## **Comparison of Proposed Best Management Practices Submitted in the Sand Mining Rulemaking Petitions**

The following table summarizes and compares the best management practices (BMPs) submitted in the rulemaking petitions by Texas Aggregates and Concrete Association (TACA) and the Lake Houston Grassroots Flood Prevention Initiative (FPI). The entire BMPs guidance document submitted by each petitioner may be viewed as part of their original petition for rulemaking submission packets on the following webpage: https://www.tceq.texas.gov/permitting/stormwater/sand-mining-rulemaking

## Table 1: Comparison of BMPs/Phases Presented in Proposed BMPs Guidance Documents

<u>Note:</u> The difference in language between the two proposed BMPs documents is shown in **bold text.** When a BMP/Phase of the two proposed BMPs documents do not match, the BMP has been shaded orange; when the BMP/Phase match, the BMP has been shaded green.

BMP/Phase	TACA Proposed BMPs Guidance Document	FPI Proposed BMPs Guidance Document
Vegetative Buffer zones	A minimum 100-foot buffer zone is recommended adjacent to perennial streams >20' in width, 50 feet for perennial streams <20' in width and 35' for intermittent streams.	A minimum 100-foot buffer zone is recommended adjacent to perennial streams >20' in width, 50 feet for perennial streams <20' in width and 35' for intermittent streams.
Sod Stabilization	The most effective vegetative practice available, involves establishing longterm stands of grass with sod on exposed surfacesProtection of trees involves preserving and protecting selected trees that exist on the site prior to development	The most effective vegetative practice available, involves establishing longterm stands of grass with sod on exposed surfacesProtection of trees involves preserving and protecting selected trees that exist on the site prior to development <b>If trees die</b> <b>or no longer viable for soil</b> <b>stabilization for any reason, then</b> <b>they must be replaced within 30</b> <b>days with an equivalent or better</b> <b>soil stabilizing tree by the</b> <b>operating APO.</b>
Tillage with Lime and Fertilizer	To maintain adequate soil pH and nutrient content, may be important before seeding	To maintain adequate soil pH and nutrient content, may be important before seeding
Temporary Seeding	Planting of fast-growing annual grasses to hold the soil in areas that will not be disturbed again for 30 or more days. For long-term protection (greater than one year), permanent seeding should be initiated	Planting of fast-growing annual grasses to hold the soil in areas that will not be disturbed again for 30 or more days. For long-term protection (greater than one year), permanent seeding should be initiated

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Permanent Seeding	Use of perennial grass (with trees & shrubs) to stabilize the soil Inspect, repair and re-seed as needed, evaluating choice of seed and quantities of lime and fertilizer	Use of perennial grass (with trees & shrubs) to stabilize the soil Inspect, repair and re-seed as needed, evaluating choice of seed and quantities of lime and fertilizer
Mulching	The placement of hay, grass, wood chips, straw, or synthetic material on the soil. Mulch holds moisture, lessens temperature extremes and retards erosion on steep slopes during seed establishment	The placement of hay, grass, wood chips, straw, or synthetic material on the soil. Mulch holds moisture, lessens temperature extremes and retards erosion on steep slopes during seed establishment
Erosion and Sediment Control Blankets	Machine-produced mats of straw or other fibers held together with netting that provide temporary or permanent stabilization in critical areas, such as slopes or channels, so that vegetation may be established	Machine-produced mats of straw or other fibers held together with netting that provide temporary or permanent stabilization in critical areas, such as slopes or channels, so that vegetation may be established
Surface Roughening	Using heavy equipment, creates horizontal grooves across the slope which reduces runoff velocity/erosion and aid the growth of seed. Roughened slopes should be immediately seeded and mulched.	Using heavy equipment, creates horizontal grooves across the slope which reduces runoff velocity/erosion and aid the growth of seed. Roughened slopes should be immediately seeded and mulched.
Temporary Structures	Installed before and during construction. After removing temporary storm water controls the area should be vegetated.	Installed before and during construction. After removing temporary storm water controls the area should be vegetated.
Permanent Structures	Remain after construction.	Remain after construction.
Diversion ridges, berms or channels of stabilized soil	Divert runoff from disturbed areas or sediment-laden runoff into sediment basins. If diversions will remain in place more than 30 days, they should be covered with temporary or permanent vegetation. Diversions must have enough slope to assure drainage, but not enough to cause erosion within the channel	Divert runoff from disturbed areas or sediment-laden runoff into sediment basins. If diversions will remain in place more than 30 days, they should be covered with temporary or permanent vegetation. Diversions must have enough slope to assure drainage, but not enough to cause erosion within the channel
Silt Fences	Used below disturbed areas to capture sediment from sheet flow. Six to eight inches of the fence material should be buried in a trench about four inches deep and four inches wide. <b>Alternatively</b> ,	Used below disturbed areas to capture sediment from sheet flow. Six to eight inches of the fence material should be buried in a trench about four inches deep and four inches wide. Silt fences that

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	six to eight inches of the silt fence material can be buried under clean gravel placed on the upstream side of the fence, if trenching due to hard rock is not practicable. Silt fences that are not buried have no useful function and are a waste of money	are not buried have no useful function and are a waste of money
Straw Bale Barriers	Used on small disturbed areas to capture sediment from sheet flow. The drainage area must be restricted to 1/8 acre per 100 feet of barrier Straw bales that are not buried are improperly installed, have no useful function, are a waste of money, and could result in substantial fines due to improper placement and subsequent sediment discharge.	Used on small disturbed areas to capture sediment from sheet flow. The drainage area must be restricted to 1/8 acre per 100 feet of barrier Straw bales that are not buried are improperly installed, have no useful function, are a waste of money, and could result in substantial fines due to improper placement and subsequent sediment discharge.
Rock Berms	Serve as check dam in areas of concentrated flow, to intercept sediment-laden runoff, detain the sediment and release the water in sheet flow. Rock berms should be used when the contributing drainage area is less than 5 acres. Rock berms are used in areas where the volume of runoff is too great for a silt fence to contain. They are less effective for sediment removal than silt fences, particularly for fine particles, but are able to withstand higher flows than a silt fence	N/A
Sediment Basins	Allow retention and deposition of sediment prior to discharge or recycling. Sediment basins are made by diking, excavating or a combination of the two. Because of typical basin shapes and embankment side slope requirements of 2:1 or less, the capacity of the basin may be estimated by using the trapezoidal rule approximation of 40% x height x surface area	Allow retention and deposition of sediment prior to discharge or recycling. Sediment basins are made by diking, excavating or a combination of the two. Because of typical basin shapes and embankment side slope requirements of 2:1 or less, the capacity of the basin may be estimated by using the trapezoidal rule approximation of 40% x height x surface area

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Riprap Outlet Protection	Placed at the outlet end of culverts or channels to reduce the depth, velocity and energy of water so that the flow will not erode the receiving stream.	Placed at the outlet end of culverts or channels to reduce the depth, velocity and energy of water so that the flow will not erode the receiving stream.
Check Dams	Small dams constructed across swales or drainage ditches (lateral or wing ditches) to reduce flow velocity and erosion. They are not used in flowing streams. Check dams can be constructed of stone, straw bales, or logs, with a maximum height of two feet	Small dams constructed across swales or drainage ditches (lateral or wing ditches) to reduce flow velocity and erosion. They are not used in flowing streams. Check dams can be constructed of stone, straw bales, or logs, with a maximum height of two feet
Construction Entrance/Exits	Aggregate stabilized site entrances which reduce sediment tracked onto public roads. Aggregate should be at least six inches thick and 50 feet long. Tire washing may also be needed.	Aggregate stabilized site entrances which reduce sediment tracked onto public roads. Aggregate should be at least six inches thick and 50 feet long. Tire washing may also be needed.
Housekeeping Practices	Good housekeeping practices include: designated areas for equipment maintenance and repair; waste receptacles at convenient locations; regular collection of waste; protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic or hazardous materials; and adequately maintained sanitary facilities	Good housekeeping practices include: designated areas for equipment maintenance and repair; waste receptacles at convenient locations; regular collection of waste; protected storage areas for chemicals, paints, solvents, fertilizers, and other potentially toxic or hazardous materials; and adequately maintained sanitary facilities
Post Construction/ Stormwater Management measures	The Construction General Permit requires the SWPPP to describe measures that will be installed to control pollutants in storm water after construction is complete	The Construction General Permit requires the SWPPP to describe measures that will be installed to control pollutants in storm water after construction is complete
Retention Pond	Complete onsite storage and treatment of a specific volume of storm water runoff by using infiltration, evaporation and recycling. The average volume is typically the first inch or half inch of storm water runoff containing the first flush of pollutants.	Complete onsite storage and treatment of a specific volume of storm water runoff by using infiltration, evaporation and recycling. The average volume is typically the first inch or half inch of storm water runoff containing the first flush of pollutants.
Vegetated swales and natural depressions	Grass-lined areas that filter sediments from runoff thus helping to prevent erosion. Vegetated swales should have side	Grass-lined areas that filter sediments from runoff thus helping to prevent erosion. Vegetated swales should have side

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	slopes of 4:1 or less. Erosion and sediment controls shall be constructed and the stabilization measures shall be applied in the order that was indicated in the implementation sequence	slopes of 4:1 or less. Erosion and sediment controls shall be constructed and the stabilization measures shall be applied in the order that was indicated in the implementation sequence
Pre-mining phase	The property to be mined should be evaluated to determine whether a sufficient amount of reserves of adequate quality exist in order to profitably mine the site. This evaluation also typically includes the location of the property with respect to existing transportation networks and the end market.	The property to be mined should be evaluated to determine whether a sufficient amount of reserves of adequate quality exist in order to profitably mine the site. This evaluation also typically includes the location of the property with respect to existing transportation networks and the end market. Locate mines outside of floodways as identified in the FEMA NFHL and or the local community floodplain permitting regulations. Prohibited activities include the operation of any quarry within 1,500 feet of a navigable water body.
Site Evaluation	Property to be mined should be evaluated in terms of how the overall mining process will take place. This is typically called a Mine Plan. It typically includes location of processing plant, office and support facilities, haul road and/or access routes, product staging areas and overburden placement. An evaluation of the soil type(s) in the area planned for mining is valuable	Property to be mined should be evaluated in terms of how the overall mining process will take place. This is typically called a Mine Plan. It typically includes location of processing plant, office and support facilities, haul road and/or access routes, product staging areas and overburden placement. An evaluation of the soil type(s) in the area planned for mining is valuable They also need to do an Threatened and Endangered Species assessment. Operators need to be aware of local floodplain and drainage regulations and meet any local regulations including obtain any appropriate community floodplain development permits. Note: some communities are regulating to the 0.2% risk area (aka the 500 year floodplain) and/or have requirements for any landscape changes in the low risk flood zone area (unshaded X zone.). You are encouraged to

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		check with the local community before performing any work. In addition be mindful if your property extends across multiple jurisdictions as they may have different regulations.
Surface water flow	If sensitive water bodies are downstream (i.e., wild and scenic 10 rivers, recreational streams, natural aquatic sites, private ponds and lakes or receiving streams listed on the 303(d) list) extra erosion controls may be neededUnderstanding site drainage can be obtained by using the appropriate United States Geological Survey (USGS) Topographic Quadrangle map(s) for the area in question and studying the drainage features across the property. These maps show changes in elevation by a series of contour lines. These lines can be used to determine slope of the ground surface through the site to identify drainage patterns, however for sites with little elevation variation, these maps may not be useful because the contours lines are typically spaced at ten-foot or twenty-foot intervals. Up to date topographic data should be obtained onsite to assist in accurately determining drainage patterns	If sensitive water bodies are downstream (i.e., wild and scenic 10 rivers, recreational streams, natural aquatic sites, private ponds and lakes or receiving streams listed on the 303(d) list) extra erosion controls may be neededUnderstanding site drainage can be obtained by using the appropriate United States Geological Survey (USGS) Topographic Quadrangle map(s) for the area in question and studying the drainage features across the property. These maps show changes in elevation by a series of contour lines. These lines can be used to determine slope of the ground surface through the site to identify drainage patterns
Ground Water Conditions	The following BMPs will help guide a ground water preservation effort: When a new sand and gravel operation is being considered, it is prudent to first check the TCEQ water well database to determine if registered public and private drinking water supply wells are located nearby; Perform a visual check for possible unregistered private wells in the immediate vicinity of the new sand and gravel pit (see distance guidelines below); The perimeter of the new	The following BMPs will help guide a ground water preservation effort: When a new sand and gravel operation is being considered, it is prudent to first check the TCEQ water well database to determine if registered public and private drinking water supply wells are located nearby; Perform a visual check for possible unregistered private wells in the immediate vicinity of the new sand and gravel pit (see distance guidelines below); The perimeter of the new sand and gravel wet mining pit should be

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	sand and gravel wet mining pit should be located at least 1,000 feet from all public supply wells and at least 100 feet from all private drinking water wells. The 1,000-foot distance is based on ordinances being passed by local agencies which could prohibit new sand/gravel pits from locating within a 1,000-foot radial boundary from any water well 11 serving an active public water system. See the TEXAS REFERENCE Code distance guideline for reference.	located at least 1,000 feet from all public supply wells and at least 100 feet from all private drinking water wells. The 1,000-foot distance is based on ordinances being passed by local agencies which could prohibit new sand/gravel pits from locating within a 1,000-foot radial boundary from any water well 11 serving an active public water system. See the TEXAS REFERENCE Code distance guideline for reference.
Crowning of Roads	Road surfaces, when constructed, should be crowned or out-sloped to dissipate surface runoff and minimize erosion of the roadbed.	Road surfaces, when constructed, should be crowned or out-sloped to dissipate surface runoff and minimize erosion of the roadbed.
Graveling and Compacting	Graveling and compacting of the road surface allows for a more permanent and less maintenance- required road surface. It minimizes loose sediment runoff or tracking of sediment during wet periods onto public roads or highways.	Graveling and compacting of the road surface allows for a more permanent and less maintenance- required road surface. It minimizes loose sediment runoff or tracking of sediment during wet periods onto public roads or highways.
Ditching and Culverting	Ditches (diversion, lateral and/or wing ditches) and culverts can be temporary or permanent drainage structures that, when adequately sized for a specific use, carry water flow from rainfall alongside or underneath a roadbed. Ditches and culverts should be sized based on anticipated rainfall events for the specific region of the state where it is being constructed. These structures should be installed at the time of roadway construction. Ditches should be sloped to prevent silting and to allow for maintenance (i.e., digging out sediment buildup). Ditches and culverts should be kept free of debris and obstructions in order for them to allow unrestricted passage of water	Ditches (diversion, lateral and/or wing ditches) and culverts can be temporary or permanent drainage structures that, when adequately sized for a specific use, carry water flow from rainfall alongside or underneath a roadbed. Ditches and culverts should be sized based on anticipated rainfall events for the specific region of the state where it is being constructed. These structures should be installed at the time of roadway construction. Ditches should be sloped to prevent silting and to allow for maintenance (i.e., digging out sediment buildup). Ditches and culverts should be kept free of debris and obstructions in order for them to allow unrestricted passage of water

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Land Clearing and Grubbing Activities	Experienced and trained equipment operators should be used during this stage of the mining process so that soil disturbance, compaction and displacement are only provided on those areas ready for immediate use. It is prudent construction practice to install/construct sediment holding basins before major site grading takes placeA minimum 100-foot buffer zone is required adjacent to perennial streams and water bodies in the San Jacinto River Watershed. Certain limited regulated activities will be allowed within this buffer zone and include: access roads provided they are stabilized to mitigate ordinary erosion, placement of utilities and infrastructure, placement of water pumps, placement of outfall structures, and allow for the movement of heavy equipment required to operate sand traps within the stream or river. In all cases disturbed areas shall be stabilized within (ENTER A TIME FRAME) of the uses excluded above.	Experienced and trained equipment operators should be used during this stage of the mining process so that soil disturbance, compaction and displacement are only provided on those areas ready for immediate use. It is prudent construction practice to install/construct sediment holding basins before major site grading takes place A minimum 100-foot buffer zone is required adjacent to perennial streams and water bodies in the San Jacinto River Watershed. Certain limited regulated activities will be allowed within this buffer zone. In all cases disturbed areas shall be stabilized within 30 days of the uses excluded above.
Stripping Activities	The removal of overburden material or material which is present atop the valuable sand and gravel reserves. The overburden material is typically comprised of the valuable topsoil near the immediate ground surface and then the vadose zone 14 soil (i.e., soil above the normal water table) It is a prudent practice and a recommended BMP to allow enough undisturbed buffer at property boundaries to provide sufficient lateral support of property lines.	The removal of overburden material or material which is present atop the valuable sand and gravel reserves. The overburden material is typically comprised of the valuable topsoil near the immediate ground surface and then the vadose zone 14 soil (i.e., soil above the normal water table) It is a prudent practice and a recommended BMP to allow enough undisturbed buffer at property boundaries to provide sufficient lateral support of property lines.
Dredging Activities	Dredging is performed by suction and pumping to a wash plant where the material is separated using a sizing screen	Dredging is performed by suction and pumping to a wash plant where the material is separated using a sizing screen

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	Gravel is stockpiled, conveyed or loaded into a haul truck for transport to a separate screening plant for further sizing. Sized aggregate is stockpiled onsite until its sale.	Gravel is stockpiled, conveyed or loaded into a haul truck for transport to a separate screening plant for further sizing. Sized aggregate is stockpiled onsite until its sale.
Effective use of Dikes	Wider dikes with gentler slopes can also better sustain natural vegetation which binds their soil and reduces erosion	Wider dikes with gentler slopes can also better sustain natural vegetation which binds their soil and reduces erosion <b>Planting</b> <b>them with grass and/or native</b> <b>trees and other vegetation can</b> <b>bind the soil, slow water down,</b> <b>reduce erosion and help retain</b> <b>sand within the mine boundaries.</b>
Aggregate Wash Plant Area (wet processing)	Process wastewater is any water that is used for or results from the production, clean-up, or use of any raw material, intermediate product, finished product, byproduct, or waste productRunoff from the stockpiles should be controlled by routing this water back to the open pit. Rainfall runoff from these stockpiles should also be directed to the open pit. Other BMPs should include silt fencing, berms and vegetated buffers, as needed.	Process wastewater is any water that is used for or results from the production, clean-up, or use of any raw material, intermediate product, finished product, byproduct, or waste productRunoff from the stockpiles should be controlled by routing this water back to the open pit. Rainfall runoff from these stockpiles should also be directed to the open pit. Other BMPs should include silt fencing, berms and vegetated buffers, as needed.
Aggregate Processing Plant Area (Dry processing)	Although significant amounts of sand and gravel are used for fill, bedding, subbase, and basecourse without processing, most domestic sand and gravel is processed prior to use Any water from the stockpiles should be 17 controlled by routing this water back to the open pit. Rainfall runoff from these stockpiles should also be directed to the open pit. Other BMPs should include silt fencing, berms and vegetated buffers, as needed. Overall, location of stockpiles, along with processing equipment should be placed at the highest elevation on the site practicable to	Although significant amounts of sand and gravel are used for fill, bedding, subbase, and basecourse without processing, most domestic sand and gravel is processed prior to use Any water from the stockpiles should be 17 controlled by routing this water back to the open pit. Rainfall runoff from these stockpiles should also be directed to the open pit. Other BMPs should include silt fencing, berms and vegetated buffers, as needed. Overall, location of stockpiles, along with processing equipment should be placed at the highest elevation on the site practicable to minimize if not

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	minimize if not prevent impacts from potential flooding.	prevent impacts from potential flooding.
Maintenance Area(s)	A Spill Prevention Control & Countermeasures (SPCC) Plan must be in place to implement spill prevention and response	A Spill Prevention Control & Countermeasures (SPCC) Plan must be in place to implement spill prevention and response Each facility that is located in the floodplain is also encouraged to have an Emergency Flood Operations plan. If equipment can be removed prior to the flood event that is highly recommended but trigger criteria and how the equipment can be removed must be identified before the event occurs. Also who is responsible to make the decision to remove equipment must be identified.
Petroleum Product Storage and Handling BMPs	The federal rules and regulations regarding the proper storage, handling and transfer of petroleum products are extensive. There are many types of BMPs associated with these practices. Some of the more important BMPs follow: During fuel transfer activities, signs should be posted instructing drivers to remain with their trucks at all times to prevent overfill or spillage. Fuel delivery drivers should be instructed on proper procedures, including chocking of wheels or locking brakes prior to offloading fuel, and checking that all hoses are properly disconnected prior to removing chocks or unlocking brakes for departure. In the event of an equipment failure all fuel transfer areas should have secondary containment adequate to contain the contents of the largest single compartment of any tank truck utilized in the facility or the discharged material should be directed to a containment pond through the use of berms and swales	The federal rules and regulations regarding the proper storage, handling and transfer of petroleum products are extensive. There are many types of BMPs associated with these practices. Some of the more important BMPs follow: During fuel transfer activities, signs should be posted instructing drivers to remain with their trucks at all times to prevent overfill or spillage. Fuel delivery drivers should be instructed on proper procedures, including chocking of wheels or locking brakes prior to offloading fuel, and checking that all hoses are properly disconnected prior to removing chocks or unlocking brakes for departure. In the event of an equipment failure all fuel transfer areas should have secondary containment adequate to contain the contents of the largest single compartment of any tank truck utilized in the facility or the discharged material should be directed to a containment pond through the use of berms and swales

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Oil Discharge Response and Cleanup	In the event of an oil discharge within the plant area, all manpower and equipment available should be utilized to prevent the discharge from reaching a Waters of the State waterway. The most important steps that need to be taken are stopping the discharge and controlling its impact to the environment	In the event of an oil discharge within the plant area, all manpower and equipment available should be utilized to prevent the discharge from reaching a Waters of the State waterway. The most important steps that need to be taken are stopping the discharge and controlling its impact to the environment
Performance Bond	N/A	Establish performance bonds to guarantee remediation of breaches and/or repurposing of mined areas once mining is complete. Reclamation or remediation of sand mines, and repair of breaches should be covered by performance bonds. Obtaining a permit requires a mine to file a remediation plan, but it does not force mines to remediate. Operators can simply walk away from pits, creating safety hazards, eyesores, and economic development headaches for communities
Site Stabilization	The Post Mining Phase reclamation is dependent on the agreement with the landowner. These activities may involve the stabilization of inactive mining pit or borrow areas with herbaceous perennial plants, stabilizing the soil, preventing wind or water erosion from causing on-site or off-site damage and improving the aesthetic appeal and the ability of the site to support wildlife	The Post Mining Phase reclamation is dependent on the agreement with the landowner. These activities may involve the stabilization of inactive mining pit or borrow areas with herbaceous perennial plants, stabilizing the soil, preventing wind or water erosion from causing on-site or off- site damage and improving the aesthetic appeal and the ability of the site to support wildlife
Debris & Waste Removal	Typical debris from sand and gravel mining usually involves trees and shrubs generated from the land clearing stage of the mining process. These trees and shrubs may be placed back into the mined portion of the property and covered with overburden material. This debris can also be stockpiled and burned if the local Fire Marshall and state regulatory	Typical debris from sand and gravel mining usually involves trees and shrubs generated from the land clearing stage of the mining process. These trees and shrubs may be placed back into the mined portion of the property and covered with overburden material. This debris can also be stockpiled and burned if the local Fire Marshall and state regulatory

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	authority allows and approves of this process beforehand	authority allows and approves of this process beforehand
Property Grading	After the mining activities are completed, grading of the property should be conducted. This minimizes non-point source stormwater pollution (i.e., sediment fines) from impacting potential pathways such as streams, creeks, tributaries, lakes, etc.	After the mining activities are completed, grading of the property should be conducted. This minimizes non-point source stormwater pollution (i.e., sediment fines) from impacting potential pathways such as streams, creeks, tributaries, lakes, etc.