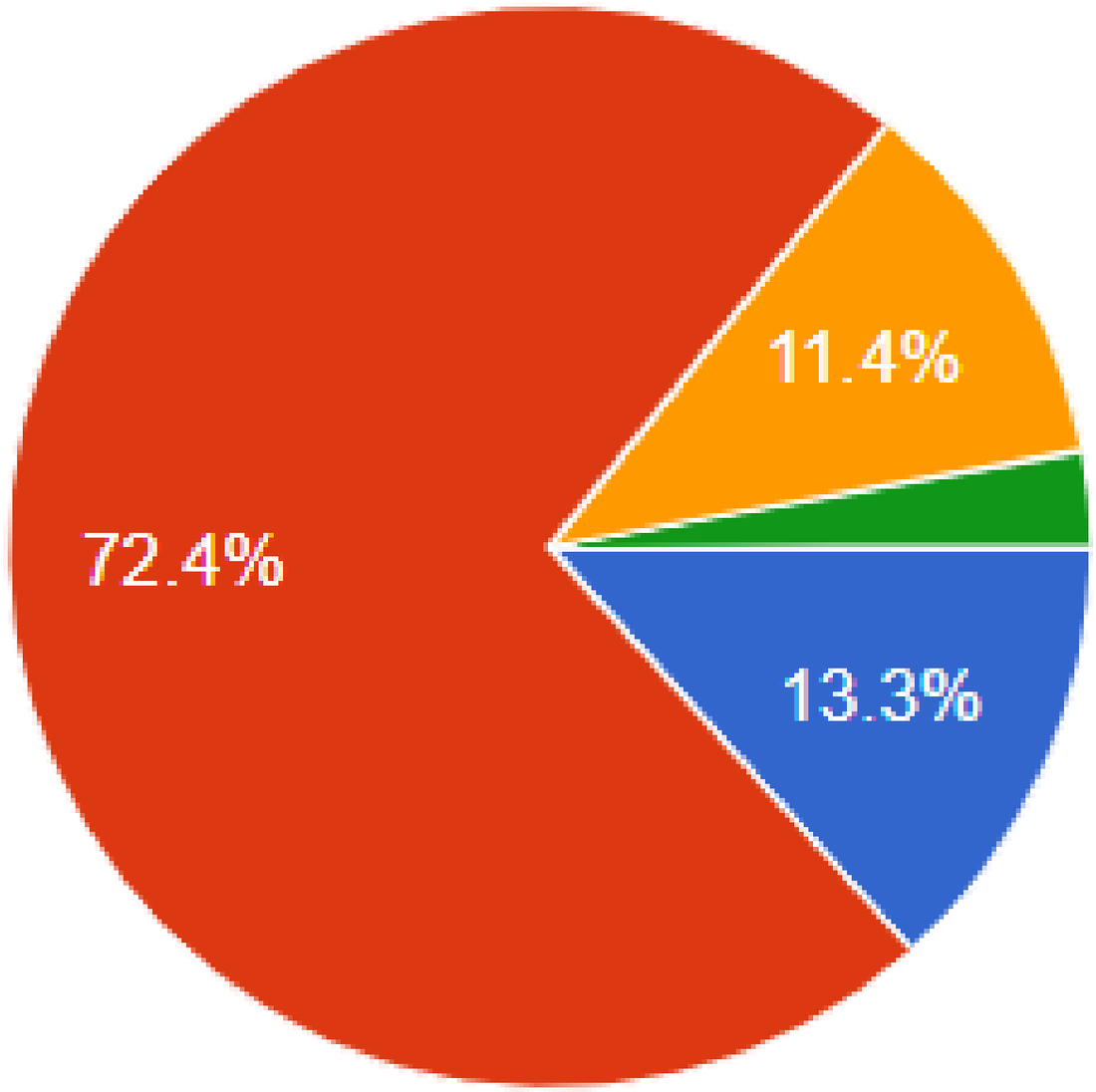




QUESTION 26

IF YOUR CLIENT DOES BUDGET FOR MAINTENANCE, WHATS DOES THAT BUDGET INCLUDE?

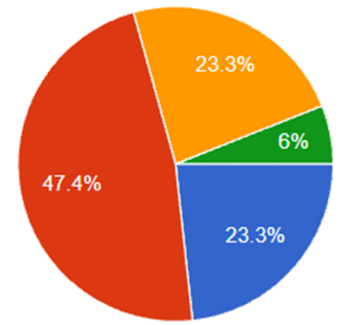
- Inspection and reporting only
- Inspection and typical maintenance
- Inspection, typical maintenance and funds for unexpected maintenance
- Inspection, typical maintenance, funds for unexpected maintenance, inflation and eventual replacement value

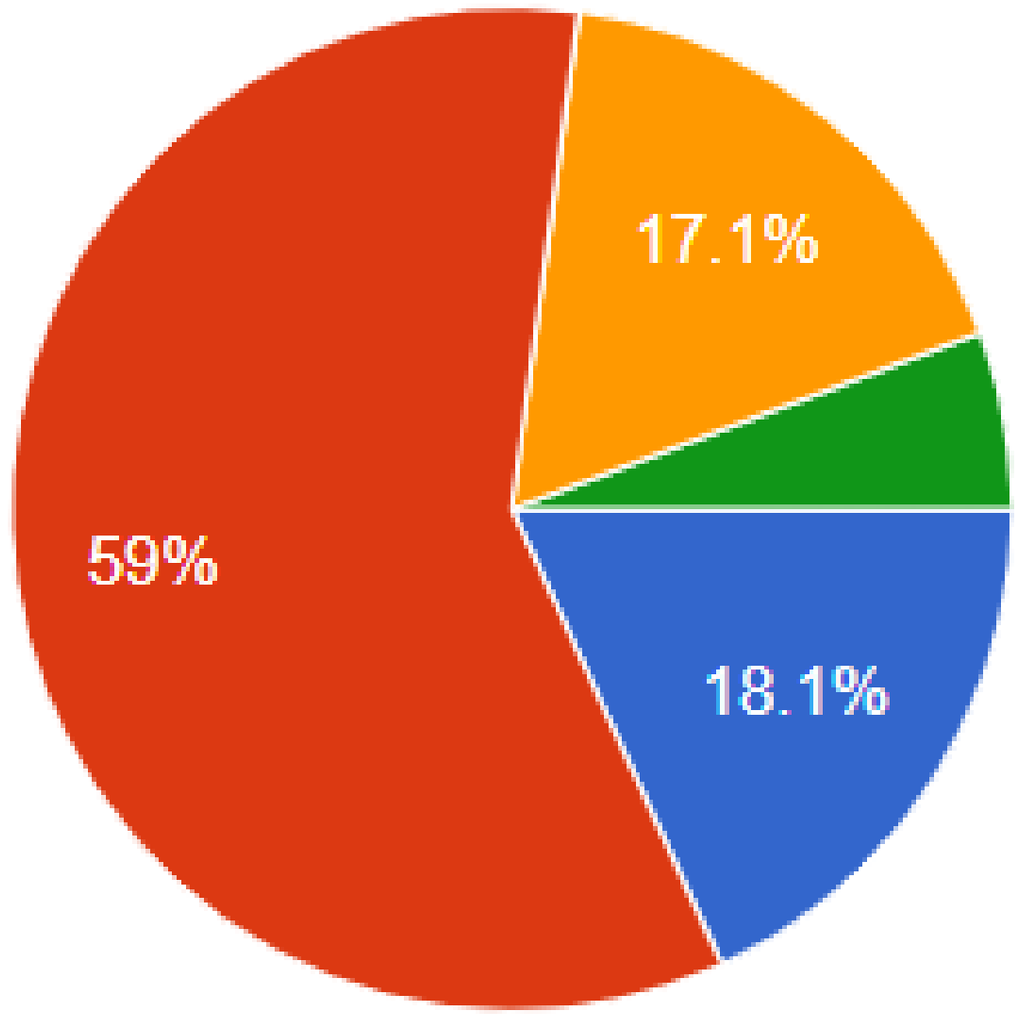


QUESTION 29

DOES WINTER MAINTENANCE IMPACT YOUR BMP SELECTION FOR A GIVEN SITE/LOCATION?

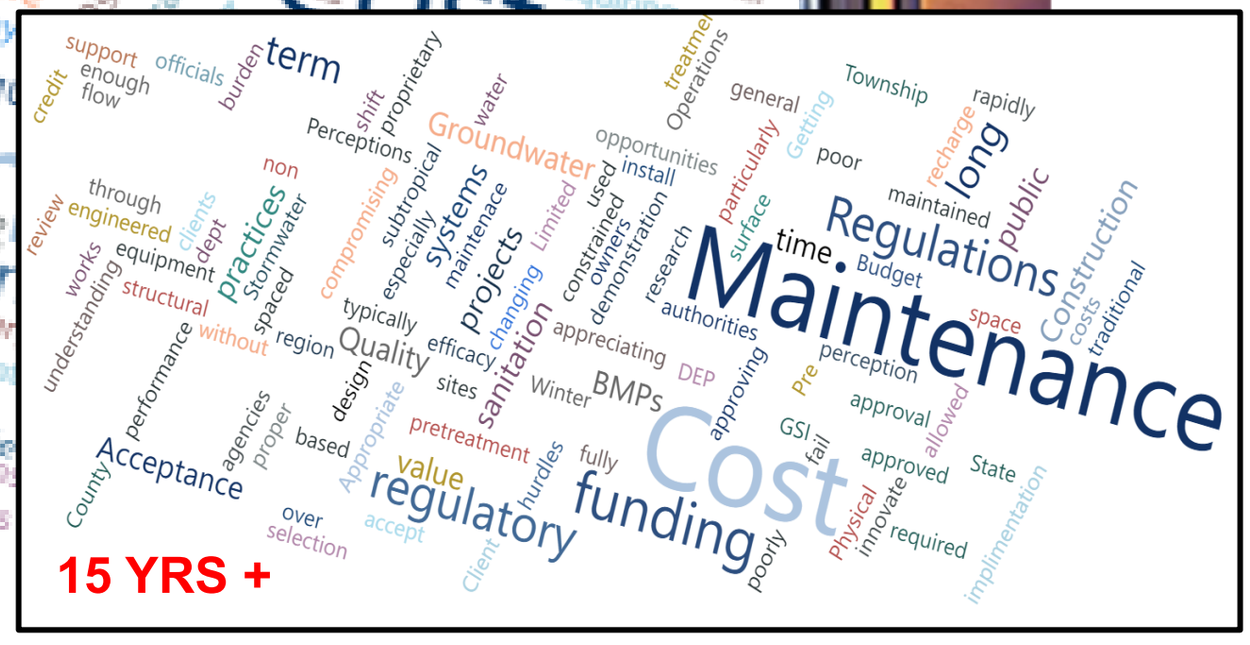
- Always
- Sometimes
- Never
- Not applicable (I design projects in warmer climates)





BONUS GENERAL QUESTION

WHAT DO YOU SEE AS THE BIGGEST CHALLENGE FACING GSI PROJECTS AND PROGRAMS TODAY?



TAKE HOME MESSAGE

- We need to be thinking about ways to better collaborate from design all the way through to post installation maintenance.

- We need pause and take what we are learning in the field and modify / adapt / revise our approaches for more sustainable outcomes. Pretreatment is a big one!

- We need to consider ways to leverage the triple bottom line co-benefits of GSI

- We need to make sure we are budgeting for maintenance so that it will/can happen.

- We need to work together to overcome the biggest challenges facing GSI – Cost and maintenance

Thank you!!

Complete the Survey:

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