Certificate in Stormwater Management and Drainage Design

Stormwater Pump Stations and Controls

Stormwater Pump Stations and Controls are critical components of stormwater management systems. Proper understanding of the key terms and vocabulary related to these systems is essential for anyone looking to pursue a career in this field. In this explanation, we will discuss some of the key terms and vocabulary related to Stormwater Pump Stations and Controls in the context of the Certificate in Stormwater Management and Drainage Design.

1. Stormwater Pump Station: A stormwater pump station is a system designed to pump stormwater from a lower to a higher elevation when the natural flow direction is impeded. These systems are typically used in areas with low-lying topography or where the stormwater collection system is located below the outfall elevation.
2. Wet Well: A wet well is a chamber that collects stormwater and houses the pumps. The wet well is designed to be submerged in water during operation, and the pumps are activated when the water level in the well reaches a predetermined level.
3. Dry Well: A dry well is a chamber that is not intended to be submerged in water during operation. Dry wells are used to collect and convey stormwater to a lower elevation, where it can be discharged into a natural waterbody or a municipal stormwater system.
4. Pump Controls: Pump controls are the electronic components that monitor the water level in the wet well and activate the pumps when the water level reaches a predetermined level. The controls may also include alarms that alert operators when the pumps are not functioning properly.
5. Level Sensor: A level sensor is a device that measures the water level in the wet well and transmits this information to the pump controls. Level sensors may be based on various technologies, including ultrasonic, float-based, or pressure-based sensors.
6. Flow Meter: A flow meter is a device that measures the flow rate of stormwater through a pipe or conduit. Flow meters are used to monitor the performance of the pump station and to ensure that the system is discharging stormwater at the required rate.
7. Check Valve: A check valve is a device that allows flow in one direction but prevents flow in the opposite direction. Check valves are used in stormwater pump stations to prevent backflow of stormwater into the wet well when the pumps are not operating.
8. Overflow Weir: An overflow weir is a structure that allows stormwater to bypass the pump station when the water level in the wet well exceeds a predetermined level. Overflow weirs are used to prevent flooding of the wet well and to ensure that the pumps do not become overwhelmed during heavy rain events.
9. Power Supply: The power supply is the source of electrical energy that drives the pumps and other electrical components in the pump station. Power supplies may be based on various technologies, including AC or DC power, and may include backup power sources such as generators or batteries.
10. Alarm System: An alarm system is an electronic device that alerts operators when there is a problem with the pump station. Alarms may be based on various technologies, including visual or audible alarms, and may be integrated with remote monitoring systems.

11. Remote Monitoring System: A remote monitoring system is an electronic device that allows operators to monitor the performance of the pump station from a remote location. Remote monitoring systems may include various features, such as real-time data monitoring, alarms, and notifications.
12. Control Panel: The control panel is the central hub for the operation and monitoring of the pump station. The control panel typically includes various components, such as switches, buttons, and indicators, that allow operators to control the pumps and other electrical components.
13. Variable Frequency Drive (VFD): A variable frequency drive (VFD) is an electronic device that adjusts the speed of the pumps based on the flow rate of stormwater. VFDs are used to optimize the performance of the pump station and to reduce energy consumption.
14. By-pass Pump: A by-pass pump is a backup pump that is used when the primary pumps are not functioning properly. By-pass pumps are typically smaller than the primary pumps and are designed to handle lower flow rates.
15. Emergency Generator: An emergency generator is a backup power source that is used when the primary power supply fails. Emergency generators are typically powered by diesel or natural gas and are designed to provide power for a limited period.
16. Flow Diversion Structure: A flow diversion structure is a device that diverts stormwater away from the pump station when the water level in the wet well is low. Flow diversion structures are used to optimize the performance of the pump station and to prevent the pumps from operating unnecessarily.
17. Pump Curve: A pump curve is a graphical representation of the relationship between the flow rate and head of a pump. Pump curves are used to select the appropriate pump for a given application and to optimize the performance of the pump station.
18. Head: Head is a measure of the pressure exerted by a fluid. Head is typically measured in feet or meters and is used to determine the performance of pumps and other hydraulic equipment.
19. Flow Rate: Flow rate is a measure of the volume of fluid that passes through a pipe or conduit in a given period. Flow rate is typically measured in gallons per minute (GPM) or cubic meters per second (m3/s) and is used to determine the performance of pumps and other hydraulic equipment.
20. Priming: Priming is the process of filling a pump with fluid before it is started. Priming is necessary to ensure that the pump is filled with fluid and that it can operate efficiently.

In practical applications, stormwater pump stations and controls are used in a variety of settings, including urban areas, industrial facilities, and construction sites. Proper design and operation of these systems are critical for preventing flooding, protecting water quality, and ensuring the safety of people and property. Challenges in this field include managing large volumes of stormwater, ensuring the reliability of pump stations, and minimizing energy consumption.

Examples of the use of stormwater pump stations and controls in real-world applications include:

* A stormwater pump station in an urban area that pumps stormwater from a low-lying neighborhood to a higher elevation, where it can be discharged into a nearby river.
* A stormwater pump station at an industrial facility that pumps stormwater from a manufacturing area to a treatment system, where it can be treated before being discharged into a nearby waterbody.
* A stormwater pump station at a construction site that pumps stormwater from an excavation site to a nearby stormwater management facility.

In conclusion, stormwater pump stations and controls are critical components of stormwater management systems. Proper understanding of the key terms and vocabulary related to these systems is essential for anyone looking to pursue a career in this field. By understanding the concepts discussed in this explanation, learners will be well-prepared to design, operate, and maintain stormwater pump stations and controls in a variety of settings.