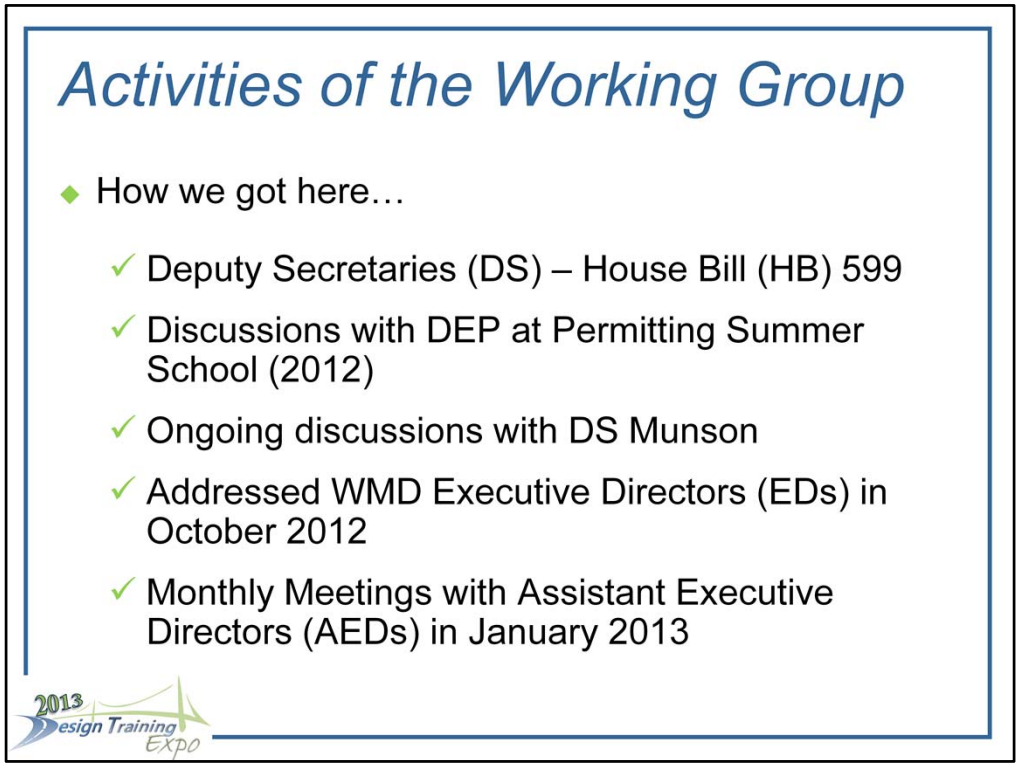
Welcome

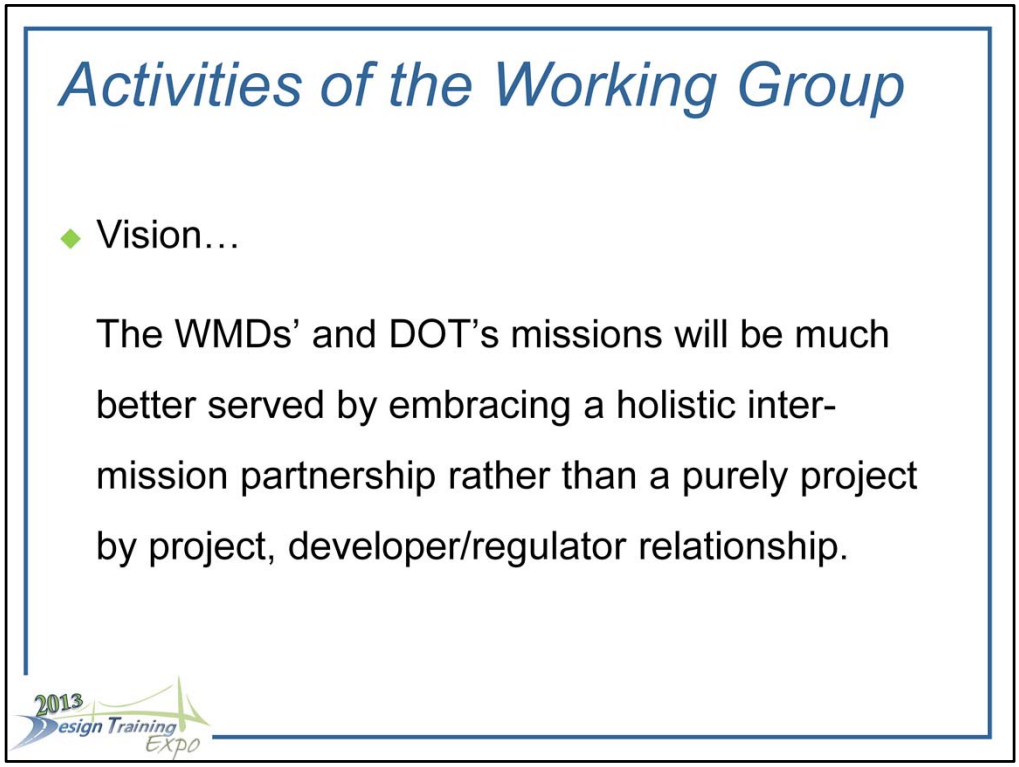
Introduce speakers

Query number of drainage folks, roadway folks, maintenance, others.

Summary what we are going to discuss:
(1) recent inter-agency stormwater initiatives
(2) recent changes in regulatory policy that drives our stormwater design



Working Group is a DEP/WMD/DOT group that is charged with moving forward interagency efforts

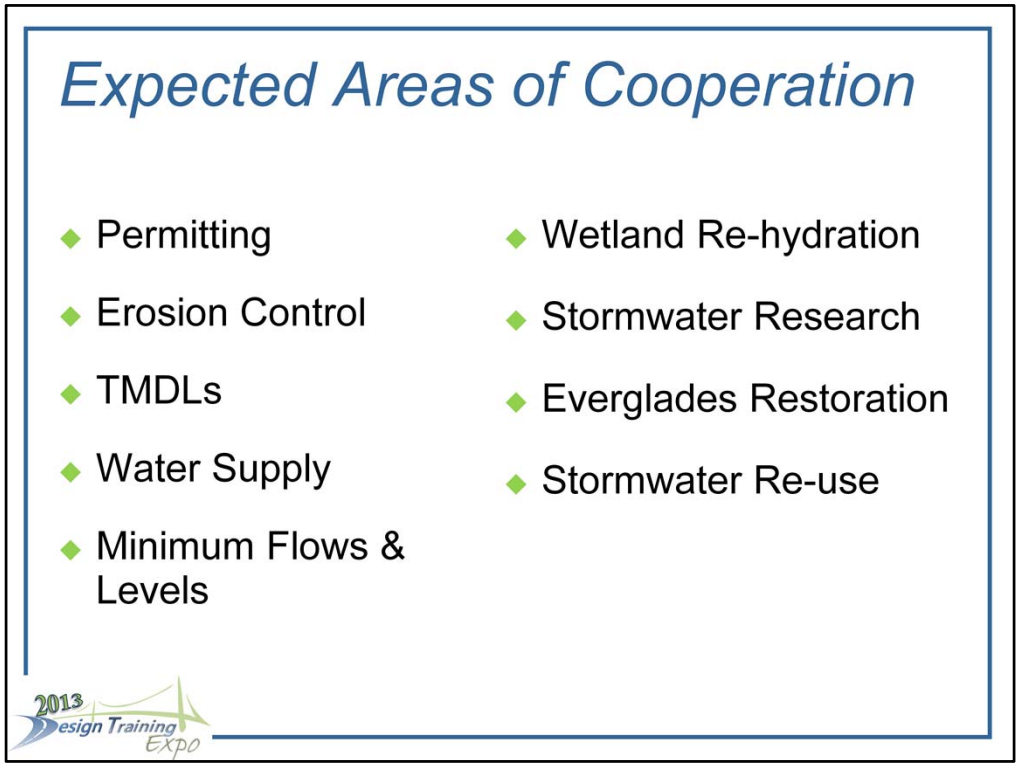


DEP / WMDs:

1. DOT is not just another developer: Environmental stewardship is in DOT's mission.

2. Do not exact regulatory costs from DOT beyond what we would if the funds for compliance were coming out of our own budget.

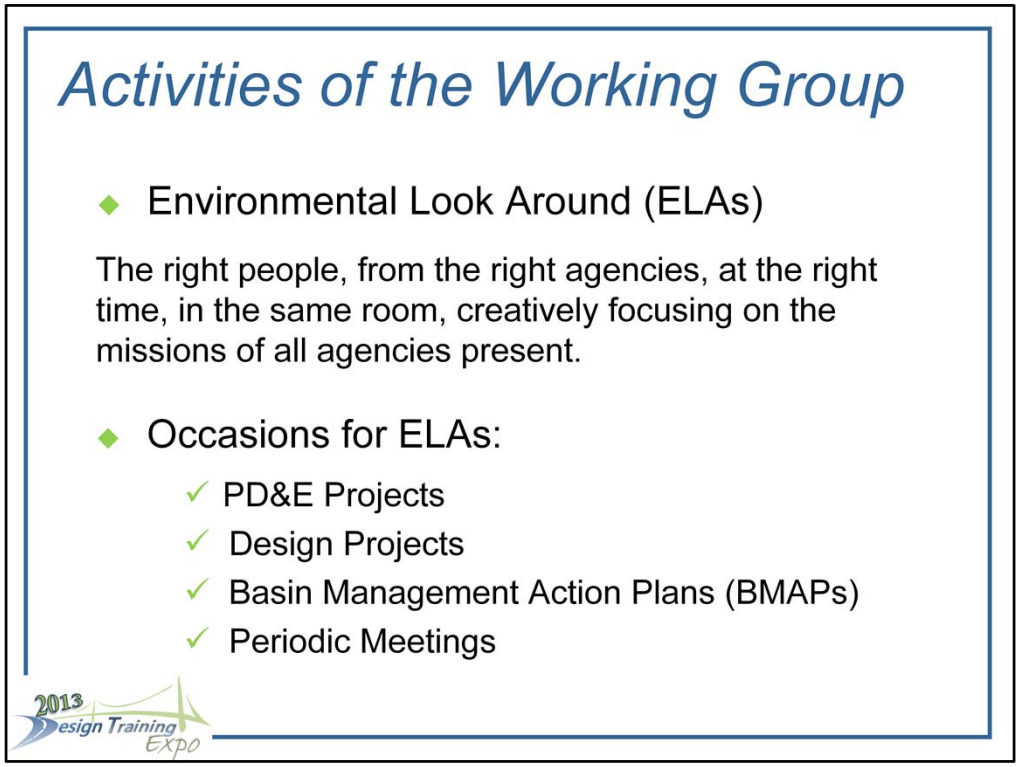
3. Get past regulations and the status quo to embrace mission to mission cooperation.



Facilitate communications at all levels

Resolve disagreements

Spot opportunities

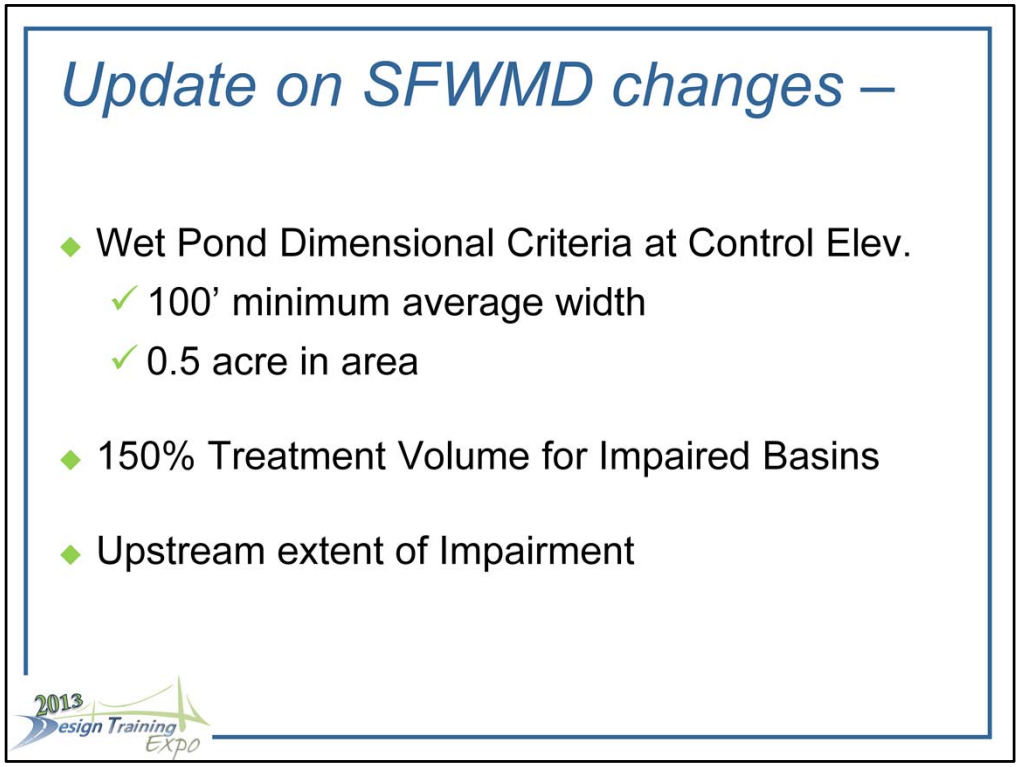


ELA's

1. Work program: DOT initiates, DEP/WMDs/FWC/Municipalities respond

2. BMAPs / periodic meetings: DEP initiated, DOT responds;

Likely, ELA in PD&E or as part of design scoping

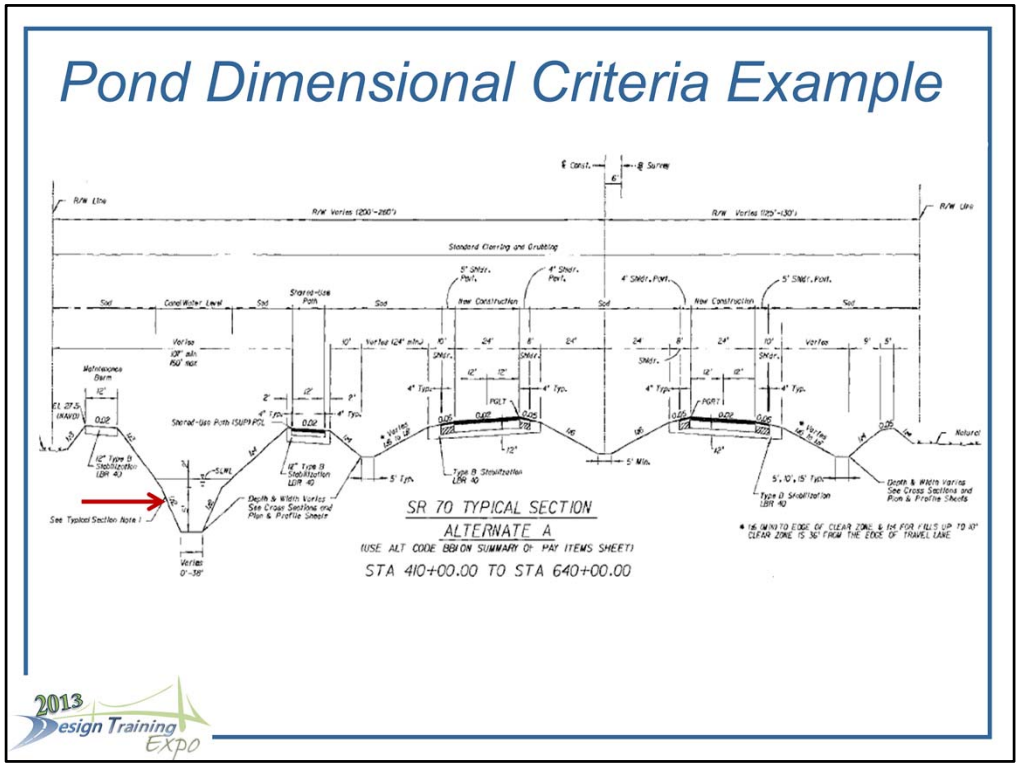


DOT Only

Targets wet detention ponds (the criteria were originally crafted as a safety net for poor maintenance, such as might be expected from private entities)

Nutrient impaired basins (the 150% policy was originally enacted to mimic the higher standard of an OFW; Harper's nutrient loading approach was not available then)

How far upstream (TMDL/BMAP program uses transport/fate of pollutant approach to identify upstream reaches that are impaired or establish DPVs)



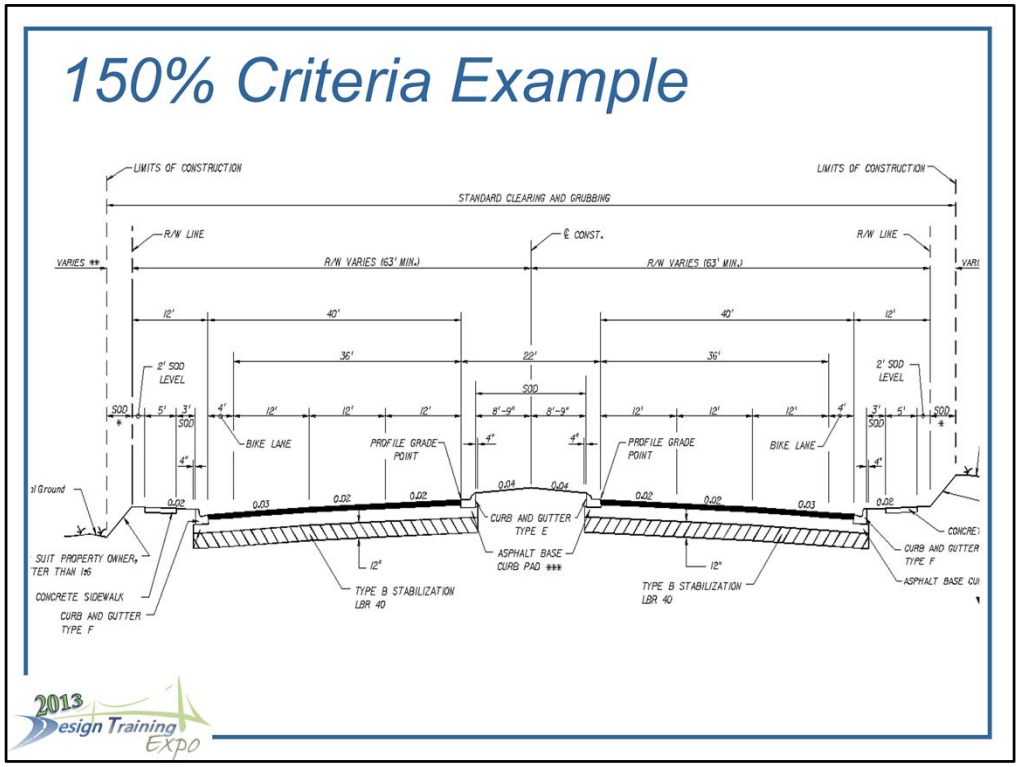
SR-70 in western St. Lucie County in D4 (thanks to Kevin from D4)

Note canal – **click** to enlarge

Canal receives significant runoff from cattle farms and citrus – provides orders of magnitude more TN & TP removal than the detention ditches

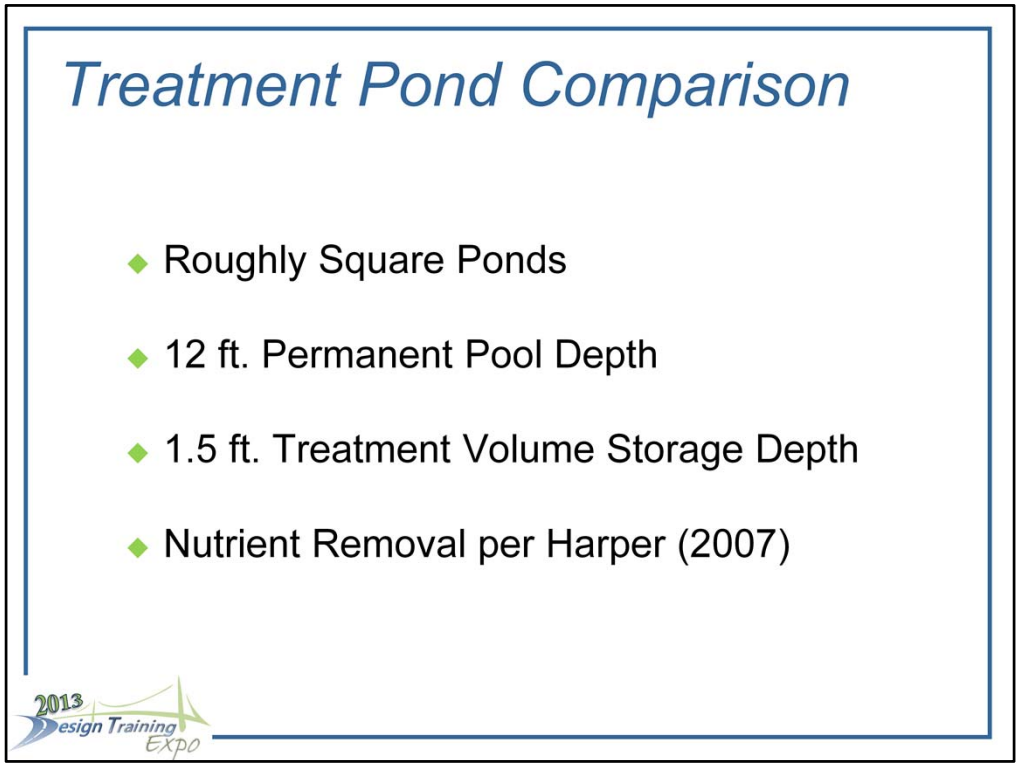
but not given WQ credit in permitting!!!

Ditches were needed anyways, we will receive BMAP credit, and costs were not impacted.



Example for comparing criteria amongst WMDs and SFWMD 150% criteria

6-lane typical section from PPM – assumed basin length = 1000 ft. of 6-lane roadway

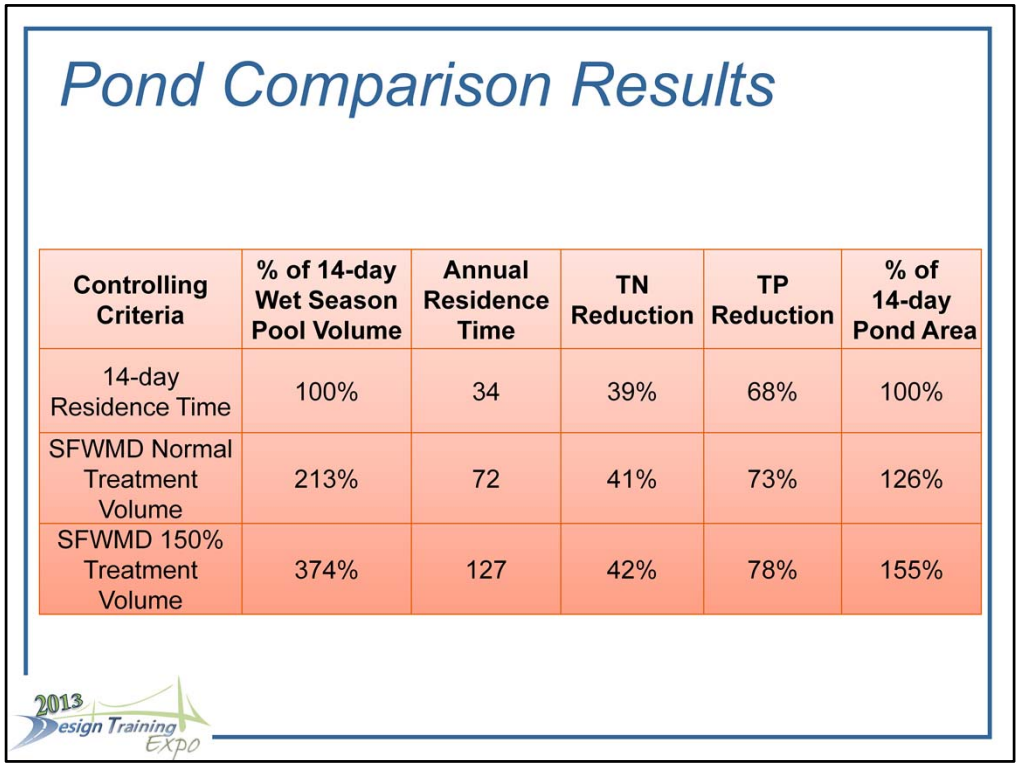


Square ponds to negate shape effects

12 ft. deep = typical practice to avoid anaerobic conditions

1.5 storage depth is typical

Location = West Palm Beach



The larger the base pond, the larger % increase in overall pond parcel area…reason: for a larger pond, sideslopes are a smaller % of pond parcel area – economy of scale

Residence time = pond pool volume / average rate of inflow over period of interest – wet season or annually

14 day wet season residence time = 34 day annual residence time (average rate of inflow is higher over the wet season – will vary around the state)

Pond area at control elevation.

Note lack of increased removal, especially for TN…. Why? **click**

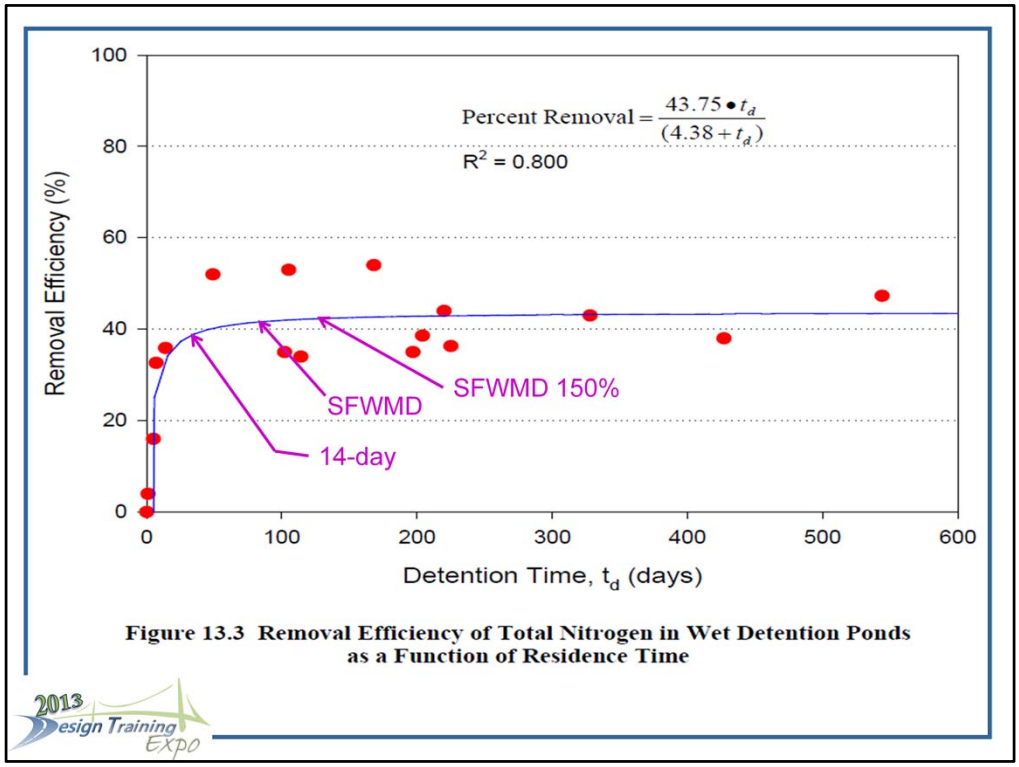


Figure 13.3 Removal Efficiency of Total Nitrogen in Wet Detention Ponds as a Function of Residence Time

Removal curve for TN from Harper 2007 – R^2 is a bit weak.

Click to show ponds' removal

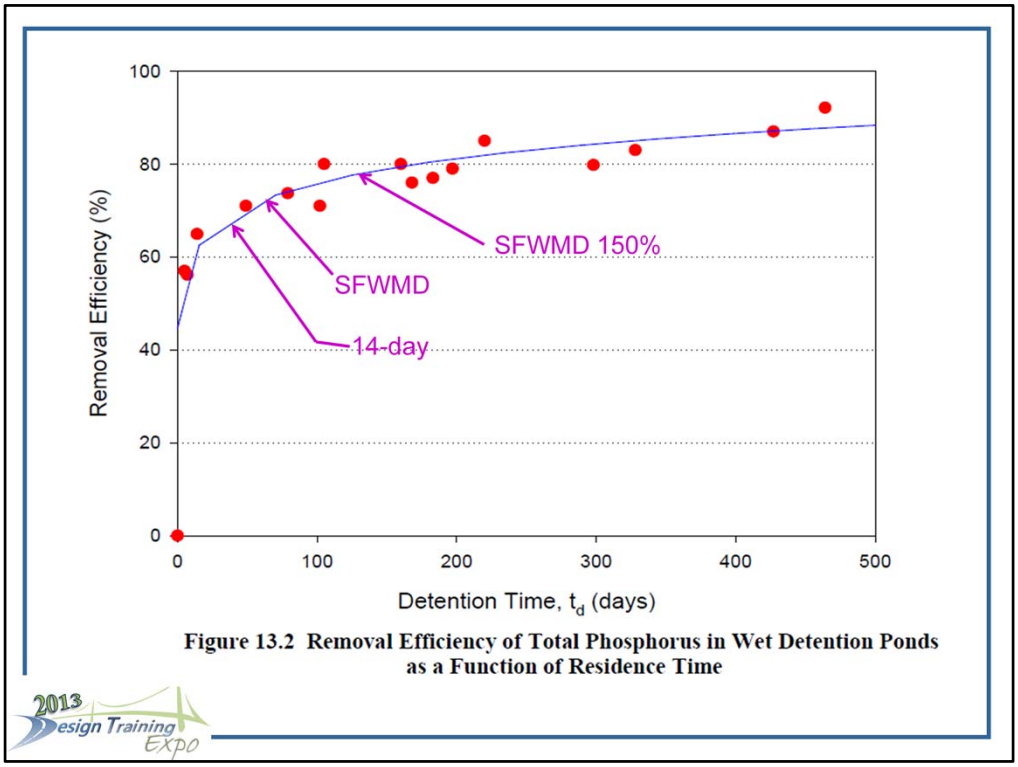
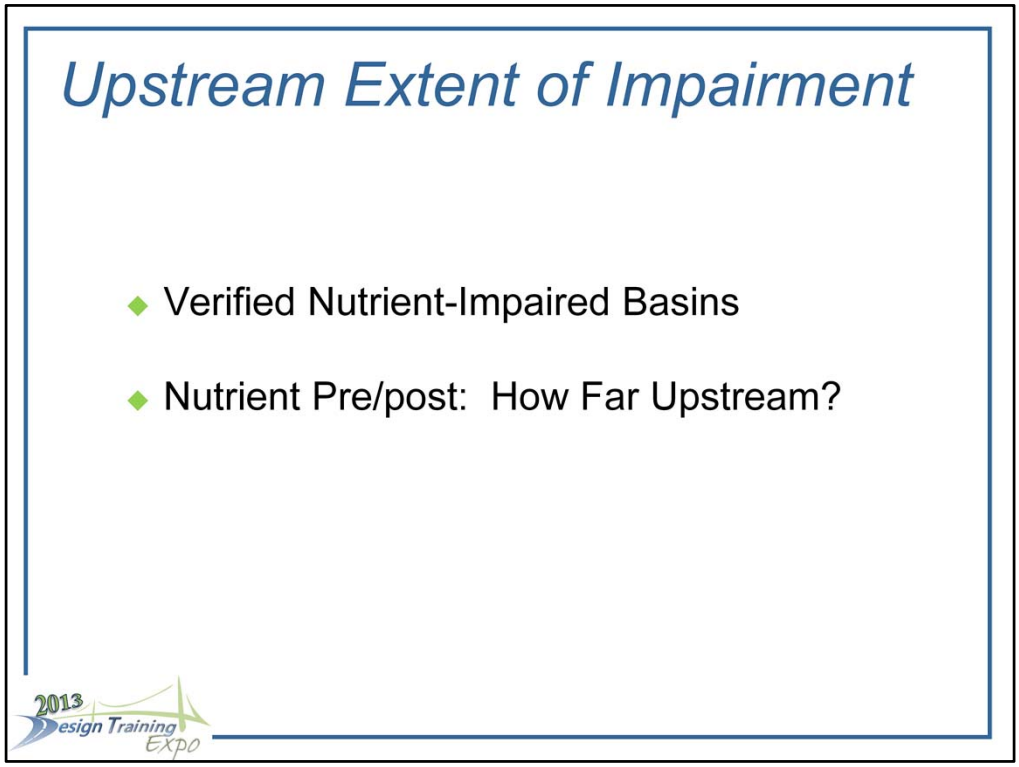


Figure 13.2 Removal Efficiency of Total Phosphorus in Wet Detention Ponds as a Function of Residence Time

Removal curve for TP from Harper 2007 – note the MUCH better fit for the data (R^2=0.979!).

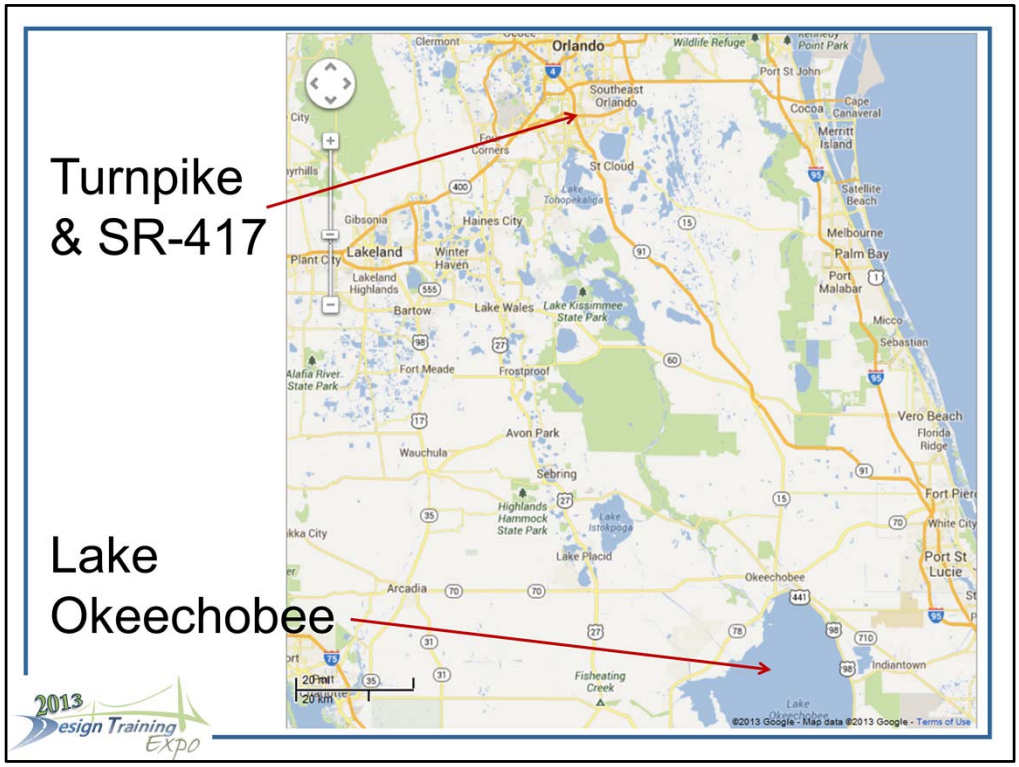
Click to show ponds' removal

So we see that the additional storage from the SFWMD 150% criteria – though at one time was the best approach available – is now shown to be a poor investment for nutrient removal in nutrient impaired basins.



Only for Verified Nutrient-Impaired Basins

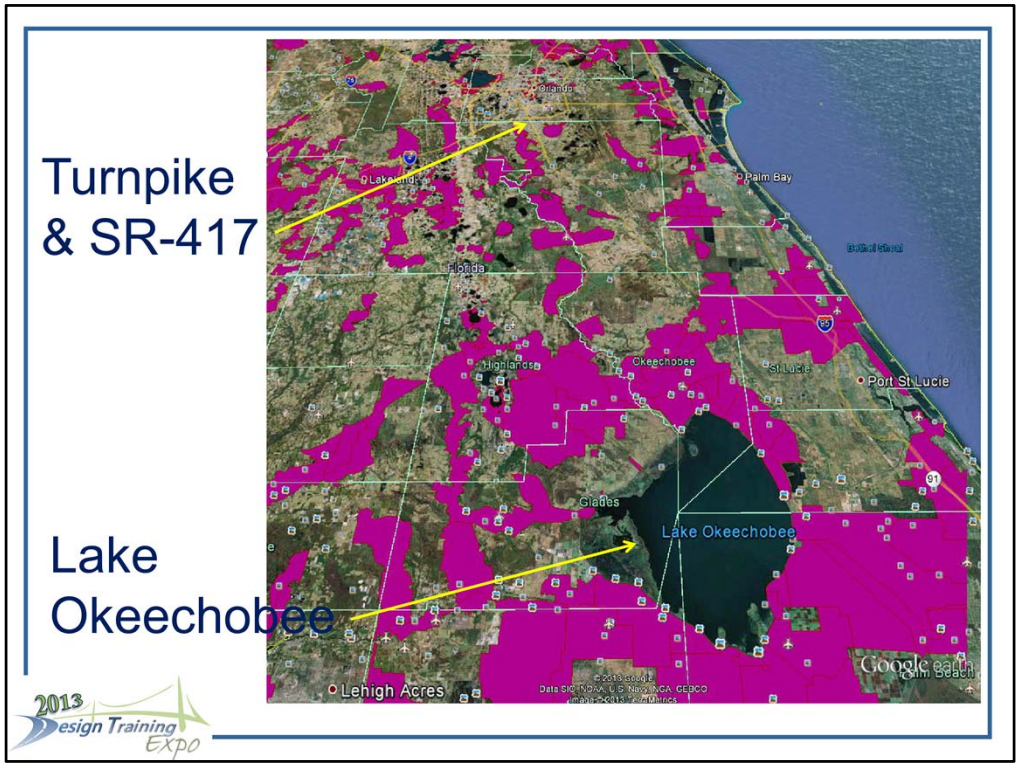
How far is “far enough?”



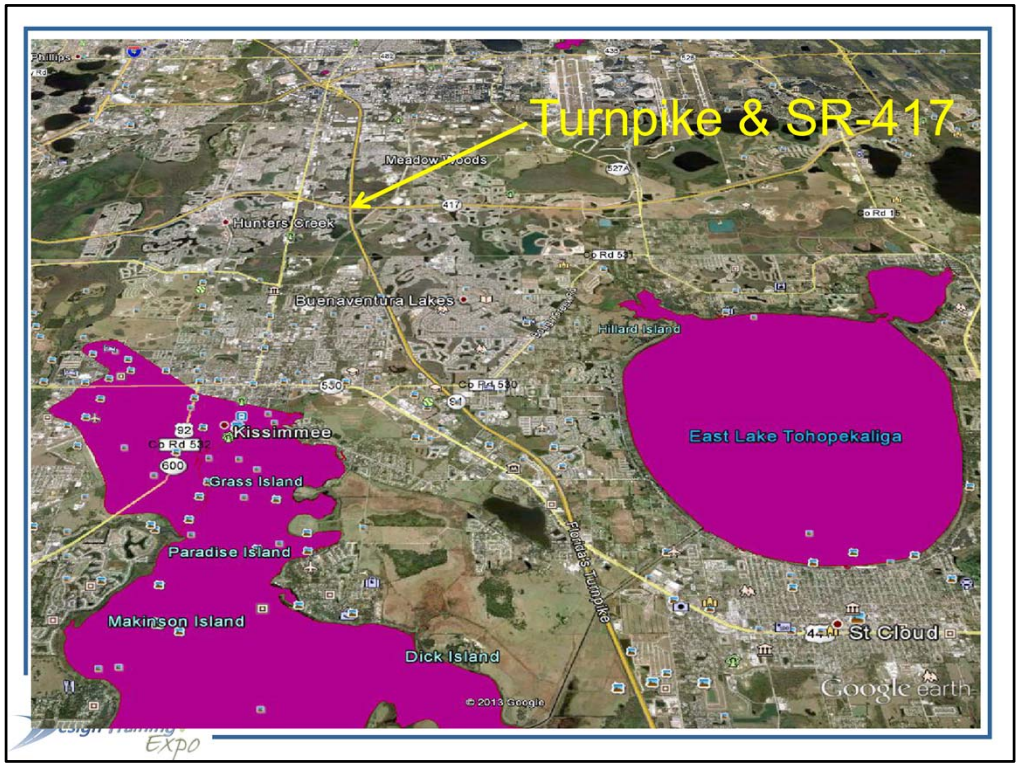
For example…

Several hundred miles and several unimpaired lakes between Lake O. and the project.

Significant costs to pre/post nutrients

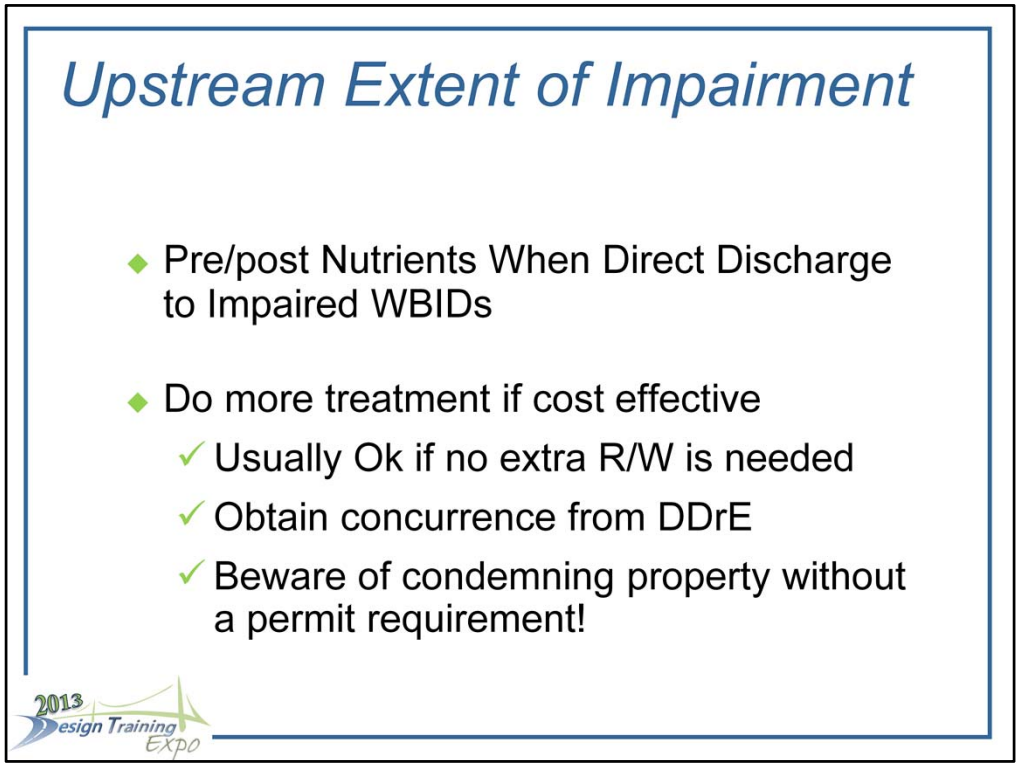


Purple areas are impaired basins



A close up view…

Project is a significant distance from nearest impairment with intermediate unimpaired lakes



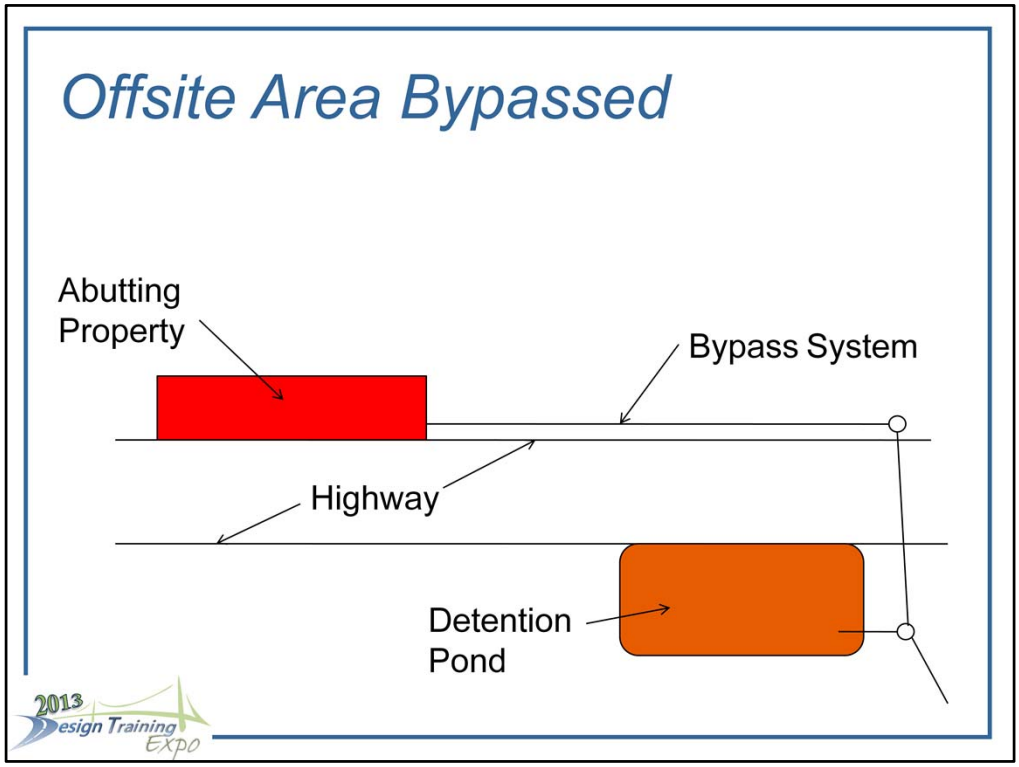
WBID – Water Basin ID

To increase storage, use available land, dig ponds deeper, strand water in ditches **if** there is sandy soils

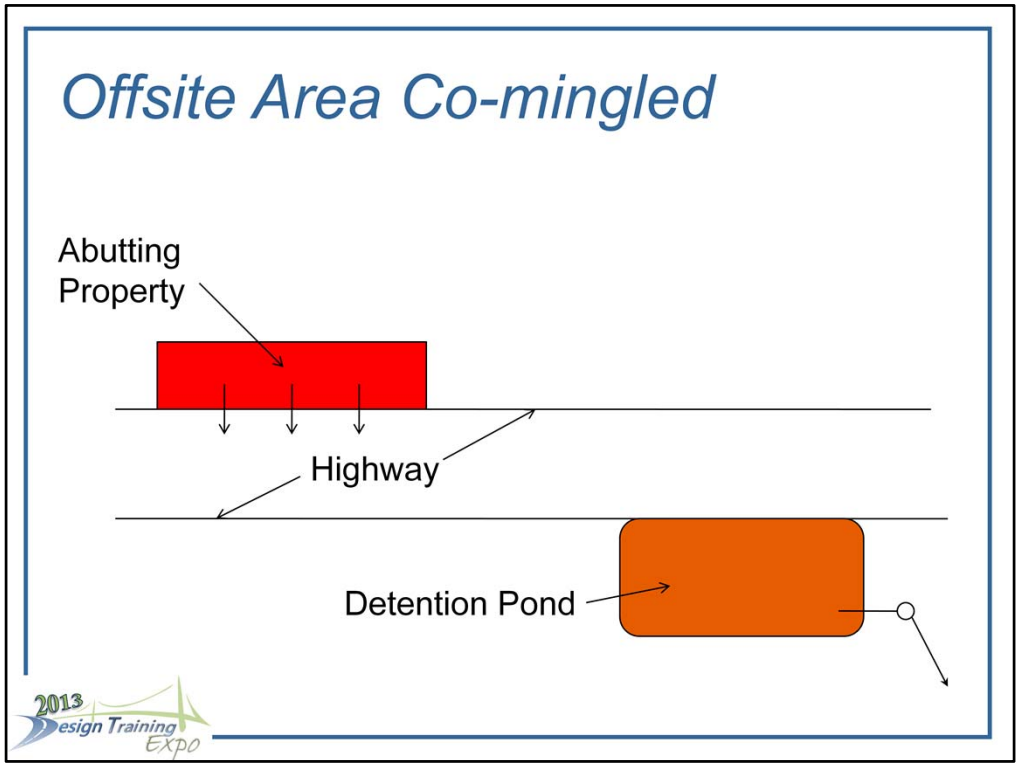
BUT… remember that additional wet pond storage *might* *not* be getting you much – go with upstream retention in ditches, if possible.

Offsite co-mingling

- Technical Background
- Design Policy / Guidance
- Some Areas Still Under Discussion…



This is the most common occurrence except in SFWMD



Detention pond is the same size as in the previous slide.

Offsite co-mingling:

- Wet Detention Pond
- Infiltration Type BMPs

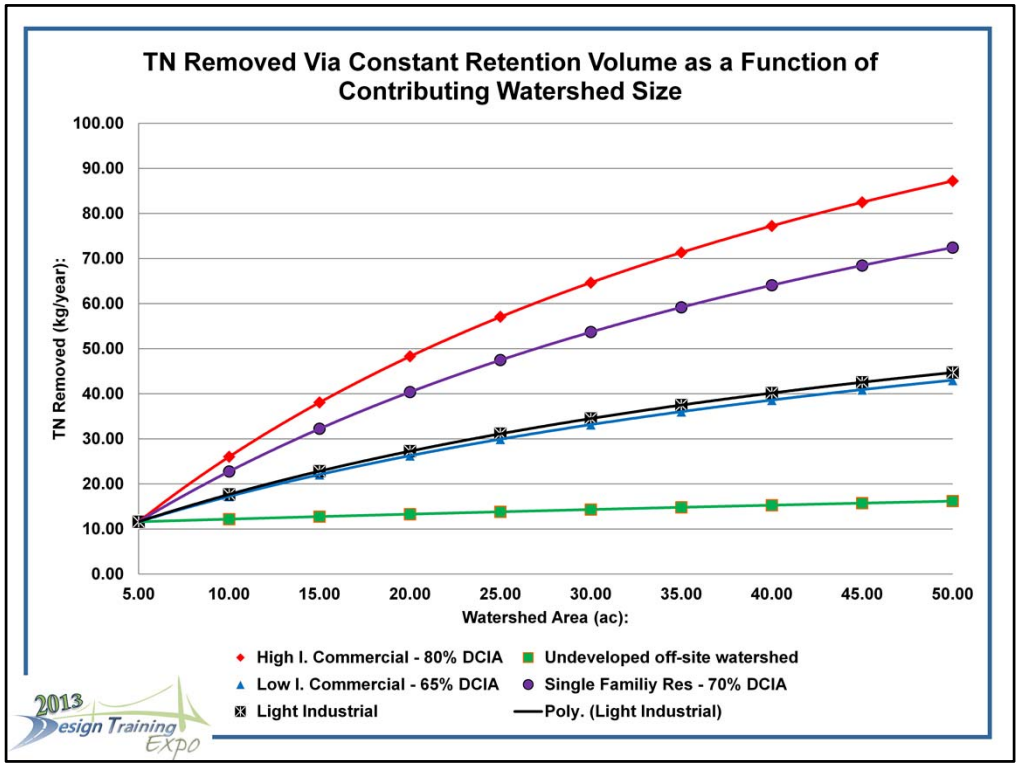
Discussion divided into two cases:

1. Wet detention ponds (pictured)

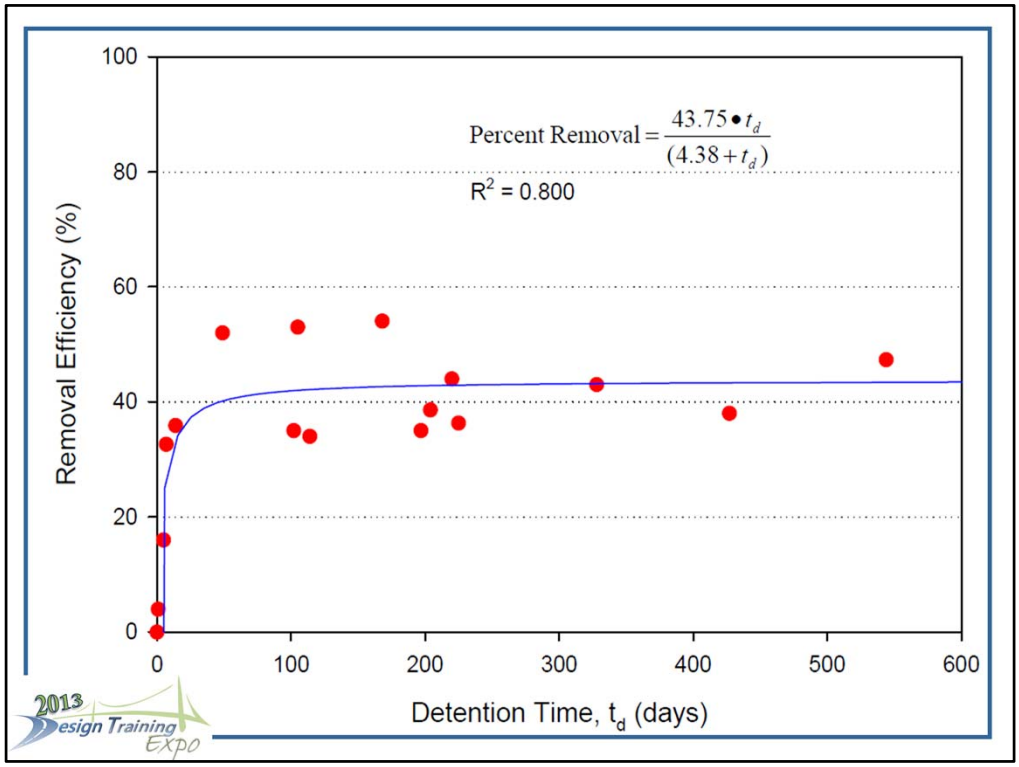
2. Infiltration BMPs: retention, dry detention, swales, rain gardens, etc.

Using nutrients as a surrogate…

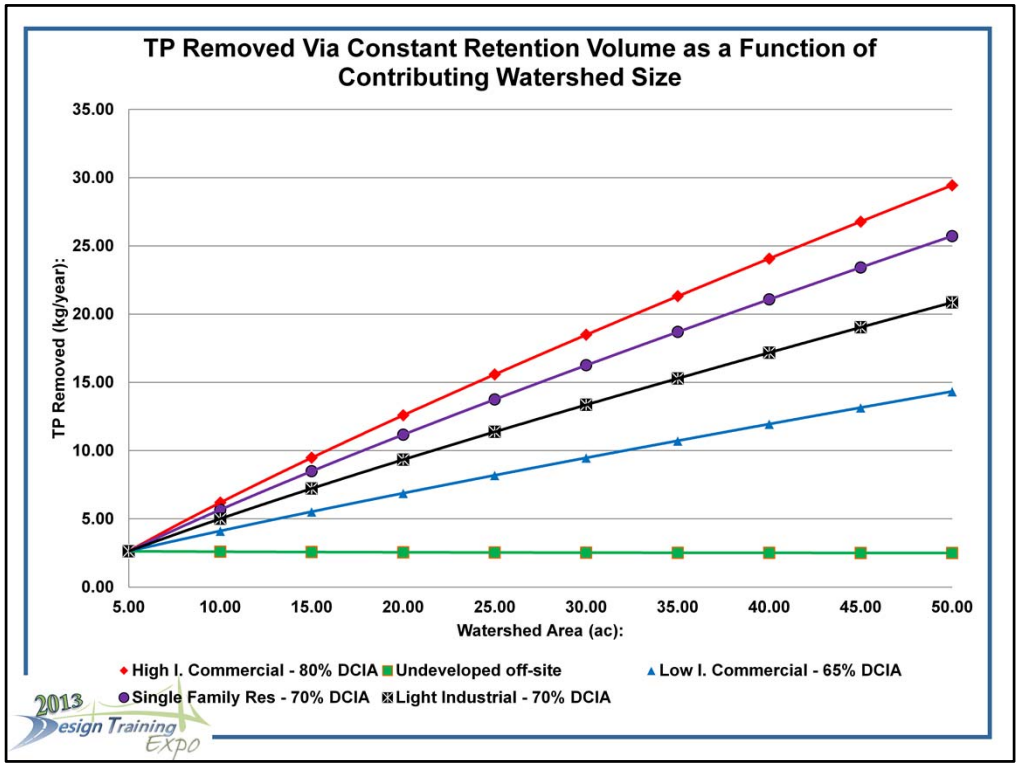
Conservative, since we are targeting dissolved pollutant rather than TSS



Always improved TN removal… why?



From Harper 2007



Always improved TP removal… why?

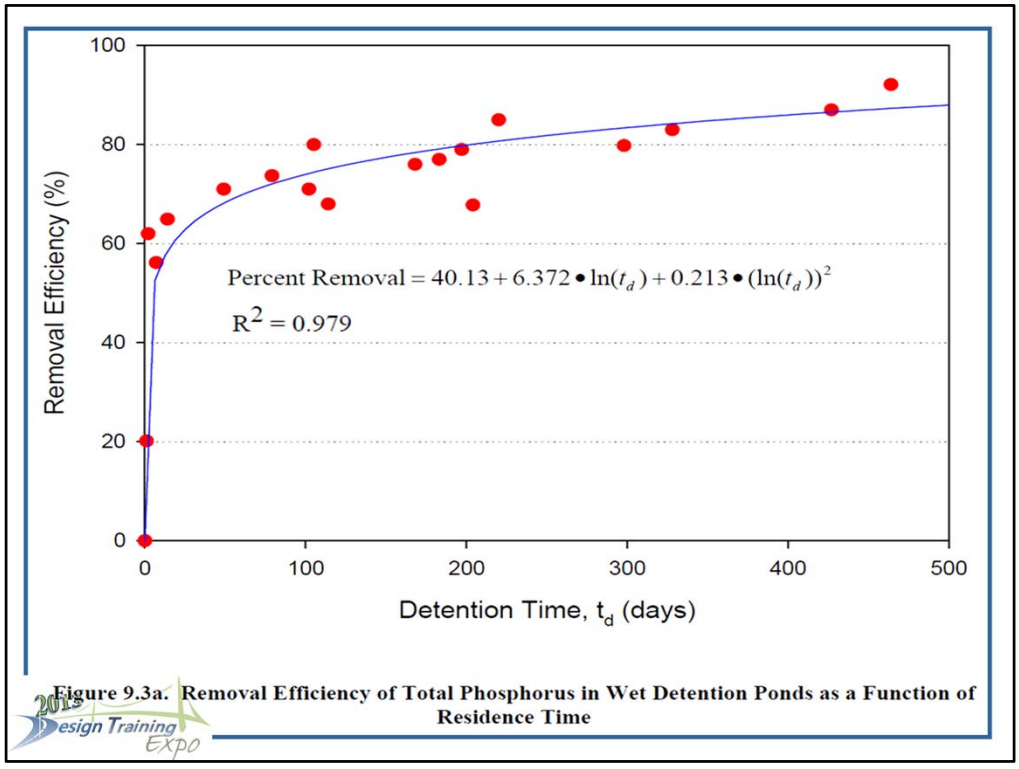
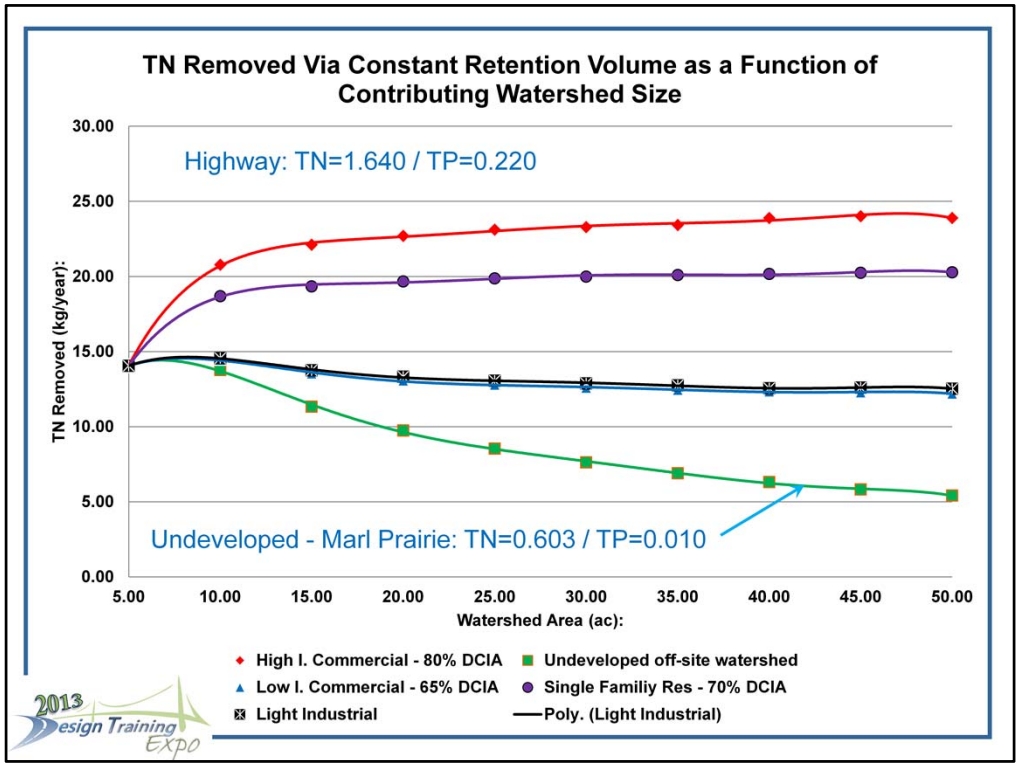


Figure 9.3a. Removal Efficiency of Total Phosphorus in Wet Detention Ponds as a Function of Residence Time

From Harper 2007

We have already looked at ponds, now let's look at Infiltration BMPs (retention, dry detention, swales, rain gardens, etc.)



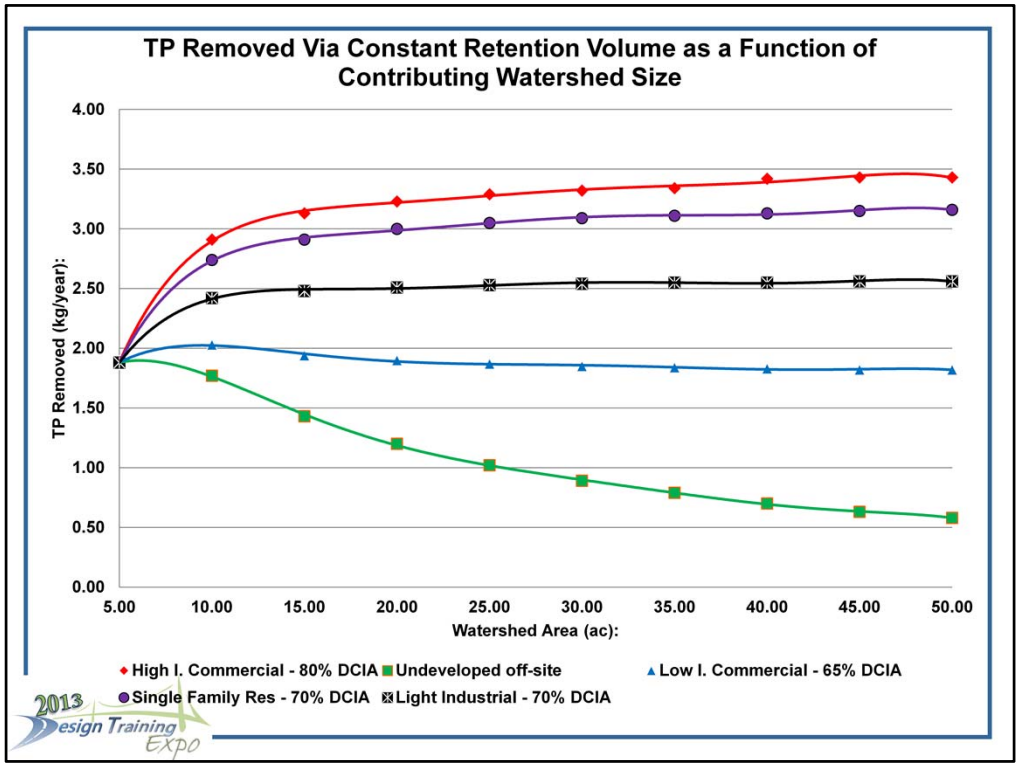
Removal curves for retention

Onsite = 5 ac roadway
Offsite = differing land uses at 5 ac size increases, up to 10 times the onsite area

Retention sized to treat the 5 ac roadway.

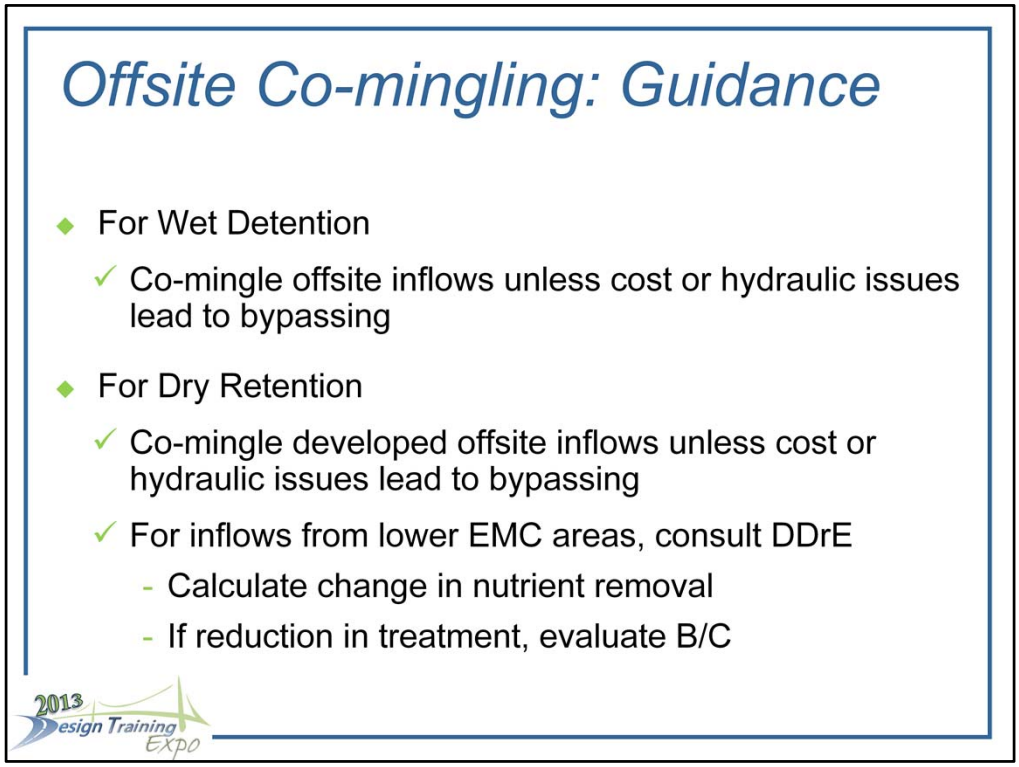
Why the decline? A: cleaner water is taking the place of roadway runoff - **click**

Undeveloped area is Marl Prairie: the cleanest natural condition - **click**.



Change from TN is the result of the different relative EMCs for the land uses.

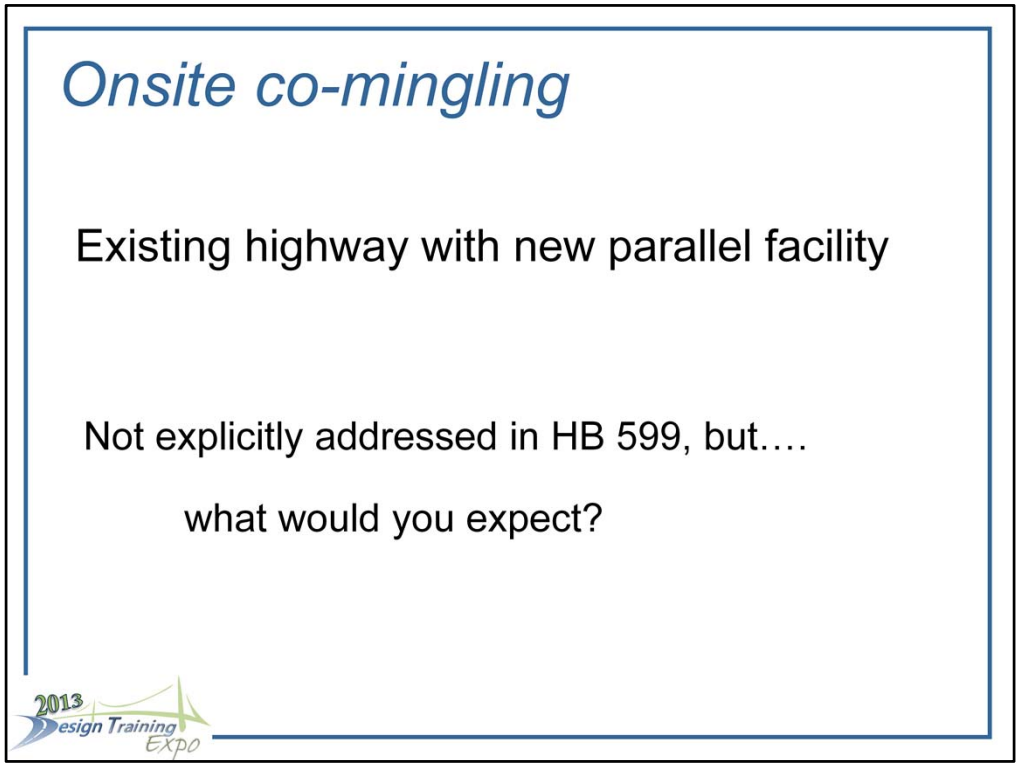
What's missing in this analysis? There is a significant conservatism? Clue: especially as the undeveloped offsite are in creases? …. **Time of concentration!** Thus, we will likely re-visit this modeling.



When would hydraulics dictate bypassing? When the offsite property is low lying and will be flooded by the roadway pond control structure.

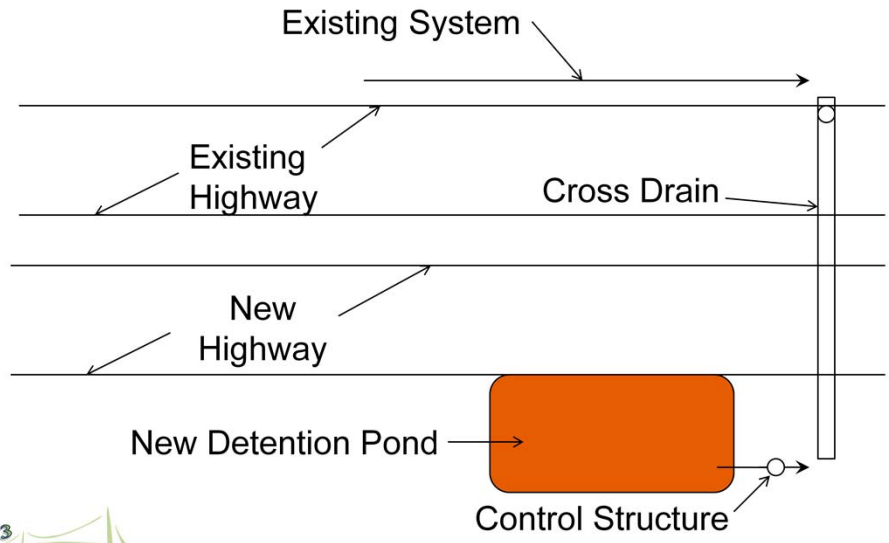
When would it cost more to co-mingle? Likely, NEVER

Still resolving issue of clean offsite inflows to infiltration BMPs



Attentive listeners will surmise that environmental treatment always improves with co-mingling onsite.

Onsite Area Bypassed



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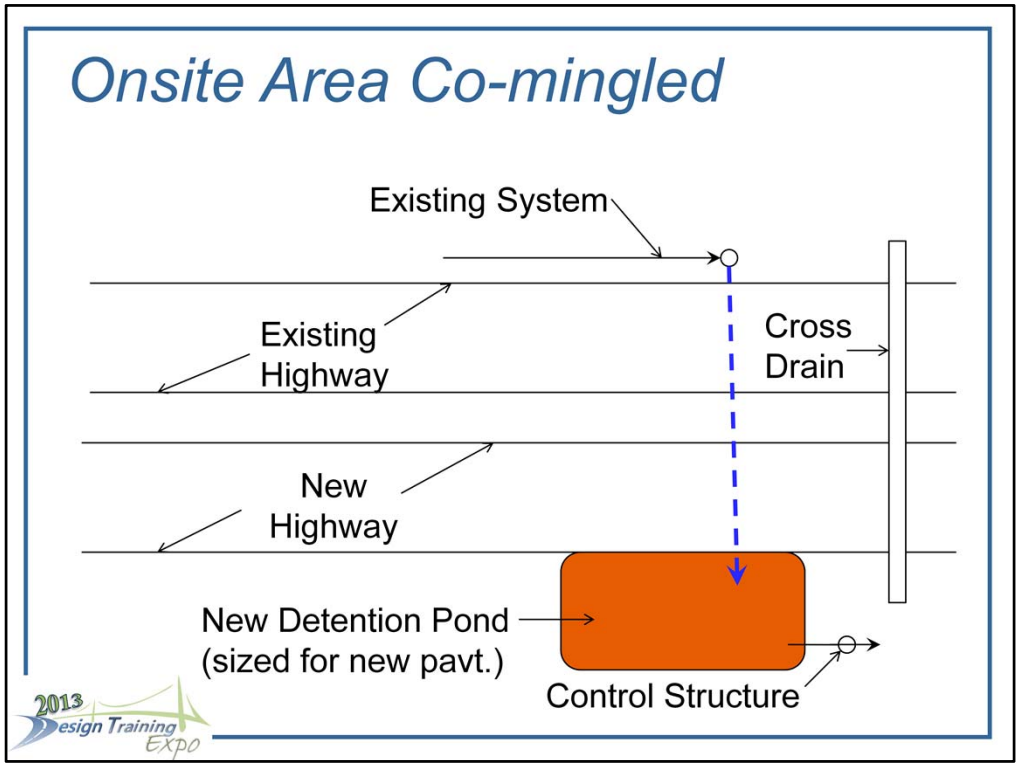
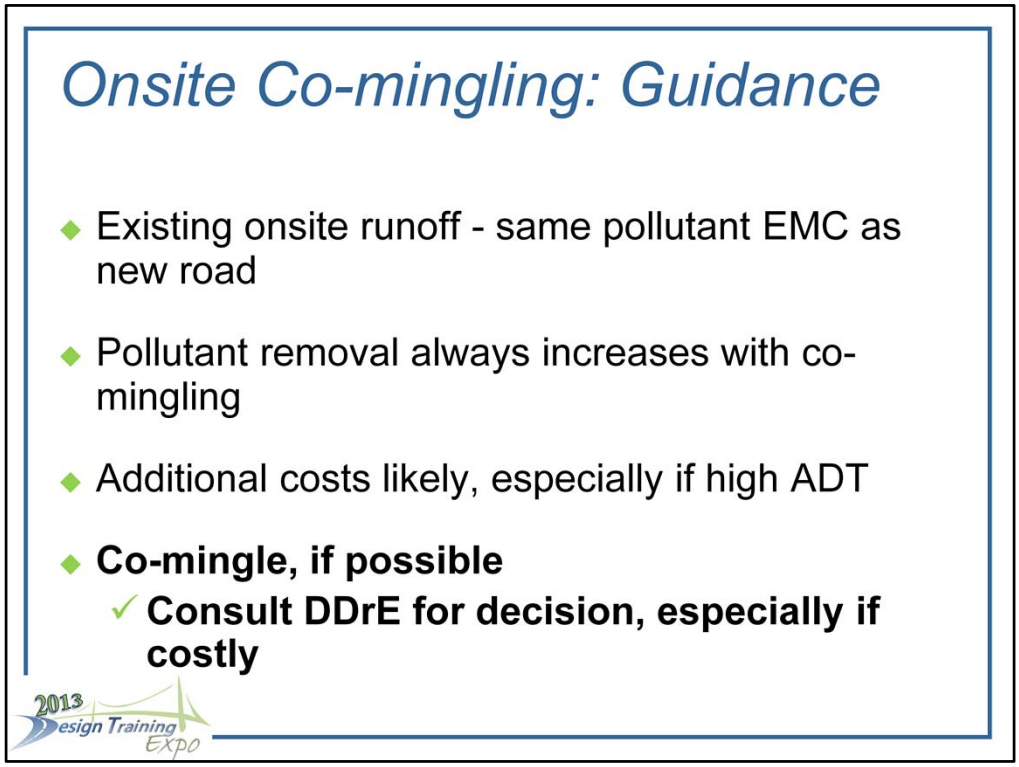


Pond is same size as before (except minor changes for hydraulics)

Blue pipe is new (extra cost)



Additional cost will be in connecting old roadway system to the new pond

Questions?

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