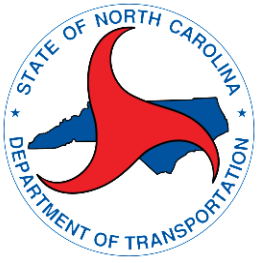
NCDOT Facility Maintenance Plan Template

Template Training Materials

March 2015

Prepared For:



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NCDOT Facility Maintenance Template Training

PURPOSE OF THIS TEMPLATE

This Facility Maintenance Template (FMT) was designed with the intent of providing a system which is robust yet streamlined. NCDOT PTD agencies vary greatly in staff and fleet size, but the theme of running efficient staffs with shared duties is universal. With that in mind, this Facility Maintenance Template was designed around a “Two Touch” philosophy. A Facility Maintenance Manager checks his schedule when the month starts to prepare for his Preventive Maintenance work and enters his work status at the end of the month for recordkeeping. This allows for Facility Maintenance to be scheduled, performed, and tracked with minimal time spent on administrative duties. This process is further detailed in this report and will be expanded upon in the training stage of this project.

HOW TO USE TRAINING MATERIALS

This training material provides a general overview of the Facility Maintenance Template documents and associated processes. Steps are given for how to retrieve the FMT package from NCDOT’s website and tailor the contents to the needs of each individual transit agency. The training material details the annual setup process for the Facility Maintenance Schedule, monthly maintenance and tracking steps to be completed by agency maintenance staff, and archiving and review procedures. Additionally, an overview of the Asset Replacement Life Cycle Costing Template is provided to explain the contents, setup, and usage of its information.

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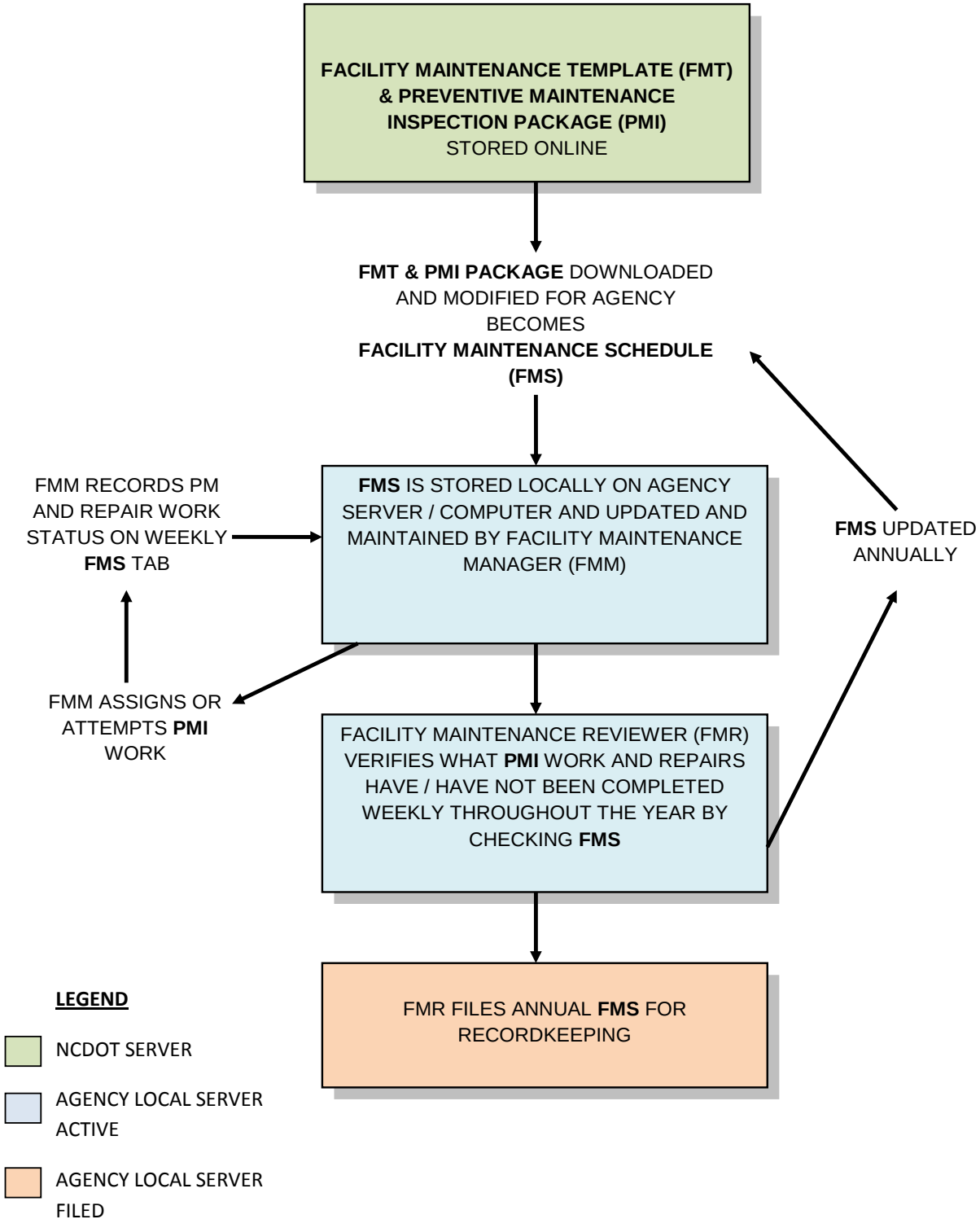
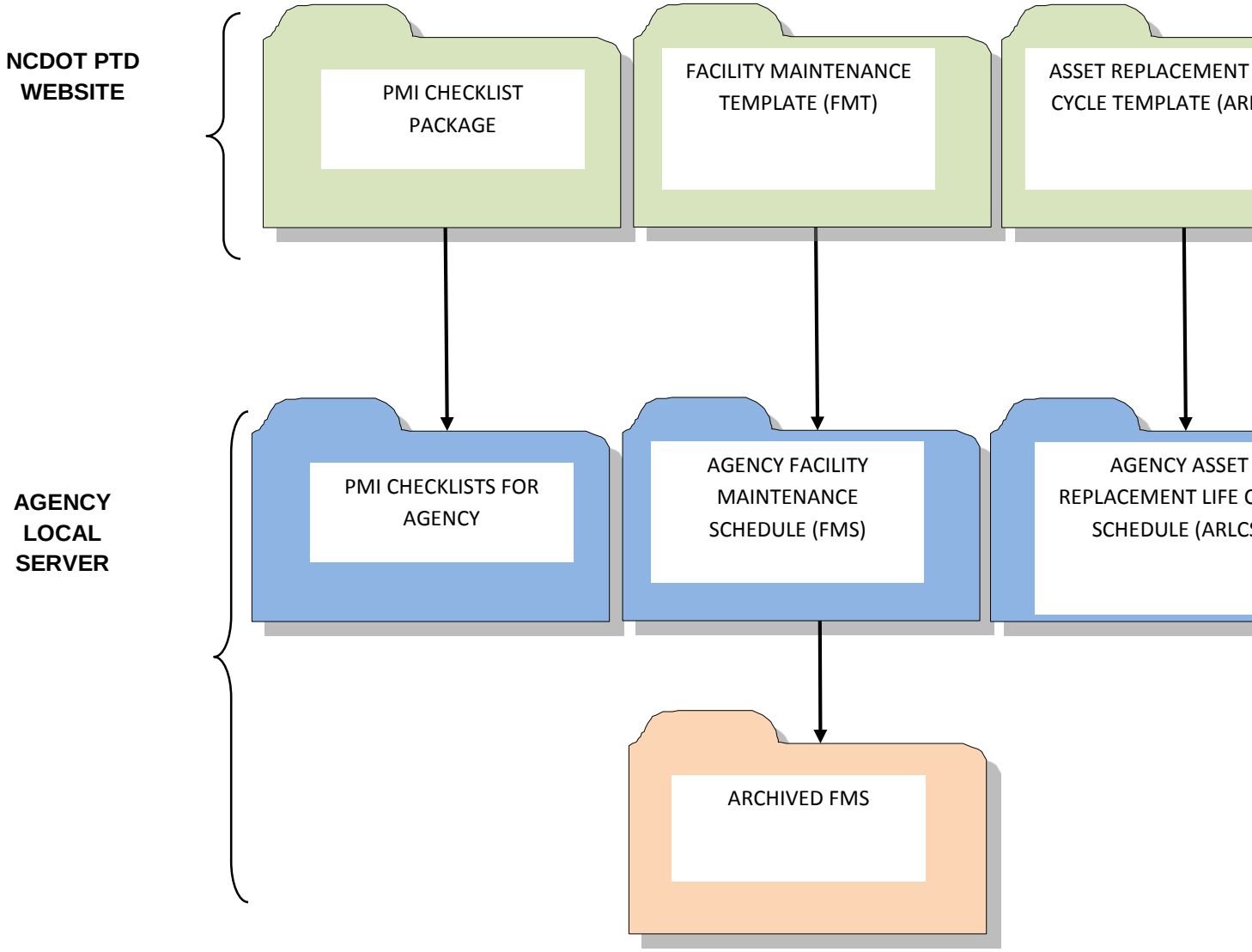
FACILITY MAINTENANCE TEMPLATE CYCLE



FILE STRUCTURE



NCDOT PDT SERVER – GREEN

AGENCY SERVER ACTIVE – BLUE

AGENCY SERVER FILED - ORANGE

ANNUAL SETUP

1) Agency Director assigns existing staff titles of Facility Maintenance Manager (FMM) and Facility Maintenance Reviewer (FMR).
   a) Staff selected by a director will be on a case by case basis due to differences in agency staffing and operations.
   b) Selection should be based on overall knowledge of the facilities to be maintained and capacity to complete the Preventive Maintenance tasks.

2) FMM will complete a facility inventory to document the facility systems and equipment to be maintained via the Facility Maintenance Template (FMT) that will include: equipment; building / site materials and finishes; building systems and fixtures; etc.

3) FMM downloads one of the FMT databases from NCDOT's server.
   a) The FMT will exist as a set of excel documents in a combined downloadable package hosted on NCDOT's website (web address TBD).

   b) FMM has the option to download one of the three tailored versions:
      - FMT for facilities with administration and operations functions;
      - FMT for facilities with administration, operation and maintenance functions; and
      - FMT for facilities with administration, operation and transit center functions.
   c) This is a one-time only download. FMM will set-up the FMT once and save the file to the local agency's network.

d) FMT will include a pool of facility equipment, finishes, and systems which will encompass the majority of expected items present in each facility.
   - Each item will be listed with its PM intervals across an overall schedule and automatically linked monthly schedule (as illustrated in the images below).
   - Each item will have an associated Preventive Maintenance Item (PMI) Checklist with associated Preventive Maintenance tasks identified.

NCDOT FACILITY MAINTENANCE TEMPLATE SCHEDULE
A=ANNUAL / S=SEMIANNUAL / Q=QUARTERLY / M=MONTHLY
MAINTENANCE COMPLETE

PMI	Description	Month								
		1	2	3	4	5	6	7	8	9
11.47	multifunction copier	NA	NA	NA	NA	NA	S	NA	NA	NA
11.48	Oven, electric range	A	NA	NA	NA	NA	NA	S	NA	NA
11.49	Pallet, battery storage	NA	NA	Q	NA	NA	S	NA	NA	Q
11.50	Parts washer	A	M	M	Q	M	M	S	M	M
11.51	Power washer	M	M	Q	M	M	S	M	M	Q
11.52	Press, hydraulic, 20 ton	A	M	M	Q	M	M	S	M	M
11.53	Press, oil filter	M	M	Q	M	M	S	M	M	Q
11.54	Pressure washer, wall mounted	A	NA	NA	Q	NA	NA	S	NA	NA

Image is an excerpt from "OVERALL" tab in FMT

MONTH: JANUARY
A=ANNUAL / S=SEMIANNUAL / Q=QUARTERLY / M=MONTHLY
X = MAINTENANCE COMPLETE

PMI	Description	TYPE	COMPLETE	NOTES
11.38	Ice maker	A		
11.39	Jack stand	NA		
11.4	Jack, axle, hyrdraulic	A		
11.41	Jack, rolling	NA		
11.42	Kitchen equipment, commercial	A		
11.43	Ladder, rolling	NA		
11.44	Lift cart	A		
11.45	Locker, mini	NA		
11.46	Lockout / tagout, wall mounted	A		
11.47	multifunction copier	NA		
11.48	Oven, electric range	A		
11.49	Pallet, battery storage	NA		
11.5	Parts washer	A		
11.51	Power washer	M		
11.52	Press, hydraulic, 20 ton	A		
11.53	Press, oil filter	M		
11.54	Pressure washer, wall mounted	A		
11.55	Public seating, plastic	M		

Image is an excerpt from "JANUARY" tab in FMT

4) FMM identifies items from the FMT package to match their facility inventory and create the Facility Maintenance Schedule (FMS) and notes which items need to be added / removed. (To be updated / revised annually.)
   a) The compiled FMT package includes a numbering system by division and assigned PM numbers for each item / system included. These numbers will be used on the inventoried items included in the Facility Maintenance Schedule.
   b) Any inventoried items not included in the system will be added sequentially at the end of their division.

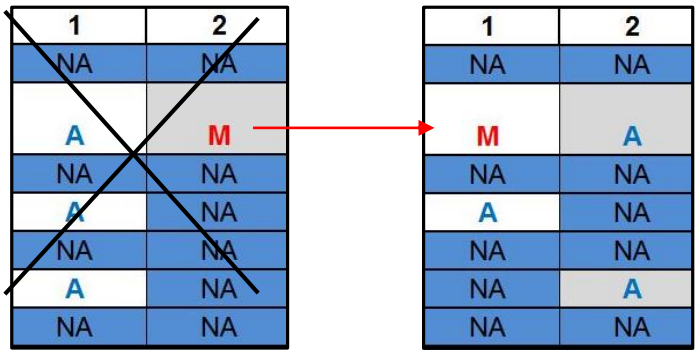
5) FMM hides the unneeded items from the overall FMS and each monthly schedule. To hide unneeded items in the FMT:
   a) Click the "OVERALL" tab, and while holding down the "SHIFT" key on the keyboard, click from the "OVERALL" tab to the "DECEMBER" tab; thus, selecting all of the tabs in the FMT.
   b) Highlight the row(s) of the item(s) to be hidden.
   c) Right-click the mouse and select "HIDE" to hide the row(s) across all selected tabs. Finish the command by clicking into another month's tab.

6) FMM adds needed items to the overall FMS and each monthly schedule. To add any new items from FMT, categorize the item by the proper division and add the next sequential number for that division. A PMI Checklist will also need to be generated. The maintenance tasks used to maintain an item can be found through operations & maintenance manuals, RSMeans or other maintenance guidelines, or agency standard practices depending on the type of item being maintained. Fill out the new PMI on the attached PMI template with the required steps and intervals and save the file according to PMI # and description. All new PMI checklists should be stored on the agency server with the existing PMI's upon completion. The steps below explain how to incorporate the new equipment/system and its intervals into the FMS:
   a) Click the "OVERALL" tab, and while holding down the "SHIFT" key on the keyboard, click from the "OVERALL" tab to the "DECEMBER" tab; thus, selecting all of the tabs in the FMT.
   b) Highlight the row below the item to be added, right-click and select "INSERT". Type in the assigned PMI # and equipment description in the new row. Finish the command by clicking into another month's tab.
   c) Click the "January" tab, and while holding down the "SHIFT" key on the keyboard, click the "DECEMBER" tab; thus, selecting all of the tabs for each month.
   d) Highlight the cells in the "A, B, and C" of row above your new blank row, and hover the mouse over the bottom right corner of the selected cells until a plus (+) symbol appears. While holding the left-click of the mouse down, drag downwards over the 3 corresponding cells of your newly created row and then release the click. Finish the command by clicking into "OVERALL" tab.
   e) In the "OVERALL" tab, scroll below the active table to the area colored in light green. Highlight the row below the PMI number you will be adding, right-click, and select "insert." Next, highlight the cells "A through N" of the row above your new blank row and mouse over the bottom right corner of your selection until a plus symbol appears. While holding a left-click, drag downwards over the corresponding cells of your newly created row and then release the click.
   f) In the FMS table on the "OVERALL" tab, add the intervals to match the PMI Checklist which was created for the new equipment. The addition is now complete.

7) FMM creates a list of high value equipment and systems to track in the Asset Replacement Life Cycle Cost Schedule. (Updated/revised annually) See Asset Replacement Life Cycle Costing Schedule

(ARLCS) section for further instructions on this list. *(Consists only of major systems such as vehicle lifts, vehicle wash systems, and roofing systems.)*

8) FMM balances the preventive maintenance (PM) items across the annual schedule by shifting Monthly, Quarterly, Semi-Annual, and Annual Preventive Maintenance Items to not overload any particular month. (Updated/revised annually)
   a) Each item included in the FMS will display its PM intervals in the schedule. The FMM will manually shift the intervals while retaining the same interval pattern to avoid overloading months with larger tasks (i.e. Shift the intervals of separate items to avoid stacking multiple annual intervals all on one month.) **DO NOT COPY / PASTE**
   b) Accomplish this by swapping two intervals of an item's row with each other. For example, swap a monthly with an annual to alleviate the crowding on a heavy month.



Images are excerpts from "OVERALL" tab in FMT

MONTHLY MAINTENANCE

1) FMM opens the monthly Facility Maintenance Schedule on the first work day if a month to see the month's required Preventive Maintenance processes and plans the month.
2) FMM completes, assigns, or contracts out all scheduled PM tasks according to each item's associated Preventive Maintenance Item Checklist (PMI) throughout the month.

NCDOT Facility Maintenance Template

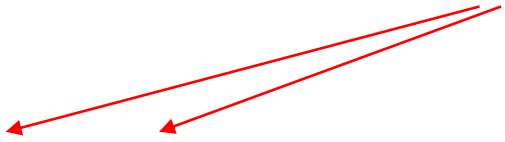
Agency: **PMI #:** 11.36
Item: Grinder, 8 inch
Location:

		Interval			
	Maintenance Task	Monthly	Quarterly	Semi-Annual	Annual
1	Clean dust collector trays and filter bags. (Confirm step completed weekly at monthly inspection)	X	X	X	X
2	Inspect grinding wheels for proper balance and damage (chipped or cracked).	X	X	X	X
3	Check spark guard (wheel guard) and tool rests for secure mounting and proper operation.	X	X	X	X
4	Clean motor and mounting base of contaminants.	X	X	X	X
5	Inspect dust collector hoses and connections for proper fit and damage; replace as required.	X	X	X	X
6	Check work light and replace bulb if necessary.	X	X	X	X
7	Inspect motor and controls for proper operation.		X	X	X
8	Inspect and properly dress (surface cleaned and square) grinding wheels.		X	X	X
9	Inspect power connections and wiring for damage.		X	X	X
10	Inspect for missing and loose bolts, screws, levers, and knobs; replace and tighten as required.		X	X	X

Comments:

Image from PMI Excel file (i.e. 11.36X Grinder PM)

3) As tasks are completed, the FMM marks each item on the associated monthly tab of FMS items completed. FMM lists any pertinent comments on the status of PM work in the "NOTES" section as required for future reference.



MONTH: JANUARY
A=ANNUAL / S=SEMIANNUAL / Q=QUARTERLY / M=MONTHLY
X = MAINTENANCE COMPLETE

PMI	Description	TYPE	COMPLETE	NOTES
2.1	Fence, chainlink	NA		
2.2	Fire Protection, Site Mechanical	A		
2.3	Paving, asphalt	NA		
2.4	Paving, concrete	A		

Image is an excerpt from "JANUARY" tab in FMT

4) FMM marks any unscheduled reactive repair work for each item in the remarks section on the monthly tab of the Facility Maintenance Schedule for recordkeeping. *(Can be reported by equipment users or FMM during inspections.)*
5) FMR checks the monthly Maintenance Schedule tab on the last work day of the month to review which Preventive Maintenance Items were successfully completed.

ANNUAL ARCHIVING

1) FMR reviews the overall Annual Schedule and looks to identify successful Preventive Maintenance activities throughout the year as well as identifying patterns of incomplete work with a focus on improving the schedule and process for the next year.
2) FMR presents the findings of the Annual Review to the FMM to assist the FMM in rebalancing their intervals.
3) FMR saves a copy of the Facility Maintenance Schedule for the year to the Agency server / local computer for archiving purposes and future reference.
4) FMR prints a copy Annual Schedule from the archived Facility Maintenance Schedule and signs the last page to confirm the work was completed as documented. The signed Annual Schedule pages will be saved for the agencies' records and will be made available to NCDOT PTD upon request.

ASSET REPLACEMENT LIFE CYCLE COSTING SCHEDULE PROCESS

The Asset Replacement Life Cycle Costing Schedule (ARLCS) is a budgeting tool to allow Facility Managers to anticipate the major asset replacements that will need to be made in the future. The following assumptions were used to create the tool:

- The period of time is 40 years.
- The cost estimates are based on experience with other bus maintenance facilities and on RSMeans Cost Data.
- The cost estimates include overhead and profit, as if all services are being outsourced.
- The cost estimates are a rough order of magnitude opinion of probable cost intended to be used for high level budgeting purposes only.
- The cost estimate is for the national average cost, US Dollars, for 2014. (No escalation factor included)

Asset Replacement Setup

1) FMM downloads the full Asset Replacement Life Cycle Template (ARLCT) database from NCDOT's servers. (One time only)
2) In the ARLCT, the FMM deletes items from the downloaded database to reflect the items whose life cycle values are to be tracked in this facility. The PMI's of the items tracked should match those used in the FMS.
3) It is important to note that the ARLCT is intended to be used for tracking costs on high value items at each facility as opposed to every item present.

ASSET REPLACEMENT LIFE CYCLE SCHEDULE
October 2014

PMI	ASSET	DATE INSTALLED	USEFUL LIFE EXPECTANCY (YEARS)	CURRENT REPLACEMENT COST	UNIT	QUANTITY	ESTIMATED REPLACEMENT DATE									
							2015	2016	2017	2018	2019	2021	2024	2029	2034	2040
2.1	Parking, asphalt	2008	10	$1	sf	20000				18440						
7.1	Gutter with downspout	2009	25	$10	lf	800									8240	
7.3	Roof system, permeable membrane	2009	25	$5	sf	6000									28080	
8.5	Overhead door, coiling	2009	35	$4,300	Each	8										
8.8	Roll-top door operator	2009	7	$6,487	Each	8		51894								
9.10	Carpet	2009	8	$7	sf	4000			26400							
11.34	Gate Operator	2009	7	$6,487	Each	2		12974								
11.87	Wash system, spray arm, drive though	2009	15	$137,500	Each	1							137500			
14.7	Lift, 2 post, inground, 30,000 lb	2009	20	$135,310	Each	2								270620		
14.8	Lift, 2 post, surface mounted, 15,000 lb	2009	20	$19,000	Each	1								19000		
14.9	Lift, 4 post, drive-on, 30,000 lb	2009	20	$54,600	Each	2								109200		
14.10	Lift, portable, 18,000 lb	2009	20	$75,000	4 Set	1								75000		
15.4	Air Conditioning Unit, Packaged, Thru-wall	2009	10	$1,865	Each	1					1865					
15.5	Air Conditioning Unit, Split,	2009	20	$25,200	Each	3								75600		
15.24	Exhaust Fan, Roof, w/ damper	2009	20	$2,644	Each	2								5288		
16.58	Water Heater, Domestic, Tank, Nat. Gas	2009	12	$2,396	Each	2						4792				
16.13	Diesel Generator	2009	25	$75,400	Each	1									75400	
16.22	Solar panels	2009	15	$1,520	Each	30							45600			
							2015	2016	2017	2018	2019	2021	2024	2029	2034	2040
				Total Annual Replacement Budget				$67,462	$27,984	$19,915	$2,052	$5,463	$219,720	$721,120	$156,408	

Image is an example of the NCDOT ARLCT 2015

4) FMM renames the file to the ARLCS and saves this custom database to the agency's local server.
5) FMM fills in "date installed" column for each of the assets.
6) FMM fills in "quantity" column for each of the assets.
7) The ARLCS is then ready to serve as an annual budgetary planner and measuring stick for each agency to reference in budget planning for asset maintenance and replacement.

ACRONYM LIST

FMT – Facility Maintenance Template

FMS – Facility Maintenance Schedule

FMM – Facility Maintenance Manager

FMR – Facility Maintenance Reviewer

ARLCT – Asset Replacement Life Cycle Template

ARLCS – Asset Replacement Life Cycle Schedule

PMI – Preventive Maintenance Inspection