

and loose organization towards such program is seen clearly within the realm of its administration; hence liquid waste management should be one of the issues for which the city administration has to give due attention.

The main sources of liquid wastes are households (residential units), commercial establishments and hotels. As there is no adequate provision for garbage container in the city, residents dispose wastes into the drainage channels, bridge/ culvert liquid open spaces. The conditions are more sever at flat areas.

The water that is running directly into the streams is often picking up pollutants along the way. These pollutants can include motor oils and gasoline that leak from vehicles, waste from sewer lines and anything else that will float or dissolve in water. Most of the drainage lines in study area oblige as waste disposal and clogged by liquid and solid wastes. Aside its' challenge to the drainage system, it could also cause a health problem and also it degrades the aesthetic value of the environment. Figure 7 shows the release of liquid waste in the study area.



Figure 8: Liquid and solid waste in the drainage system

CONCLUSION

In the study area it is observed that drainage problem is a cause of flooding on pavement, congested traffic flow and difficulty on day to day activity of people. To investigate the cause of the problem, we try to assess the drainage system in the flood prone areas and site investigation was done by collecting direct field data to assess the storm drainage condition and operation management problem.

Under the current rainfall conditions the system responded with serious problems and was not able to drain the generated runoff. So, the systems were vulnerable for flooding and surcharges atop the nodes were considerable in the most drainage systems. So this drainage problem in the study area is as a result of inadequate structure provision, which is the hydraulic capacity of the drainage structures, is less than the design discharge and blockage waste material respectively of the drainage structures.

RECOMMENDATION

Drainage problem become major challenge for recently constructed road as it is observed in Assosa town. As a number of road projects are constructed with huge investments, for drainage related issues emphasis shall be given. The following recommendations have been drawn from this study.

Design of the structures

- ✓ All consideration, such as appropriate design method which depends on the catchment area, variability of climate, future settlement of people, expansion of urbanization and other factors shall be taken into account during the detail design of the drainage facilities so as the structures capacity shall accommodate the design flood.
- ✓ In case if the problem occurs and the town administration shall to take action to keep the serviceability of the road, the rehabilitation needs to be supplemented by the detail design to alleviate the problem permanently with low cost.
- ✓ There is a need to introduce LID to reduce the runoff production and to minimize the receiving water pollution.
- Continuous Monitoring of the drainage facilities

- ✓ Continuous monitoring of the drainage facilities is required to take timely action where unexpected problem encounter that may create risk on the people, road and surrounding environment.
- ✓ Periodically, cleaning of the drainage facilities is also required to prevent of clogging of the drainage system.

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